

**ASSESSMENT AND IMPROVEMENT OF SANITATION AND HAND  
WASHING  
SUPPLY CHAIN IN BURERA, MUSANZE, NYABIHU AND RUBAVU  
DISTRICTS  
IN RWANDA**

**PART A: MAIN ASSESSMENT REPORT**

February 2015

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**ACRONYMS AND ABBREVIATIONS**

- EWSA** – Energy, Water and Sanitation Authority
- GoN** – Government of Netherlands
- GoR** – Government of Rwanda
- HCD** – Human Centered Design

**HWWS** – Hand Washing With Soap

**JMP** – Joint Monitoring Programme

**MDG** – Millennium Development Goals

**MINEDUC** – Ministry of Education

**ODF** – Open Defecation Free

**PVC** – Poly vinyl Chloride

**RSB** – Rwanda Standards Board

**UNEP** – United Nations Environment Programme

**UNICEF** – United Nations Children Fund

**USAID** – United States Aid

**VIP** – Ventilated Improved Pit Latrine

**WASAC** – Water and Sanitation Corporation

**WASH** – Water, Sanitation and Hygiene

**WHO** – World Health Organisation

## **EXECUTIVE SUMMARY**

The Government of Rwanda (GoR) is making steady progress towards MDG 7 and Vision 2020 targets for water supply and sanitation. According to the third Household Integrated Living Conditions Survey (EICV3) undertaken in 2011, 74% of households in Rwanda use an improved drinking water source and 75% of households have access to an improved sanitation facility. The Joint Monitoring Programme (JMP)-2014 update, figure for water supply coverage for 2012 is 71%; for sanitation, the

coverage rate is 64%. Differences can be explained by the fact that JMP data are based on an analysis of several surveys over time, resulting in a straight ‘line of best fit’ projection.

Focusing on rural sanitation, Rwanda has made remarkable gains since 1990, with JMP coverage estimates increasing from 30% to 64% in just over 20 years, and just 3% of the rural population practicing open defecation at national level. Despite the progress reflected in both GoR and JMP data, much remains to be done before universal access can be achieved.

UNICEF and the Government of the Netherlands (GoN) partnered in December 2008 to support the GoR in implementation of the “Acceleration of Access to Water Supply, Sanitation and Hygiene (WASH) towards Reaching Rwanda’s Millennium Development Goals” project. The project covers four districts, Burera, Musanze, Nyabihu and Rubavu, in Rwanda’s Northern and Western Provinces. The project has helped to improve access to safe drinking water and improved sanitation facilities to almost 500,000 people.

In October 2014, SNV commissioned a Consultant to undertake a research titled, “Initial Rapid Assessment on the Status of Sanitation and Hygiene in Four Districts of the Volcanic Region of Rwanda”. The key objectives of this research was:

- To undertake a quick scan of the status of sanitation and hygiene in the four districts (Burera, Musanze, Nyabihu and Rubavu)
- To identify barriers and motivators to safe sanitation and hygiene behaviours

The assignment on “Assessment and Improvement of Sanitation and Hand Washing Supply Chain in Burera, Musanze, Nyabihu and Rubavu Districts in Rwanda” is a follow-up of the initial rapid assessment study and is aimed at achieving outputs 5.1 and 6.1 of the “Acceleration of Access to Water Supply, Sanitation and Hygiene (WASH) towards Reaching Rwanda’s Millennium Development Goals” project.

This report presents the final assessment report of the assignment on “Assessment and Improvement of Sanitation and Hand Washing Supply Chain in Burera, Musanze, Nyabihu and Rubavu Districts in Rwanda”

The key questions the study aimed at answering included:

- What factors and players enable or inhibit the environment in which sanitation and private water supply service providers operate? Who are the key stakeholders and what incentives are necessary to motivate them to support the environment?
- What types of sanitation (specifically latrines and hand washing) solutions are low-income households currently utilizing, and to what degree are the sanitation solutions affordable and sustainable?
- What are the categories and characteristics of business models that currently provide sanitation services to low-income households and operation and maintenance spare parts to the private water providers in the project areas?
- To what degree is the current level of service provider activity in the sanitation and private water providers supply chain viable and sustainable, and what are the requirements of scaling up the provision of the products and services through these providers?

The design of the assessment methodology was aligned to effectively answer the research questions within the study limitations. In utilising the HCD methodology, a mixed qualitative and quantitative assessment was adopted. The quantitative component attempted to assess the status of the latrine and hand washing facilities at the households. The key focus was to compile information on the type of latrines and hand washing facilities (i.e. simple pit latrines, VIP latrines, pour flush toilets, eco-san toilets, tippy taps etc.); what type of materials are the latrines constructed, the level of utilisation, design flaws and inadequacies. This assessment was done by using semi-structured questionnaires, observation and discussions with the WASH District informants.

The qualitative part basically used personal interviews (in their various forms), focus group discussions, document review and qualitative observation. Key informant interview was also used with WASH representatives at district level as well as top level sanitation sector officials at UNICEF and WASAC.

The key findings from the household interviews on latrine and hand washing use and perceptions are:

- 93% own latrines
- 93% of the latrines do not have pit ventilation through a vent pipe
- 67% of the latrines have open hole and mud or wooden floors

- 100% of the households desire to improve the latrines construction and hand washing fabrications
- 79% of the latrines were constructed by local artisans and 75% of the latrines were constructed after the year 2010
- 27% of the households own a hand washing facility of which 23% are tippy taps

Data from the sanitation and hand washing facilities inventories of the study Districts:

- 26,170 (9%) of the households do not have latrines
- 146,012 (49%) of the households have unimproved latrines
- 79,920 (65%) of the households have improved latrines but do not have hand washing facilities

The key findings from the hand washing prototype testing are given below:

- All the respondents were familiar with the tippy tap and had either used one before or still own one.
- All the respondents desired to own an improvement to the tippy tap, with the key reasons (drawbacks of the tippy tap) being:
  - The tippy tap system, despite its simplicity, has a lot of components (support frame, water container, and foot-pedal system) and is prone to break-downs.
  - Refilling of the tippy tap is cumbersome (the water container is fixed onto the frame).
  - There are fears of security and safety of the tippy tap being left outside at night.
- Most of the respondents were happy and desired to own the portable (wall hanging) hand washing unit. The main reasons being:
  - You can carry it into the house at night, making it safe from theft or vandalism
  - The simple design (support frame and water container with a tap)
  - Refilling is convenient because you go with the water container to the point of refilling
  - You can have various water container sizes, 5, 10 and even 20 litres
  - It presents a “prestige” status compared to the tippy tap.
- Most of the respondents desired the liquid soap compared to the bar or powder soap.
- Most of the respondents would purchase any of the hand washing units being tested at a price of Rwf. 3,000.
- The portable, wall hanging hand washing units had the following problems:

- It was mostly difficult to get a suitable latrine wall to hang the unit since most of the latrine walls are constructed from mud bricks.
- Most of the tap units were leaking at the point of tap insertion.

The key findings from the baseline WASH supply side assessment are presented below:

In Kigali City;

- Out of the 21 companies interviewed, there are 8 manufacturing companies all based in Kigali City and manufacturing the following products:
  - Plastic pipes – 4 companies
  - Roofing materials – 2 companies
  - Clay products – 1 company
  - Detergents and soaps – 1 company
- 11 of the company's retail in ceramic toilets and hand basins which are all imported.
- 3 companies retail in plastic latrine products (specifically plastic latrine pans, mobile toilets and latrine cubicles). 2 of the companies are have manufacturing industries in Kigali and have other manufacturing industries in other of the East African countries.
- Only one company manufactures soaps and detergents.
- Two companies manufacture roofing products.
- Plastic, ductile iron, steel and galvanised steel pipes are all available. However, only plastic pipes are manufactured in Rwanda.
- Water treatment chemicals and point-of-use disinfectants are available from 4 of the retailers, and one is a pharmacy business.
- One company manufactures and retail clay products.

In Musanze Town;

- 22 retailing businesses (hard ware shops) were interviewed and all were located in the Musanze Central Business District.
- None of the hard ware shops retail in the plastic latrine products, however, all the 22 hardware shops retail in the ceramic toilets and ceramic hand washing basins.
- None of the hard ware shops retail in plastic water tanks, hand pumps, POU disinfectants and water treatment chemicals.

- All the hard ware shops retail in pipe fittings, and 19 in water valves and 5 in water meters.
  - 7 of the hard ware shops retail in cement and roofing products.
- 1 and 2 hard ware shops retail in concrete and clay products respectively.

In Rubavu Town;

- 12 retailing businesses (hard ware shops) were interviewed and all were located in the Rubavu Central Business District.
- One hard ware shop (SONATUBE) is a branch of the main company in Kigali City.
- None of the hard ware shops retail in the plastic latrine products, however, all the 12 hardware shops retail in the ceramic toilets and ceramic hand washing basins.
- None of the hard ware shops retail in hand pumps, POU disinfectants and water treatment chemicals.
- All the hard ware shops retail in pipe fittings, and 10 in water valves and 2 in water meters.
- 2 of the hard ware shops retail in cement and 3 in roofing products.
- Only 1 hard ware shop retail in concrete and clay products.

From the above independent data, it can be concluded that there is an opportunity to achieve the following improvements of the sanitation level of service in the Districts of Musanze, Burera, Nyabihu and Rubavu:

- 1) Construction of 26,170 new ventilation improved latrines;
- 2) Upgrading of 146,012 latrines from unimproved latrines to ventilation improved latrines;
- 3) Fabrication and installation of 352,102 hand washing units

This study has recommended various improvements to the existing latrines and hand washing facilities and seven different technologies of demonstration ventilated improved pit latrines and three hand washing units which are to be constructed and tested. Based on the feedback from the households and other stakeholders, it can be concluded that a minimum of three latrine and hand washing designs be further improved and promoted as Standard Ventilated Improved Pit Designs.

By standardising and actively promoting and marketing the latrine and hand washing designs, it is possible to create and develop a sustainable market in the whole of Rwanda.

From the findings of the WASH supply side assessment interviews, it can be concluded that:

The Rwanda WASH supply chain (manufacturers, agent importers, wholesale retailers and local retailers) is capable of meeting the WASH demand side (private water providers, local contractors and artisans and individual households). However, it is necessary to improve the procurement efficiencies by re-aligning and aggregating the supply side model. One way of achieving this would be to develop “SANIMARK SHOPS”. This will be “one-stop” shops located at the District and Sector levels, where all the key sanitation and hand washing products and services will be available.

One of the key outputs of this study is the publishing of a baseline Rwanda WASH supply chain directory. This baseline directory is presented in Part B of this report. This directory contains the following information:

- Listing of all the key WASH stakeholders (individuals and organisation),
- Listing of all the relevant WASH standards published by the Rwanda Standards Board,
- Listing (baseline) by organisation of the key WASH suppliers (manufacturers, importers and retailers) in Kigali City,
- Listing (baseline) by organisation of the key WASH suppliers in Musanze and Rubavu Towns,
- Listing (baseline) by product of the key WASH suppliers in Kigali City, Musanze and Rubavu Towns.

This study recommends that:

- a) the baseline Rwanda WASH supply chain directory published under this study be upgraded by extending the scope to cover all the Districts of Rwanda,
- b) the Rwanda WASH supply chain directory be uploaded onto a dedicated website with an interactive online database system.
- c) The Rwanda water and sanitation sector working group be tasked with a) and a) above.

## **1. STUDY BACKGROUND**

The Government of Rwanda (GoR) is making steady progress towards MDG 7 and Vision 2020 targets for water supply and sanitation. According to the third Household Integrated Living Conditions Survey (EICV3) undertaken in 2011, 74% of households in Rwanda use an improved drinking water source and 75% of households have access to an improved sanitation facility. The Joint Monitoring Programme (JMP)-2014 update, figure for water supply coverage for 2012 is 71%; for sanitation, the coverage rate is 64%. Differences can be explained by the fact that JMP data are based on an analysis of several surveys over time, resulting in a straight ‘line of best fit’ projection.

Focusing on rural sanitation, Rwanda has made remarkable gains since 1990, with JMP coverage estimates increasing from 30% to 64% in just over 20 years, and just 3% of the rural population practicing open defecation at national level.

Despite the progress reflected in both GoR and JMP data, much remains to be done before universal access can be achieved. Based on JMP estimates, over 3.8 million people in rural Rwanda still lack

access to improved sanitation. In addition, national figures hide significant regional disparities (Access to sanitation 83.3% in Kigali, 66.2% in Southern Province and 74.2% in Northern Province).

There are also growing concerns related to the quality of existing toilets and their sustained use. According to JMP 2014 update, only 10% of household in Rwanda have a hand-washing facility. In order to maximise the health dividend of improved sanitation, it will, therefore, be necessary to strengthen related hygiene practices, especially the safe disposal of child and infant faeces, and hand washing with soap or ash.

UNICEF and the Government of the Netherlands (GoN) partnered in December 2008 to support the GoR in implementation of the “Acceleration of Access to Water Supply, Sanitation and Hygiene (WASH) towards Reaching Rwanda’s Millennium Development Goals” project. The project covers four districts, Burera, Musanze, Nyabihu and Rubavu, in Rwanda’s Northern and Western Provinces. The project has helped to improve access to safe drinking water and improved sanitation facilities to almost 500,000 people. There are, however, challenge with regard to promotion of household sanitation and hygiene behaviour change. According to Sustainability Check-2013 of UNICEF/GoN-funded project, 37% of people in the supported communities were found to use soap always for washing hands after visiting the toilet while 62% were found to use soap “sometimes” after visiting the toilet. Moreover, it was found that 95% of people in the project supported communities were using latrines for defecation while 82% of household latrines were found to have no faeces visible on the floor or walls of latrine. Open defecation was found to be 3% in the targeted districts while 5% of the people go to the bush and/or dig a hole for the defecation. As a result, many people, especially infants and younger children, in these districts continue to be exposed to the risk of water related diseases.

This follow-up project is designed to complement the earlier interventions carried out under the UNICEF/GoN-funded WASH project in four districts and address the remaining gaps pertaining to sanitation, hygiene promotion and capacity building. It aims to support the four districts and their communities to improve sanitation and hygiene status in the communities which were targeted under UNICEF/GoN-funded project in the four districts i.e. Burera, Musanze, Nyabihu and Rubavu (Figure 1). In addition, the project will also support the capacity building of line agencies and key stakeholders in sustainable operation and maintenance of water and sanitation infrastructure supported under UNICEF/GoN-funded project.

The project is in line with the GoN/UNICEF-funded project proposal, National Policy and Strategy for Water Supply and Sanitation Services, EDRSP-2, UNICEF Country Programme 2013-2018 and the recommendations of Sustainability Check Report-2013 and 2013-Programme Review for UNICEF/GoN-funded WASH project. The project is being implemented under the leadership of the district governments and EWSA and in close collaboration with Ministry of Health, MINEDUC, communities, private sector and development partners working in the target areas.

In October 2014, SNV commissioned a Consultant to undertake a research titled, “Initial Rapid Assessment on the Status of Sanitation and Hygiene in Four Districts of the Volcanic Region of Rwanda”. The key objectives of this research was:

- To undertake a quick scan of the status of sanitation and hygiene in the four districts (Burera, Musanze, Nyabihu and Rubavu)
- To identify barriers and motivators to safe sanitation and hygiene behaviours

The assignment on “Assessment and Improvement of Sanitation and Hand Washing Supply Chain in Burera, Musanze, Nyabihu and Rubavu Districts in Rwanda” is a follow-up of the initial rapid assessment study and is aimed at achieving outputs 5.1 and 6.1 of the “Acceleration of Access to Water Supply, Sanitation and Hygiene (WASH) towards Reaching Rwanda’s Millennium Development Goals” project; namely;

Output 5.1: Assessment of available options for sanitation and hand-washing to improve the existing designs, based on community feedback and feasibility, and

Output 6.1: National level assessment of supply chain for water spare parts providers and sanitation and hygiene products providers (building materials, slabs, tippy taps, soap, water purification products, detergents for reducing smell in latrines)

This report presents the final assessment report of the assignment on “Assessment and Improvement of Sanitation and Hand Washing Supply Chain in Burera, Musanze, Nyabihu and Rubavu Districts in Rwanda”

## **2. BASIC DEFINITIONS**

Throughout this report, the following definitions are adopted:

- **Sanitation facility:**

“Sanitation facility” is defined narrowly any facility designed and operated solely for the disposal of human faecal waste.

- **Improved Sanitation facility**

“Improved sanitation facility” is defined by the WHO/UNICEF Joint Monitoring Program (JMP) as including the following technologies: ‘

- connection to a public sewer,
- connection to a septic system,
- pour-flush latrine,
- simple pit latrine, and,
- ventilated improved pit latrine.

- **Simple Pit Latrine**

Perhaps the most common sanitation facility is the simple pit latrine, primarily due to it being one of the most basic forms of improved sanitation. A simple pit latrine consists of:

- a pit dug into the ground
- a slab on top of the pit that often consists of logs or planks covered by compacted soil, or a concrete slab
- an opening in the slab known as a drop-hole, which may have foot pads or a seat on top (depending on user preference)
- an enclosed structure for privacy (roofs are optional), technically referred to as the superstructure

Some of the benefits of the simple pit latrine are that it is easy to construct, operate and maintain. The main disadvantages of the simple pit latrine include; odor from the pit, breeding of flies and other insects, risk of collapse due to pit collapse, and risk of children falling into the pit through the pit holes that are too large.

- **Ventilated Improved Pit Latrine**

The basic design of a VIP latrine is similar to that of the Simple Pit latrine in many ways:

- a pit dug out of the ground
- a slab on top of the pit that often consists of logs or planks covered by compacted soil, or a concrete slab
- an opening in the slab known as a drop-hole, which may have foot pads or a seat on top (depending on user preference)

The key difference between the two types of latrines consists of:

- a vertical ventilation duct placed over an additional opening in the slab that allows air to pass from the pit directly into the atmosphere above the superstructure
- a screen placed near the top of the ventilation duct to prevent flies from entering
- a fully enclosed superstructure that must have a roof

It should be understood that the key advantages of a VIP latrine over a Simple Pit latrine are that it removes foul odors and maintains low fly populations within the latrine. To fulfil these advantages, the VIP latrine must be constructed properly, maintained, and used appropriately.

- **Latrine Slab**

The floor of the latrine. It can be made from concrete, mud, wooden planks or poles

- **Hygiene behaviour**

Refers to behavioural habits of the population that increase or decrease their exposure to faecal-oral contamination.

- **Supply chain**

“*Supply chain*” is the combination of organizations, people, activities, information and resources required to create a product or service and move it from supplier to customer. Supply chain actors typically include input suppliers, producers, transporters, wholesalers, retailers, and consumers. To be sustainable, commercial supply chains require, at a minimum, a flow of revenues up the chain which allows each actor to make enough profit to justify their participation. Participants in the supply chain for sanitation services generally include: importer/wholesaler, retailer (sometimes also wholesaler and also contractor), concrete product producer, mason, and the consumer. Other stakeholders include government officials, community groups, private organisations and civil society organizations.

- **Latrine components**

refer to hardware and materials typically associated with the construction of a structure (usually small, accommodating a single person) for defecation, including pit, squat pans, toilet bowls, concrete tank rings and floor slabs, etc. Other superstructure general building materials such as PVC pipe, thatch, wood, and/or corrugated metal sheets are also often used.

### **3. TERMS OF REFERENCE**

As per the consultancy terms of reference for the assignment “Assessment and Improvement of Sanitation and Hand Washing Supply Chain in Burera, Musanze, Nyabihu and Rubavu Districts in Rwanda”, the specific tasks to be performed by the consultant was to include but not be limited to the following:

Task 1: Meet with main stakeholders of the project to have clear understanding of the scope of the works and expectations of the assignment;

Task 2: Assess the supply chain of sanitation and hygiene products including, inter-alia, building materials e.g. PVC pipe, thatch, wood, and/or corrugated metal sheets; latrine slabs and pans; concrete rings; tippy taps; soap; water purification products; detergents for reducing smell in latrines; girls hygienic pads,) available nation-wide in Rwanda;

Task 3: Assess the supply chain of water supply spare parts available nation-wide in Rwanda;

Task 4: Review/assess the available sanitation and hand washing technology options used in Rwanda and in other developing countries will similar conditions;

Task 5: Identify a set of sanitation (latrines) and hand washing technological options that are appropriate and affordable to the target area (Burera, Nyabihu, Musanze and Rubavu districts);

Task 6: Assess pros and cons of the selected technology options, based on cost/affordability, suitability to local geographical conditions, cultural acceptability, durability, use of skilled labour, operation and maintenance, through site testing and feedback from the targeted population;

Task 7: Suggest recommendations for improvement of selected sanitation and hand washing options based on observations and feedback from key national WASH stakeholders; and prepare basic drawings and cost estimates for the most feasible improved options;

Task 8: Prepare the draft report in English based on the above;

Task 9: Facilitate a national-level stakeholders meeting to gather inputs on the draft report; and

Task 10: Produce a final assessment report integrating inputs of key WASH stakeholders.

The consultancy will require estimate duration of 30 working days.

The Inception report was submitted with the following objectives:

- 1) Conduct an in-depth literature review of similar studies in Rwanda and other countries;
- 2) Conduct consultations with the key stakeholders to understand their expectations;
- 3) Conduct preliminary field visit to meet the District officials related to the project and present the proposed fieldwork methodology and get the feedback on the appropriateness and feasibility;
- 4) Conduct preliminary field visit of the private water providers and establish the scope of the operation and maintenance spare parts needs;
- 5) Based on 1) to 4) above, review the project terms of reference to meet the stakeholders expectations whilst taking into considerations the actual situation in the field and data availability;
- 6) Establish a detailed data collection and survey methodology based on the project limitations

- 7) Review the initial work plan and prepare a firm project work plan to achieve the project objectives within the budget and time constraints.

The original terms of reference were reviewed and re-aligned as follows:

*Task 1: Meet with main stakeholders of the project to have clear understanding of the scope of the works and expectations of the assignment;*

This task remained unchanged.

*Task 2: Assess the supply chain of sanitation and hygiene products including, inter-alia, building materials e.g. PVC pipe, thatch, wood, and/or corrugated metal sheets; latrine slabs and pans; concrete rings; tippy taps; soap; water purification products; detergents for reducing smell in latrines; girls hygienic pads,) available nation-wide in Rwanda;*

The task scope is for the whole of Rwanda whilst it should be limited to the 4 Districts. Since the supply chain is exclusively for the construction and operation products for the latrines and hand washing facilities), it is proposed that the girls' hygiene pads be excluded.

The revised task should read as follows;

*Assess the supply chain of sanitation and hygiene products (for the latrines and hand washing types presently in use in the Districts of Rubavu, Burera, Musanze and Nyabihu) including, inter-alia, building materials e.g. PVC pipe, thatch, wood, and/or corrugated metal sheets; latrine slabs and pans; concrete rings; tippy taps; soap; water purification products; detergents for reducing smell in latrines;) available nation-wide in Rwanda;*

*Task 3: Assess the supply chain of water supply spare parts available nation-wide in Rwanda;*

The spare parts requirements should be limited to the needs of the private water providers operating in the 4 Districts. However, from the visit of the water plant and interviews with the three private water providers, namely, AQUA –VIRUNGA, REDEC and AGEOH, it was established that the operation and maintenance spare part needs will be for a conventional water treatment and distribution system.

The revised task should read as follows;

*Assess the supply chain of water supply (operation and maintenance) spare parts (for the private water providers in the Districts of Rubavu, Burera, Musanze and Nyabihu) available nation-wide in Rwanda;*

*Task 4: Review/assess the available sanitation and hand washing technology options used in Rwanda and in other developing countries will similar conditions;*

This task remained unchanged.

*Task 5: Identify a set of sanitation (latrines) and hand washing technological options that are appropriate and affordable to the target area (Burera, Nyabihu, Musanze and Rubavu districts);*

This task remained unchanged.

*Task 6: Assess pros and cons of the selected technology options, based on cost/affordability, suitability to local geographical conditions, cultural acceptability, durability, use of skilled labour, operation and maintenance, through site testing and feedback from the targeted population;*

From the stakeholder consultations, only the selected hand washing technology will undergo prototype testing, whilst the latrine technology will be selected based on the usage in the 4 Districts.

The revised task should read as follows;

*Assess pros and cons of the selected technology options (in use in the Districts of Rubavu, Burera, Musanze and Nyabihu), based on cost/affordability, suitability to local geographical conditions, cultural acceptability, durability, use of skilled labour, operation and maintenance, and through site testing and feedback from the targeted population testing (of the hand washing technology);*

*Task 7: Suggest recommendations for improvement of selected sanitation and hand washing options based on observations and feedback from key national WASH stakeholders; and prepare basic drawings and cost estimates for the most feasible improved options;*

This task remained unchanged.

*Task 8: Prepare the draft report in English based on the above;*

This task remained unchanged.

*Task 9: Facilitate a national-level stakeholders meeting to gather inputs on the draft report; and*

This task remained unchanged.

*Task 10: Produce a final assessment report integrating inputs of key WASH stakeholders.*

This task remained unchanged.

#### **4. RESEARCH OBJECTIVES AND QUESTIONS**

One of the key specific objectives of the UNICEF/GoR WASH project is to:

- (i) Improved hygiene practices in the target communities (500,000 people or 100,000 households) of four districts - resulting in increase of hand washing with soap from 37% (current baseline) to 57%;
- (ii) Improved access to sanitation and hand washing facility in the target communities of four districts improved access to sanitation in the target communities (500,00 people or 100,000 households) of four districts – resulting in increase in coverage of household latrines from 93.4 to 100% and hand washing facility from 47 to 70%; and
- (iii) Contribution made to improved sustainability, management and functionality of WASH services in four districts – resulting in increase in number of private service operators who are regularly assessed by the district governments/EWSA as per agreed assessment framework from 0 to 10.

This assignment on “Assessment and Improvement of Sanitation and Hand Washing Supply Chain in Burera, Musanze, Nyabihu and Rubavu Districts in Rwanda” is aimed at achieving outputs 5.1 and 6.1 of the “Acceleration of Access to Water Supply, Sanitation and Hygiene (WASH) towards Reaching Rwanda’s Millennium Development Goals” project; namely;

- Output 5.1: Assessment of available options for sanitation and hand-washing to improve the existing designs, based on community feedback and feasibility, and
- Output 6.1: National level assessment of supply chain for water spare parts providers and sanitation and hygiene products providers (building materials, slabs, tippy taps, soap, water purification products, and detergents for reducing smell in latrines).

The key questions the study aimed at answering included:

- What factors and players enable or inhibit the environment in which sanitation and private water supply service providers operate? Who are the key stakeholders and what incentives are necessary to motivate them to support the environment?

- What types of sanitation (specifically latrines and hand washing) solutions are low-income households currently utilizing, and to what degree are the sanitation solutions affordable and sustainable?
- What are the categories and characteristics of business models that currently provide sanitation services to low-income households and operation and maintenance spare parts to the private water providers in the project areas?
- To what degree is the current level of service provider activity in the sanitation and private water providers supply chain viable and sustainable, and what are the requirements of scaling up the provision of the products and services through these providers?

## **5. METHODOLOGY**

### **5.1. Introduction**

In order to develop a clear understanding of the current utilization of sanitation and hand washing products and services and private water providers supply chain in the project area, the study utilized a modified version of the Human Centred Design (HCD) methodology. HCD is a process and a set of techniques used to create new solutions, including products, services, business models and modes of interaction.

The process generates a range of solutions which are then analysed under the following key questions:

- Desirability: What do people desire?
- Feasibility: What is technically and organizationally feasible?
- Viability: What can be financially viable?

Through a process of preliminary literature review, field assessments, and supply chain analyses, the study generated a high-level foundational overview, gap analysis, capacity assessment, and recommendations to optimise market development opportunities and develop new business models to scale up sanitation and private water provider products and services in the project area.

Non-probability, purposive sampling was used in the selection of the population used in the study. The sample of the study covered a total of 140 households, 3 private water operators and 55 sanitation and water supply chain actors, including; private water providers, hard ware retailers, importers, manufacturer agents and manufacturing companies in Kigali and the study Districts.

Data collection methods used were:

- Literature review
- Face to face interviews using semi-structured questionnaires
- Non-structured interviews
- Observation
- Phone interviews

## **5.2. Design of the Assessment**

The design of the assessment methodology was aligned to effectively answer the research questions within the study limitations. In utilising the HCD methodology, a mixed qualitative and quantitative assessment was adopted.

The quantitative component attempted to assess the status of the latrine and hand washing facilities at the households. The key focus was to compile information on the type of latrines and hand washing facilities (i.e. simple pit latrines, VIP latrines, pour flush toilets, eco-san toilets, tippy taps etc.); what type of materials are the latrines constructed, the level of utilisation, design flaws and inadequacies. This assessment was done by using semi-structured questionnaires, observation and discussions with the WASH District informants.

The qualitative part basically used personal interviews (in their various forms), focus group discussions, document review and qualitative observation. Key informant interview was also used with WASH representatives at district level as well as top level sanitation sector officials at UNICEF and WASAC.

From the terms of reference, this study's key objective is to a rapid assessment of the household sanitation technology (latrines and hand washing) available, the supply chain actors and business models available for providing goods and services for construction and operation of the technologies and for the private water providers in the rural areas of the Districts of Rubavu, Musanze, Burera and Nyabihu.

The study is not meant to focus on gathering extensive qualitative information on the household needs, beliefs or practices related to sanitation. However, a limited number of qualitative, contextual questions that interface with sanitation supply chain was included. These questions helped to gauge the extent of the household interaction with the sanitation service providers and to understand the benefits and challenges the households face in accessing the sanitation solutions. Specific questions for the

households covered such areas as current household sanitation technology, access to construction and operation materials and services, and willingness/ability to pay for the sanitation products and services. These qualitative household question served as supplemental to the supply chain interviews.

Data was collected using the following methods; i) stakeholder consultations, ii) unstructured interviews with the WASH officials and village heads, iii) semi-structured interviews with households, iv) semi-structured interviews with private water providers and sanitation products and services actors, and vi) spot-check observations of latrines and hand-washing facilities.

The following table presents the data collection methodology to be used.

Methodology	Main Activities	Interviewees/Respondent Profile
Stakeholder Consultations	Meetings with key Project and WASH stakeholders	<ul style="list-style-type: none"> <li>UNICEF</li> <li>WASAC</li> <li>WASH District Officials</li> </ul>
Quantitative Data Collection	Conducting surveys with sanitation and water supply chain actors in the 4 Districts and Kigali City	<ul style="list-style-type: none"> <li>Manufacturers</li> <li>Agents, importers, wholesalers and artisans</li> </ul>
Qualitative Data Collection	Conducting Surveys with selected households in the 4 Districts	<ul style="list-style-type: none"> <li>Household heads in the 4 Districts</li> </ul>
Spot-check Observations	Conduct spot-check observations of the existing latrines & hand washing facilities in selected households, schools and public places in the 4 Districts	<ul style="list-style-type: none"> <li>Households</li> <li>Schools</li> <li>Public places</li> </ul>

### 5.3. Population, Sample & Sampling Method

Based on the initial field assessment, review of secondary data and similar studies and in consultation with the District WASH teams the following was the survey sample selection criteria:

DISTRICT	No of Sectors	Population	Sample Criteria (10%)
Musanze	15	368,563	2
Rubavu	12	404,278	2
Nyabihu	12	295,580	1
Burera	17	336,455	1
<b>TOTAL</b>	<b>56</b>		<b>6</b>

(Source: Rwanda National Census, 2012)

The following table enumerates the number of interviews conducted for under similar studies;

Assessment/Study	No of Interviews (household plus supply chain actors)
Analysis of the Sanitation Supply Chain in Rural and Small Towns in Uganda – 2012. (PATH 2012)	45
Supply Chain Analysis for Rural Sanitation Products and Services in Lao PDR. (WSP 2014)	200
Enabling Technologies for Hand washing with Soap: Case Study on the Tippy Tap in Uganda. (WSP 2011)	78
Formative and Baseline Survey on Hand Washing with Soap. (WSP 2007)	515
Sanitation Supply/Value Chain Assessment for Amhara Region, Ethiopia. (SNV 2012)	79

From the above, the proposed survey sample selection is designed as below:

Methodology	Sample Interviewees/Respondents			
	Stakeholders	Private Water Providers	Households	Supply Chain Actors
Stakeholder Consultations	UNICEF, WASAC, District WASH officials			
Quantitative Data Collection		Aqua-Virunga, AGEOH and REDEC		Key WASH products manufacturers in Kigali; Key Importers & Agents; wholesalers and 10 retailers in Kigali; All major hardware shops in the main town of the 4 Districts
Qualitative Data Collection			Minimum of 30 households per District (180 total)	
Spot-check Observations			Dependent on the field opportunities	

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#### 5.4. Desk Review

The initial phase of the study involved a preliminary review of current information on sanitation provision and the sanitation value chain in Rwanda from available resources to extract specific intelligence related to the sanitation market. The study began by pulling demographic, economic, and sanitation-related data from various data sets including, WSP, SNV and UNICEF past and similar studies, World Development Indicators, World Bank Country Indicators, Rwanda Demographic and Health Survey, and Rwanda Bureau of Statistics and census reports.

Furthermore, the desk review involved a study of multiple documents and reports specific to sanitation activities, research, and policy in Rwanda and the region and other developing countries provided directly from WSP or sourced through government of Rwanda, development agency websites and publications, and sanitation-focused consortium websites on the internet.

A desk segmentation exercise was also conducted based upon analysis of secondary demographic and geographic data collected in order to identify characteristics of the consumer market for and provide a rough estimate of the market opportunity for household sanitation solutions among low-income households in developing countries.

The study made attempts, whenever possible, to obtain all possible resources to inform the study. However, our search was neither systematic nor comprehensive. Therefore, certain key publications or data sources were inevitably missed that might have contributed further to the analysis.

## **6. STUDY LIMITATIONS**

This study had a number of limitations that should be borne in mind when interpreting the results:

- 1) In Nyabihu District, the household interview was conducted in Kagagga village which is an ODF village under the GoR/UNICEF project. The households in this village have had ongoing interventions from the project implementers and it is likely that their answers were influenced from previous similar interviews.
- 2) In Nyabihu and Musanze, the hand washing prototype testing was conducted in the ODF villages and in the presence of either the Village heads or the WASH officers. These factors could have resulted in respondent bias.
- 3) The interviews of the private water operators was conducted in the presence of the respective District WASH officers and it was noted that there were attempts by the private water operators to be perceived to be operating an efficient spare parts management system, yet it was observed that this was not the case.
- 4) In the interviews of the hardware retailers and manufacturers, there was a perceived fear that the interviewers were undercover agents from RRA trying to check on tax issues resulting in strong resistance from some a number of potential respondents.

## 7. STUDY AREA BACKGROUND

### 7.1. Study Area in Relation to the WASH Project



Figure 1. Location of the target districts

The location of the study area are the Districts of Nyabihu and Rubavu in the Western Province of Rwanda and Musanze and Burera Districts in the Northern Province of Rwanda. The study area is shown in figure 1.

UNICEF and the Government of the Netherlands (GoN) partnered in December 2008 to support the GoR in implementation of the “Acceleration of Access to Water Supply, Sanitation and Hygiene (WASH) towards Reaching Rwanda’s Millennium Development Goals” project. The project covers four districts, Burera, Musanze, Nyabihu and Rubavu, in Rwanda’s Northern and Western Provinces.

The project has helped to improve access to safe drinking water and improved sanitation facilities to almost 500,000 people. There are, however, challenge with regard to promotion of household sanitation and hygiene behaviour change. According to Sustainability Check-2013 of UNICEF/GoN-funded project, 37% of people in the supported communities were found to use soap always for washing hands after visiting the toilet while 62% were found to use soap “sometimes” after visiting the toilet. Moreover, it was found that 95% of people in the project supported communities were using latrines for defecation while 82% of household latrines were found to have no faeces visible on the floor or walls of latrine. Open defecation was found to be 3% in the targeted districts while 5% of the people go to the bush and/or dig a hole for the defecation. As a result, many people, especially infants and younger children, in these districts continue to be exposed to the risk of water related diseases.

## **7.2. Rapid Assessment Study**

In October 2014, SNV commissioned a Consultant to undertake a research titled, “Initial Rapid Assessment on the Status of Sanitation and Hygiene in Four Districts of the Volcanic Region of Rwanda”. The key objectives of this research was:

- To undertake a quick scan of the status of sanitation and hygiene in the four districts (Burera, Musanze, Nyabihu and Rubavu)
- To identify barriers and motivators to safe sanitation and hygiene behaviours

The key findings from the initial rapid study that are relevant to our study are:

- **Key barriers to improved latrines and Hygiene**
- ✓ **Financial constraints:** The barriers that rural households face are linked to financial capacity and cultural and attitudinal variations. Most households near volcanoes have difficulties digging the soil because of very hard volcanic rocks. Digging a pit latrine in the volcanic area is very expensive since for one household to get a one meter deep pit, at least 50,000 Rwanda francs are needed to pay people capable of breaking volcanic rocks. Some people say that the toilet there might be even more expensive than a house. People report that for a household to have an improved latrine it needs between 320,000 Rwanda francs and 400,000 Rwanda francs. There are also people who take advantages of caves and use them as pits. These are sometimes far from the households.

- ✓ **Lack of toilet emptying facilities and faeces treatment mechanisms:** Most toilets there are between one meter and two meters deep. There are even people who are forced to build toilets upward as tank-like structures because they cannot dig. So toilets quickly get full. People are required to dig other pits and end up having compounds full of pits which might even cause other problems. Emptying facilities and faeces treatment mechanisms are not promoted in the region.
- ✓ **Cultural beliefs and attitudes:** Apart from barriers that are linked to financial constraints, there are also barriers that are linked to cultural beliefs and related attitudes. Children faeces are not considered harmful. People, especially women do not mind when children defecate or urinate on them. They do not even think of washing themselves quickly because they think it is normal and healthy. In some households children faeces are scattered everywhere in the compound.
- **Key motivators and measures for proper sanitation**
- ✓ **Poor understanding of the rationale and use of hand washing facilities:** Most households in urban and sub-urban areas are generally clean and have hand washing facilities. However, they do not demonstrate proper understanding of why and how they are supposed to be used. Those with taps turn on water with wet dirty hands, leave some dirt on the tap and then wash their hands. After washing their hands, they again get dirty when turning the tap off due to the dirt they put on the tap while turning it on. They do not even remember to wash the tap before turning the water off. Those with open containers like basins and buckets wash their hands in while letting dirty water in the bucket or basin. So they again put dirt on their hands.
- ✓ **Unclear messages from leaders:** In many rural areas, hand washing has been misinterpreted. Instead of perceiving hand washing facilities as instruments to help them get clean and avoid certain diseases, people saw these as a requirement by leaders. There are places where tippy taps are considered as the property of Executive Secretaries of sectors.
- ✓ **Witchcraft and poisoning:** Witchcraft and poisoning have been a barrier to the regular and proper use of tippy taps. The belief in witchcraft and poisoning is very rampant in the volcanic region and influences people's practices.

The findings from this initial rapid assessment study will be incorporated in the findings from the household assessments.

### 7.3. Private Water Providers

#### 7.3.1. Introduction

There are three private companies who have been contracted by WASAC to provide water supply services in the rural areas of the Districts of Rubavu, Musanze, Nyabihu and Burera. The companies are: AQUA-VIRUNGA, REDEC and AGEOH.

AQUAVIRUNGA Ltd, was established on 10 February 2007 in Kigali, is a Rwandan company that provides drinking water and sanitation services at national and international level. Its administrative head office is established at Mizingo, Kanzenze Sector, Rubavu District, in the Western Province. AQUAVIRUNGA Ltd has two shareholders, namely AQUARWANDA Ltd (Rwanda) and NV PWN Water Supply Company in Northern Holland (The Netherlands) with respectively 49% and 51% of shares. AQUAVIRUNGA presently operates two Public-Private-Partnership Contracts in Rwanda:

Contract	PPP Partner	Duration	Start	End
Design, Rehabilitate, Finance and Operate (DRFO) of the Yungw-Bikore and Mizingo-Mutura drinking water supply systems	Rubavu District	15 years	2009	2024
Delegated Mgt. of Mutera drinking water supply system	Musanze and Nyabihu Inter-district Association	14 years	2010	2024

Below are some photos of the water supply system which Aqua-Virunga is managing:



**THE TREATED WATER STORAGE RESERVOIR AT THE RUBAVU WATER TREATMENT PLANT**



**THE WORKSHOP AND STORE AT THE RUBAVU WATER TREATMENT PLANT**



**PART OF THE TREATMENT SYSTEM AT THE RUBAVU WATER TREATMENT PLANT**



**THE NEW WATER INTAKE FOR THE RUBAVU WATER TREATMENT PLANT**



**INSIDE THE STORE AT THE RUBAVU WATER TREATMENT PLANT**

## 8. STUDY FINDINGS

### 8.1. Products & Services

#### 8.1.1. Latrines

##### 8.1.1.1. Introduction

The findings from the initial rapid assessment of the study area (SNV 2014) indicate that the predominant form of sanitation is the “improved sanitation facilities” with the key types of latrines used being the simple pit latrine and the improved pit latrine.

The sanitation coverage of the study area as given by the inventories of the four Districts of Burera, Nyabihu, Musanze and Rubavu are presented in table 8.2. The data is sourced from the respective District WASH social mobilisers.

**TABLE 8.2: SANITATION AND HAND WASHING INVENTORIES OF THE 4 DISTRICTS**

DISTRICT	No of CELLS	No. of VILLAGES	No of HHs	HHs with LATRINES	HHS without LATRINES		HHs with UNIMPROVED LATRINES		HHs with IMPROVED LATRINES		HHs with IMPROVED LATRINES and NO HAND WASHING	
<b>BURERA</b>	69	571	73,843	68,622	4,352	6	49,521	67	19,970	27	11,903	60
<b>RUBAVU</b>	80	525	80,771	71,368	9,403	12	22,004	27	49,364	61	33,598	68
<b>MUSANZE</b>	0	0	80,782	71,269	9,513	12	40,877	51	30,392	38	16,112	53
<b>NYABIHU</b>	0	0	59,674	56,772	2,902	5	33,610	56	23,162	39	18,307	79
			<b>295,070</b>	<b>268,031</b>	<b>26,170</b>	<b>9</b>	<b>146,012</b>	<b>49</b>	<b>122,888</b>	<b>42</b>	<b>79,920</b>	<b>65</b>

(Note: HHs = Households)

There is a national guidelines for the design, construction and maintenance of latrines in Rwanda – “Guidelines for usable latrines,” prepared by the Ministry of Infrastructure.

This study aims at assessing the existing latrine usage in the study area, and using the national guidelines as the design baseline, recommend appropriate improvements of the latrines taking into consideration the households needs and abilities.

##### 8.1.1.2. Household Assessment Findings

The household assessments was conducted using semi-structure questionnaires (see the sample questionnaires in appendix B) in randomly selected villages of all the four Districts. The key findings on latrines are presented in table 8.4.

The following photos illustrate the types and state of the latrines observed during the assessment:



**SIMPLE PIT LATRINE WITH WOODEN PLANKS FLOOR (Note opening between the joints)**



**SIMPLE PIT LATRINE WITH WOODEN POLES FLOOR (Note opening between the joints)**



**SIMPLE PIT LATRINE WITH CONCRETE FLOOR (Note bad slope design leading to urine accumulation)**



**SIMPLE PIT LATRINE WITH MUD BRICK WALL AND CORRUGATED IRON SHEET ROOFING**



**SIMPLE PIT LATRINE WITH WOODEN WALLS AND CORRUGATED IRON SHEET ROOFING**



**SIMPLE PIT LATRINE WITH BURNT BRICK (and cement mortar plaster) AND CORRUGATED IRON SHEET ROOFING**

<b>TABLE 8.4: KEY FINDINGS FROM THE HOUSEHOLD ASSESSMENT INTERVIEWS ON LATRINE</b>	
<b>Assessment Question</b>	<b>Results/Findings</b>
<b>GENERAL</b>	
Interview Dates	11th, 13th and 19th December 2014 and 17th Jan 2015 in Nyabihu, Musanze, Rubavu and Burera Districts respectively
Location of Interviews	Musanze District (Cyuve Sector, Migeshi Cell, Kiviriza Village); Nyabihu District (Jenda Sector, Kabatezi Cell, Kagagga Village) and Rubavu District ( Nyundo & Nyakiiba Sectors, Nyund & Bisizi Cells and Runandi & Runaba Villages) and Moma village (Gacundura cell) in Burera District.
No of Interviews conducted	40 interviews in Musanze, 40 in Rubavu,40 in Burera and 30 in Nyabihu (150 in total)
<b>SOCIO-ECONOMICS</b>	
Ownership of land onto which the household home is constructed	89% own the land onto which the household house is constructed
Type of construction of house	71% and 29% of the houses are constructed of mud and brick walls respectively; 73% and 27% are mud and concrete floors respectively, and 47% and 54% tile and corrugated iron sheet roofs respectively
<b>WATER SUPPLY</b>	
Main source of water supply to household	61% of the households buy water from vendors during the dry and wet seasons
Method of drinking water treatment	41% always treat their drinking water, 9% sometimes and 50% never treat their drinking water. 36% treat their drinking water by boiling and 0% treat their water using point of use chemicals
Method of water storage	100% store their drinking water in plastic jerry cans
<b>LATRINE USE &amp; PERCEPTION</b>	
Ownership of latrine	93% own latrines
Type of latrine	93% of the latrines do not have pit ventilation through a vent pipe
Latrine construction materials	91%, 7% and 4% of the latrine sub-structure (pit) are unlined, concrete ring and brick lines respectively; 21%, 47% and 25% have open hole and mud, wood and concrete floors respectively and 6% have plastic slabs on wood and concrete floors; 56%, 17% and 2% of the walls are made from mud, brick and grass; and 40% and 25% of the roofs are made of corrugated iron sheets and tiles respectively.
Method of cleaning after toilet use	34% use water to wipe after toilet use, 21% use used papers and 35% use leaves
Desire for latrine improvements and ability to pay	100% have the desire to improve the latrine construction

Source of funding for latrine construction	91% paid for their latrine construction
Date of latrine construction	75% of the latrines were constructed after year 2010
Who constructed your latrine	79% of the latrines were constructed by local artisans

**TABLE 8.5: KEY FINDINGS FROM THE HOUSEHOLD ASSESSMENT INTERVIEWS ON HAND WASHING**

Assessment Question	Results/Findings
<b>GENERAL</b>	
Interview Dates	11th, 13th and 19th December 2014 and 17th Jan 2015 in Nyabihu, Musanze, Rubavu and Burera Districts respectively
Location of Interviews	Musanze District (Cyuve Sector, Migeshi Cell, Kiviriza Village); Nyabihu District (Jenda Sector, Kabatezi Cell, Kagagga Village) and Rubavu District ( Nyundo & Nyakiiba Sectors, Nyund & Bisizi Cells and Runandi & Runaba Villages) and Moma village (Gacundura cell) in Burera District.
No of Interviews conducted	40 interviews in Musanze, 40 in Rubavu, 40 in Burera and 30 in Nyabihu (150 in total)
<b>SOCIO-ECONOMICS</b>	
Ownership of land onto which the household home is constructed	89% own the land onto which the household house is constructed
Type of construction of house	71% and 29% of the houses are constructed of mud and brick walls respectively; 73% and 27% are mud and concrete floors respectively, and 47% and 54% tile and corrugated iron sheet roofs respectively
<b>WATER SUPPLY</b>	
Main source of water supply to household	61% of the households buy water from vendors during the dry and wet seasons
Method of drinking water treatment	41% always treat their drinking water, 9% sometimes and 50% never treat their drinking water. 36% treat their drinking water by boiling and 0% treat their water using point of use chemicals
Method of water storage	100% store their drinking water in plastic jerry cans
<b>HAND WASHING &amp; PERCEPTION</b>	
Ownership of hand washing unit	27% of the households own a hand washing unit and the rest do not have a hand washing unit
Type of hand washing unit	23% of the households own a tippy tap
Hand washing soap usage and preference	28% use soap when hand washing
Date of hand washing unit fabrication	31% use bar soap and nobody uses liquid or powder soap; 26% would prefer liquid soap

Cost of hand washing unit fabrication	100% indicated that they spent between Rwf. 1,000-3,000 to fabricate the hand washing unit
Hand washing unit installer/fabricator	24% indicated that they used local artisan to fabricate the hand washing unit for them
Desire for hand washing unit improvement & ability to pay	100% expressed the desire to on/improve the hand washing unit, however, only 1% have the ability to save between 400- 500 per month for procurement of the hand washing unit

**FIG 8.5: HAND WASHING UNITS FABRICATED BY KIGALI ARTISANS USED IN COMMERCIAL ESTABLISHMENTS AND PUBLIC PLACES**

			
<p>50 LITRES PLASTIC TANK WITH FOOT PEDESTAL (RWF. 30,000)</p>	<p>20 LITRES PLASTIC TANK WITHOUT FOOT PEDESTAL (RWF. 15,000)</p>	<p>20 LITRES ALUMINIUM TANK WITH FOOT PEDESTAL (RWF. 20,000)</p>	<p>50 LITRES PLASTIC TANK WITHOUT FOOT PEDESTAL (RWF. 25,000)</p>

## **8.1.2.Hand washing**

### **8.1.2.1.Introduction**

Hand washing with soap has been shown to reduce risk of leading causes of child mortality. Pneumonia accounts for 17% of the 6.6 million deaths of children under 5 years of age and diarrhoea accounts for 9%. Over 750,000 deaths during the neonatal period (babies under 28 days old) are estimated to occur annually because of infectious syndromes such as sepsis, acute respiratory infection, neonatal tetanus, and diarrhoea; many of these can be prevented by hand washing with soap. Research studies have demonstrated that the risk of diarrhoea can be reduced by 42 to 47% through hand washing interventions. Promotion of HWWS has been shown to reduce the risk of acute respiratory infection by half in children < 5 years old. One study found that neonatal mortality was significantly lower among children of mothers who reported washing their hands. Hand washing promotion campaigns are increasingly being implemented as part of an effort to improve child survival. [UNICEF 2013].

### **8.1.2.2.Household Assessment Findings-Hand Washing**

During the household assessment, a section of the questionnaire (see appendix B), was dedicated to establish the hand washing status. The household assessment schedule is given in table 8.3 of section 8.2.1.2

The key questions the questionnaire sought to determine were:

- Do the households own any hand washing units?
- What type of hand washing units are the households using?
- What problems (if any) are they experiencing in using the hand washing units?
- What is the household's ability to buy (if they do not have) or improve the hand washing units?

The key findings on the hand washing use and perception are presented in table 8.5

The Kinyarwanda name of the tippy tap is “Kandagira Ukarabe”.

The hand washing stations fabricated in Kigali and normally used in commercial establishments and some public institutions are shown in figure 8.5.

### **8.1.2.3.Hand washing prototype testing**

The findings from the household assessments indicate that the predominant hand washing device in households without running tap water is the tippy tap. However, it was observed that most of the tippy taps were not functional to the following two main problems:

- There was no water in the tippy tap
- The tippy tap foot pedestal system was not working (either the string was cut, or the foot pedal was missing)
- The support system was not working

The following photos illustrate the above mentioned concerns:



**TIPPY TAP WITHOUT WATER AND NON-FUNCTIONAL FOOT-PEDESTAL SYSTEM**



**TIPPY TAP WITH RUDIMENTARY SUPPORT FRAME AND NON-FUNCTIONAL FOOT-PEDESTAL SYSTEM**



**TIPPY TAP WITH NON-FUNCTIONAL FOOT-PEDESTAL SYSTEM**



**TIPPY TAP WITH NON-FUNCTIONAL FOOT-PEDESTAL SYSTEM (Note weak support frame)**

This study intends to increase the availability of the tippy tap by improving the functional design of the existing tippy tap design. This exercise will be conducted by using the consumer-driven approach in the following steps:

- Observe and assess the available tippy tap design through a household assessment
- Establish the key functional design problems
- Suggest alternative improvements to the existing design through prototypes
- Test the prototypes
- Observe and assess the prototypes
- Refine the prototypes and re-test
- Finalise and market the most acceptable and best functional prototype(s)

Table below presents the activities of the tippy tap improvement program:

STAGE	DESIRED ACTIVITY	ACTUAL STUDY ACTIVITY
<b>MARKET ANALYSIS</b>	Conduct desk research and rapid consumer assessment to gain an understanding of the current market trends and drivers	<ul style="list-style-type: none"> <li>• Initial rapid assessment study (<i>SNV, 2014</i>).</li> <li>• Assessment findings (<i>Chapter 8</i>).</li> </ul>

<b>PRODUCT DESIGN</b>	Evaluate existing offerings and develop early product prototypes for initial testing and market analysis	<ul style="list-style-type: none"> <li>Design of hand washing prototype designs &amp; prototype testing</li> </ul>
<b>PRODUCT TESTING</b>	Test and refine product prototypes based on consumer input; continue consumer research to better understand and segment the market	<ul style="list-style-type: none"> <li>Findings from prototype testing and refinement for re-testing together with the demonstration Latrines</li> </ul>
<b>GO-TO- MARKET</b>	Finalize design concepts; finalize design for production; create targeted production and distribution plans	<ul style="list-style-type: none"> <li>Feedback from the demonstration latrines to be incorporated for final product design</li> </ul>

Appendix C presents the alternative hand washing prototype designs and the households where the testing was done.

Feedback was conducted from the households to establish the acceptability and main areas of problems which require refinement. A non-structured interview was used to conduct the feedback, however the questions were based on the following criteria:

- Affordability and ability to buy
- Design simplicity and ease of use, (water release system and water refilling)
- Availability of fabrication materials locally
- Security and safety (ease of transferring the unit into the house at night)

The key findings from the hand washing prototype testing are given below:

- All the respondents were familiar with the tippy tap and had either used one before or still own one.
- All the respondents desired to own an improvement to the tippy tap, with the key reasons (drawbacks of the tippy tap) being:
  - The tippy tap system, despite its simplicity, has a lot of components (support frame, water container, and foot-pedal system) and is prone to break-downs.
  - Refilling of the tippy tap is cumbersome (the water container is fixed onto the frame).
  - There are fears of security and safety of the tippy tap being left outside at night.
- Most of the respondents were happy and desired to own the portable (wall hanging) hand washing unit. The main reasons being:
  - You can carry it into the house at night, making it safe from theft or vandalism
  - The simple design (support frame and water container with a tap)
  - Refilling is convenient because you go with the water container to the point of refilling

- You can have various water container sizes, 5, 10 and even 20 litres
- It presents a “prestige” status compared to the tippy tap.
- Most of the respondents desired the liquid soap compared to the bar or powder soap.
- Most of the respondents would purchase any of the hand washing units being tested at a price of Rwf. 3,000.
- The portable, wall hanging hand washing units had the following problems:
  - It was mostly difficult to get a suitable latrine wall to hang the unit since most of the latrine walls are constructed from mud bricks.
  - Most of the tap units were leaking at the point of tap insertion.

From the hand washing prototype testing feedback, the prototypes will be further improved and will be further tested together with the demonstration latrines.

### **8.1.3.WASH Supply Side Assessment**

#### **8.1.3.1.Manufacturers and Retailers Assessment Findings**

The assessment of the WASH supply side (manufacturers, importers and retailers) was conducted using semi-structured questionnaires (sample is presented in appendix B). The questionnaire was designed within the following key questions:

- What is the business legal and ownership status (business name, ownership, location);
- Who is the contact person for day-to-day marketing and operations;
- What type of business structure and operations (manufacturer, authorised agent, importer, wholesale retailer, local retailer);
- What types of WASH products does the business market (toilet products, hygiene products, water supply products, construction products);

It is important to appreciate that the scope of interviews in Kigali City at the retail marketing level was only baseline and should not be read to be representative of the whole city. However, the findings will provide a good baseline and starting point for further in-depth assessment studies.

It should also be borne in mind that, the interviews were targeted at the hard ware retail shops only and not the general retailing shops. It is noted that soaps and detergents are normally retailed by grocery shops and supermarkets only.

The number of interviews conducted was as follows:

- Kigali City – 21 interviews (manufacturers, importers, wholesalers, retailers)
- Musanze Town – 22 hard ware shops
- Rubavu Town – 12 hard ware shops
- Burera Town – None
- Nyabihu Town - None

The key findings from the WASH supply side assessment are presented below:

### **1. Kigali City**

- d) Out of the 21 companies interviewed, there are 8 manufacturing companies all based in Kigali City and manufacturing the following products:
  - i. Plastic pipes – 4 companies
  - ii. Roofing materials – 2 companies
  - iii. Clay products – 1 company
  - iv. Detergents and soaps – 1 company
- e) 11 of the company's retail in ceramic toilets and hand basins which are all imported.
- f) 3 companies retail in plastic latrine products (specifically plastic latrine pans, mobile toilets and latrine cubicles). 2 of the companies are have manufacturing industries in Kigali and have other manufacturing industries in other of the East African countries.
- g) Only one company manufactures soaps and detergents.
- h) Two companies manufacture roofing products.

- i) Plastic, ductile iron, steel and galvanised steel pipes are all available. However, only plastic pipes are manufactured in Rwanda.
- j) Water treatment chemicals and point-of-use disinfectants are available from 4 of the retailers, and one is a pharmacy business.
- k) One company manufactures and retail clay products (bricks, roofing tiles, building blocks, etc.)
- l) **Musanze Town**
  - a. 22 retailing businesses (hard ware shops) were interviewed and all were located in the Musanze Central Business District.
  - b. None of the hard ware shops retail in the plastic latrine products, however, all the 22 hardware shops retail in the ceramic toilets and ceramic hand washing basins.
  - c. None of the hard ware shops retail in plastic water tanks, hand pumps, POU disinfectants and water treatment chemicals.
  - d. All the hard ware shops retail in pipe fittings, and 19 in water valves and 5 in water meters.
  - e. 7 of the hard ware shops retail in cement and roofing products.
  - f. 1 and 2 hard ware shops retail in concrete and clay products respectively.

For ease of cross-referencing, the following WASH products codification was adopted:

<b>WATER, SANITATION AND HYGIENE PRODUCTS DIRECTORY CLASSIFICATION GUIDE</b>				
<b>MAIN PRODUCT TYPE CATEGORY</b>	<b>LATRINE PRODUCTS</b>	<b>HAND WASHING PRODUCTS</b>	<b>WATER SUPPLY PRODUCTS</b>	<b>OTHER CONSTRUCTION PRODUCTS</b>
<b>LATRINE PRODUCTS</b>				
Plastic Latrine Pans	LAT/01			
Mobile Toilets	LAT/02			
Fixed Plastic Cubicles	LAT/03			
Ceramic Toilets	LAT/04			
<b>HAND WASHING/HYGIENE PRODUCTS</b>				

Ceramic Hand Basins		HW/01		
Tippy Tap/Local hand washing units		HW/02		
Soaps		HW/03		
Detergents		HW/04		
<b>WATER SUPPLY PRODUCTS</b>				
Plastic Pipes			WS/01	
Steel Pipes			WS/02	
Ductile Iron Pipes			WS/03	
Galvanised Steel Pipes			WS/04	
Pipe Fittings			WS/05	
Plastic Water Tanks			WS/06	
Water pumps			WS/07	
Hand Pumps			WS/08	
Valves			WS/09	
Water Meters			WS/10	
Point of Use Disinfectants			WS/11	
Water Treatment Chemicals			WS/12	
<b>OTHER CONSTRUCTION MATERIALS</b>				
Cement				OC/01
Roofing				OC/02
Concrete Products				OC/03
Clay Products				OC/04

## 2. Rubavu Town

- a. 12 retailing businesses (hard ware shops) were interviewed and all were located in the Rubavu Central Business District.
- b. One hard ware shop (SONATUBE) is a branch of the main company in Kigali City.

- c. None of the hard ware shops retail in the plastic latrine products, however, all the 12 hardware shops retail in the ceramic toilets and ceramic hand washing basins.
- d. None of the hard ware shops retail in hand pumps, POU disinfectants and water treatment chemicals.
- e. All the hard ware shops retail in pipe fittings, and 10 in water valves and 2 in water meters.
- f. 2 of the hard ware shops retail in cement and 3 in roofing products.
- g. Only 1 hard ware shop retail in concrete and clay products.

## **9. DEVELOPMENT OF SANITATION PRODUCTS & SERVICES**

### **9.1. Sanitation Products & Services Development Strategy**

### 9.1.1.Introduction

The strategy adopted to achieve the sanitation supply chain market improvement is based on the “selling sanitation” approach of consumer-driven design and sanitation upgrading according to the “sanitation ladder”.

#### 9.1.1.1.Consumer-Driven Product Design Approach

Sanitation studies have shown that even amongst the poorest consumer segment, how a sanitation product (latrine, hand washing station, etc.) is designed makes a difference in a potential customer’s actual willingness to pay for the product.

The most effective methodology of selling sanitation products is the “Consumer-Driven Product Design approach”. This approach is recommended in the strengthening of the sanitation supply chain in this study.

Design a product that consumers will buy begins with understanding what they want and how they make buying decisions. The consumer-driven product design approach is an iterative process that starts and ends with consumers’ preferences and behaviours.

The approach methodology is described in table 9.1 below:

**Table 9.1: CONSUMER DRIVEN SANITATION PRODUCT DESIGN APPROACH**

STAGE	DESIRED ACTIVITY	ACTUAL STUDY ACTIVITY
<b>MARKET ANALYSIS</b>	Conduct desk research and rapid consumer assessment to gain an understanding of the current market trends and drivers	<ul style="list-style-type: none"> <li>Initial rapid assessment study (<i>SNV, 2014</i>).</li> <li>Assessment findings (<i>Chapter 8</i>).</li> </ul>
<b>PRODUCT DESIGN</b>	Evaluate existing offerings and develop early product prototypes for initial testing and market analysis	<ul style="list-style-type: none"> <li>Design of demonstration latrines (<i>Chapter 9.1.2</i>).</li> <li>Hand Washing prototype testing (<i>Chapter 8.2.2.2</i>)</li> <li>Development of Baseline Sanitation Directory (<i>9.1.4</i>)</li> </ul>
<b>PRODUCT TESTING</b>	Test and refine product prototypes based on consumer input; continue consumer research to better understand and segment the market	<ul style="list-style-type: none"> <li>Findings from Demonstration Latrine and Baseline Sanitation Directory Testing</li> </ul>
<b>GO-TO- MARKET</b>	Finalize design concepts; finalize design for production; create targeted production and distribution plans	<ul style="list-style-type: none"> <li>Findings from Product Testing stage</li> </ul>

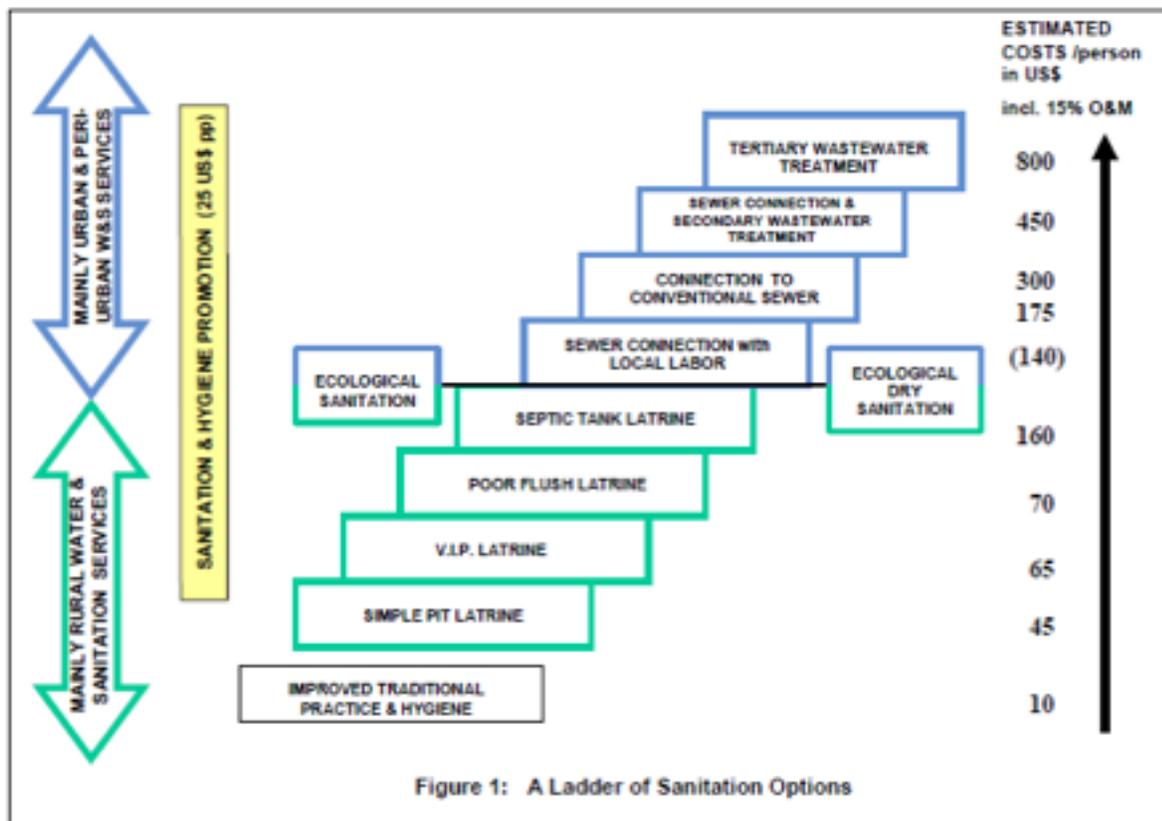
In the following sections, the recommendations for the product designs are described in detail.

### 9.1.1.2. Sanitation Ladder

The findings from the household assessment indicate that the predominant type of latrine in the study area is the simple pit latrine. According to the sanitation ladder as defined by UNEP, 2004 and reproduced in figure 9.1 below, the sanitation level of service in the study area is at the “Simple Pit Latrine” Level.

The desired and cost effective strategy towards improving the sanitation level of service of the study area is to develop a step-wise approach of climbing the sanitation ladder. The Latrine products recommended in this study are upgrades from the predominant simple pit latrines to the ventilated improved pit latrines.

Figure 9.1: THE SANITATION LADDER



(Source: UNEP 2004)

### 9.1.2. Latrine Products

The proposed sanitation improvement is the upgrading of the existing simple pit latrines to the next sanitation level of Ventilation improved pit (VIP) latrine.

Chapter 11 further elaborates on the key improvements recommended to the existing pit latrines and hand washing units.

In accordance with the consumer-driven latrine product design approach, after conducting the consumer assessments to gain an understanding of the current latrine trends and drivers, the next stage is to evaluate existing latrine options and develop early product latrine prototypes for initial testing and market analysis.

Table 9.3 below presents the demonstration latrines (prototypes) recommended for testing. The demonstration latrines were selected on the basis of the following criteria;

- Adoption in the study area
- Cost
- Availability of materials
- Simplicity of construction
- Durability of materials

The detailed engineering design and construction drawings, bills of quantities and costings are provide in appendix E.

### **9.1.3. Hand Washing Products**

The predominant hand washing facilities in the study area is the tippy tap. However, it was observed that most of the tippy taps were not functional (either they cannot work as designed or there was no water in the container). Various variants of the traditional tippy tap were designed and the prototypes tested. The findings are presented in section 8.2.2.2.

In accordance with the consumer-driven hand washing product design approach, the testing conducted is the stage two of evaluating the existing hand washing options and develop early product latrine prototypes and initial testing.

The next stage is the further refinement of the prototypes, and re-testing. It is proposed that the stage two testing be conducted together with the latrine demonstration testing. From the initial findings of the prototype testing, further improvements were incorporated and the hand washing facilities

recommended for further testing. The detailed engineering design and fabrication drawings, bills of quantities and costings are provided in appendix E

#### **9.1.4. Sanitation Directory Services**

Task 2 and 3 of the terms of reference were to;

- Assess the supply chain of sanitation and hygiene products including, inter-alia, building materials e.g. PVC pipe, thatch, wood, and/or corrugated metal sheets; latrine slabs and pans; concrete rings; tippy taps; soap; water purification products; detergents for reducing smell in latrines;) available nation-wide in Rwanda.
- Assess the supply chain of water supply spare parts available nation-wide in Rwanda.

The two tasks are assessments of the sanitation supply side, however, to have a better understanding of the supply chain market, it is necessary to assess both the supply and demand side of the sanitation supply market. Sections 8.2.1.1 and 8.2.2.1 present the findings of the assessments of the latrine and hand washing, where semi structured questionnaires were adopted in the assessments. Sample of the questionnaires are given in appendix B. However, in the assessment of the private water providers, non-structured interviews were adopted.

The supply side assessment was conducted using semi-structured questionnaires (sample given in appendix B). The supply side actors interviewed included manufacturers, importers, wholesale retailers and local retailers of water supply spare parts, sanitation and hygiene products. The findings are presented in section 8.2.3.1 and 8.2.3.2.

One key observation when discussing with the WASH sector stakeholders; households, and the sanitation products manufacturers and retailers is that there is no single documentation of the WASH market in Rwanda. This makes it difficult to understand the structure, size and gaps of the Rwanda WASH market. The starting point of strengthening the WASH supply chain market is the publication of the existing WASH market players.

PART B of the report presents the baseline WASH supply chain directory of Rwanda. The contents of the directory include:

- 1) Contacts of the WASH stakeholders in Rwanda

- 2) Listing of the relevant WASH specifications by the Rwanda Standards Board
- 3) Listing of key Manufacturers of WASH products in Rwanda (Baseline)
- 4) Listing of key WASH products Importers, Agent dealers and Wholesale Retailers in Kigali (Baseline)
- 5) Listing of Key WASH retailers in Rubavu and Musanze (Baseline)
- 6) Technical Specifications of water supply pipes and fittings (baseline)

This is a baseline directory and it is recommended that a countrywide documentation of the WASH supply side market be conducted and the baseline directory updated and published on a regular basis (preferably annually). It is further recommended that the WASH supply chain directory be uploaded and availed online through a dedicated database website. It is proposed that the Rwanda water and sanitation sector working group be tasked to conduct this exercise.

## **10.0 RECOMMENDATIONS FOR STRENGTHENING THE SANITATION SUPPLY CHAIN MARKET**

### **10.1 Introduction**

This study underscores a significant opportunity to leverage the current basic sanitation coverage to grow business opportunities for household sanitation provision and improvement. Study findings indicate that many households in the study area do not necessarily lack awareness about the need

for better sanitation, but do need better latrine and hand washing products and services delivered through more efficient and cost-effective means.

While opportunities exist within every portion of the value chain, it should be understood that focusing a potential solution on only one link within the chain will likely bring only limited success. The key is to prioritize the opportunities at hand and integrate them into a model that addresses gaps across the entire value chain. Initially, this process may require sacrificing scale until success is proven, but the end goal should be sustainability of the solution over initial reach. Providing a solution that can fill all the gaps across the value chain is most critical to ensure lasting impact. While challenges exist in terms of supply chain players, infrastructure limitations, inadequate financial resources, the opportunities for market creation around household sanitation in the study area are promising with the right mix of approach, focus and stakeholders support and participation.

## **2. Standardising Latrine and Hand Washing Designs**

As the study findings point out, a significant need exists for creating definite design criteria for household latrines, hand washing and their components. A minimum product standard and design accepted across the stakeholder community would allow for better engagement with value chain entities to explore how to provide solutions that meet (or exceed) that specific threshold. A common latrine and hand washing unit specification would educate and subsequently allow market actors and small entrepreneurs to create specialized products and services to meet differing needs for product, price, and availability depending upon the communities they serve.

This standard would also allow for supply chain aggregation around that design in a way that could create significant efficiencies, drive up supplier margins (thereby encouraging entry into the sanitation business), and drive down prices to the end consumer (increasing affordability and, ultimately, uptake of sanitation products). Finally, as noted above, setting a standard for household latrines and hand washing units would help to catalyze the creation of “brands” that could be properly and extensively marketed to a broad number of households through an established and integrated network of suppliers at an appropriate price point. Such products would also open the door for testing financing options,

increasing the affordability to low-income households, and improving access and use of safe sanitation solutions.

### **3. Targeting the Supply Chain Actors**

The key to strengthening the sanitation supply chain market is to find potential supply side entrepreneurs and then identifying and concentrating on providing the resources and tools they need to be successful at scale. Identifying gaps in the capacity of the supply chain, such as technical and sales skills or access to capital, and focusing technical assistance objectively and efficiently is critical to the success of a market-based solution to sanitation challenges. Not all links in the supply chain are worthy of support, and resources to build capacity are limited. Therefore, these resources should be focused on actors who provide the greatest potential return on investment.

Identifying these types of entrepreneurs and then targeting efforts to help build their operations has the potential to lead to much greater long-term impact than broad training or capacity-building programs that do not recognize the strengths and limitations of participants. Even targeted entrepreneurs are not all guaranteed to succeed, and approaches to identifying the right ones and building their capacity need constant revision. However, ultimately, patient, diligent, and focused efforts can build solid results and grow a sustainable market.

In Uganda, there exist a thriving informal industry for fabrication of hand washing units as illustrated in the following photos.



## **HAND WASHING FABRICATIONS IN MUKONO DISTRICT (Along JINJA Road), UGANDA**

It is the intention of this study will prepare the foundation of the development of a substantive and sustainable formal hand washing facilities supply chain market.

### **4. Alignment of the WASH Stakeholders**

Further coordination and alignment between public-sector and NGOs efforts and private-sector inputs to household sanitation provision is necessary to enable the recommendations and other opportunities identified from the study. Key WASH private-sector players currently operate under a strategy of primarily supplying product orders to local retailers and private water providers without any further involvement in commercial distribution, sales, or communication efforts. Meanwhile, public-sector awareness and distribution efforts still rely heavily on NGOs support to help build and sustain demand for household sanitation solutions.

## **11. KEY IMPROVEMENTS TO THE EXISTING LATRINES AND HAND WASHING FACILITIES**

### **1. Introduction**

One of the study's key questions was:

- What types of sanitation (specifically latrines and hand washing) solutions are low-income households currently utilizing, and to what degree are the sanitation solutions affordable and sustainable?

This question can only be answered by a two-stage approach:

Stage 1: Conduct an assessment of the existing latrines and hand washing facilities being used by the households in the study area, and;

Stage 2: Review the existing facilities and recommend specific improvements to make the facilities more affordable and sustainable.

Stage 1 was undertaken and the key findings are detailed in chapter 8 of this report, whilst this chapter 11 undertakes to detail the key recommendations of specific improvements to the latrines and hand washing facilities. Section 11.2 provides the improvements to the latrines, section 11.3 provides improvements to the hand washing facilities and section 11.4 presents other sector-wise recommendations.

## **2. Improvements to the Existing Latrines**

Some of the study findings on existing latrines given in table 8.4 include:

- 93% of the latrines do not have pit ventilation through a vent pipe
- 91% of the latrine sub-structure (pit) are unlined;
- 21%, 47% and 25% have open hole and mud, wood and concrete floors respectively and 6% have plastic slabs on wood and concrete floors;
- 56%, 17% and 2% of the walls are made from mud, brick and grass;
- 40% and 25% of the roofs are made of corrugated iron sheets and tiles respectively;
- 34% use water to wipe after toilet use, 21% use used papers and 35% use leaves;
- 100% have the desire to improve the latrine construction.

From the above findings and considering the basic design of a pit latrine, the following latrine functional components are available for re-design and improvements:

- Pit
- Ventilation
- Slab, and
- Superstructure

### **2.2.1. Improvements to the Latrine Pit Design**

The key function of the latrine pit is to provide a safe and discrete chamber which separates the excreta from the human beings and thus eliminates contamination and incidences of diseases. The most common type of latrine pit is a hole dug in the ground and covered by a superstructure laid on a slab.

The key features of the latrine pit include:

- It should be of good structural design to avoid collapse of the superstructure,
- It should not contaminate ground water sources
- It must be of adequate sizing for long life of the latrine

The key structural features are that the pit should be constructed in firm yet permeable soil formation and a circular pit is structurally stronger (self-internal forces) than a rectangular pit. The pit should be located upstream of any nearby ground water well and at least 10m away and at least 2m above the water table.

In deciding on the pit sizing the following factors should be considered:

- The latrine system (wet or dry system);
- The number of users
- The required design life of the pit
- Whether anal cleansing solids will be used

The design life of the pit is the time (in years) it takes for the latrine pit to fill up at the expected usage rate. As a general rule, it is more economical to dig a deeper pit to increase the volume than to increase the cross-sectional area. If the cross-sectional area is increased, then proportionally, the latrine floor slab must be increased and with it the overall latrine cost.

According to (*WASH 1993*);

$$V = 1.33 \times C \times P \times N \dots\dots\dots (1)$$

Where,

V = the volume of the pit (m<sup>3</sup>),

C = the pit design capacity (m<sup>3</sup>/person-year), (see table 11.1 for values)

P = the number of users of the latrine,

N = the pit design life (years)

1.33 = a constant factor incorporated to ensure a clear space (freeboard) above the excreta top level at the end of the design life.

**Table 11.1: Values of the Pit Design Capacity (C) (m<sup>3</sup>/person-year)**

Wet Pit	Dry Pit
---------	---------

Use of anal cleaning water	Use of anal cleaning solid	Use of anal cleaning water	Use of anal cleaning solid
<b>0.04</b>	<b>0.06</b>	<b>0.06</b>	<b>0.09</b>

(Source: WASH 1993)

From formula (1) and table 11.1, the following tables are designed:

**Assumptions:**

- The pit is circular of diameter 1.5m
- The soil is firm and permeable
- The latrine is a dry pit and the households use any of the solid materials (toilet paper, user paper or leaves)

**Table 11.2: Pit design Life for varying Number of Users**

<b>N (No of users)</b>	<b>Depth of Pit (m)</b>	<b>(P) Pit design Life (Years)</b>	
4	3	11	
5	3	9	
6	3	7	
7	3	6	
8	3	6	
9	3	5	
10	3	4	
11	3	4	
4	2	7	
5	2	6	
6	2	5	
7	2	4	
8	2	4	
9	2	3	
10	2	3	
11	2	3	
4	1	4	
5	1	3	
6	1	2	
7	1	2	
8	1	2	
9	1	2	
10	1	1	
11	1	1	

**Table 11.3: Pit design Life for varying pit depths**

<b>N (No of users)</b>	<b>Depth of Pit (m)</b>	<b>(P) Pit design Life (Years)</b>	
4	1	4	

*Assessment & Improvement of Sanitation and Hand Washing Supply Chain in Burera, Musanze, Nyabihu & Rubavu Districts in Rwanda*

4	1.5	6	
4	2	7	
4	2.5	9	
4	3	11	
5	1	3	
5	1.5	4	
5	2	6	
5	2.5	7	
5	3	11	
6	1	2	
6	1.5	4	
6	2	5	
6	2.5	6	
6	3	7	
7	1	2	
7	1.5	3	
7	2	4	
7	2.5	5	
7	3	6	
8	1	2	
8	1.5	3	
8	2	4	
8	2.5	5	
8	3	6	

The study findings indicate that the study area is in the volcanic zone and the pit excavation is mainly in volcanic rocks and very difficult and expensive. However, it is desirable to maintain a minimum pit depth for effective excreta separation and sustainable pit operational life.

It is recommended that the desirable pit life be a minimum of 10 years. However, the volcanic rock formation of the study area are a limitation. From tables 11.2 and 11.3, the recommended pit design is as presented in table 11.4:

**Table 11.4: Recommended Pit Design for Study Area**

No of Pit users	Depth of Pit (m)	Pit diameter (m)	Pit design Life (Years)
4	3	1.5	11
5	3	1.5	11
6	3	1.5	7
7	3	1.5	6
8	3	1.5	6
9	3	1.5	5
10	3	1.5	4
11	3	1.5	4

To increase the life of the latrine pits, it is also recommended that biological digesters be placed into the pits at least once a year. The biological digesters have the ability to digest the excreta in the pits by up to 70-80% and to therefore increase the life of the latrine pit to up to 10 years. Another advantage of using biological digesters is that they eliminate odor from the pits increasing comfort and also reduce flies.

### **2.2.2. Improvements to the Pit Ventilation**

From the study findings, 93% of the latrines do not have a direct vertical pit ventilation. The absence of such a ventilation component results in bad smell in the latrine and presence of flies which are a nuisance and a disease pathway.

According to (MARA 1984), the difference between a traditional pit latrine and a ventilated improve pit (VIP) latrine is that the VIP latrine has a vertical vent pipe into the pit and fitted with a flyscreen at the top.

The installation of a vent pipe creates a natural ventilation airflow path which, under the right conditions, allows for any foul odor inside the pit to pass into the atmosphere through the vent pipe rather than the superstructure. Since odor are expelled outside of the latrine via the vent pipe, insects that may be attracted to the smell of excrement gather around the mouth of the vent pipe rather than inside the superstructure. The gathering flies are unable to pass into the pit due to a mesh screen covering the mouth of the vent pipe. Without being able to detect any odor emanating from the superstructure, flies are thus prevented from breeding within the pit and becoming vectors for diseases associated with human excrement.

Fly control is further enhanced if light levels inside the superstructure are kept low enough so that the greatest source of light inside the pit is being cast down through the vent pipe. Given that most species of flies are phototrophic, any fly that may be inside the pit instinctively tries to leave via the vent pipe; it however cannot escape because of the fly screen. In properly functioning VIP latrines these fly control mechanisms have been found to be very effective. In a 1978 study in Zimbabwe, 146 flies were caught escaping from a VIP latrine while 13,953 were caught from an unvented, but otherwise identical, pit latrine (Mara 1984, p. 4). In theory, with minimal flies and odor inside the superstructure, beneficiaries are less likely to be discouraged from using the latrine rather than returning to the behaviour of open defecation.

The Mara & Ryan investigation found that the primary driving mechanism of ventilation was wind passing over the top of the vent pipe. This mechanism was further enhanced when an opening in the superstructure of the latrine faced the direction of the wind. Thermally induced updraft was found to be of little importance unless the latrine was located in a low wind environment. Furthermore, the researchers were able to determine flow rates for various types of vent pipe designs and materials such as cylindrical cement pipes, PVC pipes, and square brick chimneys. A summary of their results are presented in the table below:

Vent Pipe Details	Superstructure Volume (m <sup>3</sup> )	Ventilation Rate (m <sup>3</sup> /hr)	Air vol. change per hour (ACH)
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Material	Internal Dia. (mm)	Volume (m <sup>3</sup> )	(m <sup>3</sup> /hr)	hour (ACH)
PVC	100	1.8	11	6
PVC	150	1.8	18-47*	10-26*
Asbestos Concrete (AC)	150	1.8	18	10
Reed/cement	280	1.8	32	18
Pole/soil	280	1.8	32	18
Hessian wire mesh/ cement	250	1.8	43	24
Brick	230 square	1.8	36	20

(\* Ranges due to variation in wind direction)

(Source: Measured ventilation rates of VIP latrines in Zimbabwean single-pit latrines (Adapted from: Mara & Ryan, 1984)

An improvement recommendation to the existing latrines without the vertical pit ventilation is that a PVC pipe ventilation of diameter 150mm be installed to extend at least 300mm into the pit and above the top of the latrine roof.

### 2.2.3. Improvements to the Slab Design

From the study findings; 21% of the households have open drop hole on mud floor slab, 47% have open drop hole on a wooden floor slab and 25% have open drop hole on a concrete floor slab.

The key improvement on the latrine floor slab is to improve the functionality of the floor slab. The key functions of the floor slab are:

- To provide structural support of the latrine superstructure and the user
- To provide a separation barrier between the user and the pit contents,
- To compliment in the pit ventilation and odor and fly control
- To provide a surface that is easily washable

The improvements recommended here are non-destructive and intend to retain the use of the existing latrine. The most common slab materials observed are the mud, wooden (eucalyptus poles or wood offcut planks) and concrete slabs. It is desirable to have a concrete floor slab because it is easy to clean, provides a good seal from the pit and is structurally sound.

The specific improvement recommendations of the mud and wooden floor slabs are given below:

- **Improvements to the existing mud floor slab**
  - ✓ Apply a 25mm thick cement and sand screed on top of the mud surface. This screed should be laid to slope towards the drop hole. For a latrine internal size of 1.5m by 1.5m, one bag of cement is sufficient.
  - ✓ Fix a plastic latrine pan onto the mud slab.
- **Improvements to the existing wooden floor slab (made from eucalyptus poles)**
  - ✓ Fill up the gaps between the poles with stones, then apply a 25mm thick cement and sand screed on top of the whole slab;
  - ✓ Nail wood offcut planks on top and perpendicularly to the poles and ensuring that the planks joints are tight.
  - ✓ Fix a plastic latrine pan onto the mud slab.
- **Improvements to the existing wooden floor slab (made from offcut planks)**
  - ✓ Nail wood offcut planks on top and perpendicularly to the bottom planks and ensuring that the top plank joints are tight.
  - ✓ Fix a plastic latrine pan onto the mud slab.

#### **2.2.4. Improvements to the Superstructure**

From the study findings, 56%, 17% and 2% of the latrine walls are made from mud, brick and grass and 40% and 25% of the latrine roofs are made of corrugated iron sheets and tiles respectively.

The key functions of the superstructure are to:

- Provide privacy and comfort to the user
- Protect the user and latrine from the weather impacts (rain, sun, wind)

The ideal latrine superstructure is to have a superstructure that is permanent, weather resistant and affordable.

The key improvement recommendations to the existing latrine superstructures are:

- ✓ The mud brick and mud mortar latrine walls to be applied with a coat of cement sand mortar both internally and externally to make it rain resistant and permanent,
- ✓ The wooden plank walls to be applied with small strips of wood along the open joints to make the latrine interior darker and thus reduce the incidence of flies.

- ✓ The openings between the walls and the roof should be covered with fly screens to block flies from entering the latrine.
- ✓ The non-durable roofing materials (grass or polythene sheeting) should be replaced by iron sheeting (used or new corrugated iron sheets are preferable).

A general recommendation is that any combination of superstructure options from the demonstration latrines should be adopted depending on the affordability and availability of materials.

### **3. Improvements to the Existing Hand Washing Facilities**

Some of the study findings on existing hand washing facilities given in table 8.5 include:

- 27% of the households own a hand washing unit
- 23% of the households own a tippy tap
- 28% use soap when hand washing
- 100% expressed the desire to on/improve the hand washing unit,

Further the key findings from the hand washing prototype testing are given below:

- All the respondents were familiar with the tippy tap and had either used one before or still own one.
- All the respondents desired to own an improvement to the tippy tap, with the key reasons
- Most of the respondents were happy and desired to own the portable (wall hanging) hand washing unit.
- Most of the respondents desired the liquid soap compared to the bar or powder soap.

From the above findings and considering the basic design of a hand washing facility, the following are the key improvement recommendation on the tippy tap hand washing unit:

- ✓ The tippy tap support framework be modified to allow quick and easy removal of the water container component for storage in the house at night or when the safety and security of the tippy tap is not assured. It is preferred to have a hanging support system
- ✓ The tippy tap food pedestal component be replaced by a simple tap unit
- ✓ The size of the water container should be available in larger sizes (10 and 20 litres)

### **4. Other Improvement Recommendations**

Other improvement recommendations are as follows:

- I. The District Latrine inventory prepared by the District WASH teams should be expanded to include the latrine construction materials. This will provide valuable data for future studies and projects on the extent and scope of latrine improvements. For example, from the District Latrine inventory (table 8.2) there are 268,031 latrines in the four Districts of Burera, Musanze, Nyabihu and Rubavu. However, it is not known how many of the latrines have mud, wooden or concrete slabs or mud brick or wooden walls.
- II. For latrines which have reached their design life and the superstructure are still in good condition, biological digesters should be applied to increase the life of the latrine.
- III. For latrines which have reached their design life and the superstructure are still in bad condition or of unacceptable design (for example the latrine internal sizing is less than 1.5m by 1.5m) or structurally weak slabs, the latrine should be filled up by converting the pit into a solid waste pit. Waste stones and soil should be poured into the pit until it is full.

## **12. CONCLUSIONS AND NEXT ACTION PLANS**

### **12.1. Introduction**

In this chapter, key conclusions and next steps from the this assessment study will be drawn based on the key findings and the recommendations made in chapter 10 for strengthening the water, sanitation and hygiene supply chain in Rwanda.

### **12.2. Latrine Upgrading and Standardisation of Latrine Designs**

The key findings from the household interviews on latrine and hand washing use and perceptions are:

- 93% own latrines
- 93% of the latrines do not have pit ventilation through a vent pipe
- 67% of the latrines have open hole and mud or wooden floors
- 100% of the households desire to improve the latrines construction and hand washing fabrications
- 79% of the latrines were constructed by local artisans and 75% of the latrines were constructed after the year 2010
- 27% of the households own a hand washing facility of which 23% are tippy taps

Data from the sanitation and hand washing facilities inventories of the study Districts indicate that:

- 26,170 (9%) of the households do not have latrines
- 146,012 (49%) of the households have unimproved latrines
- 79,920 (65%) of the households have improved latrines but do not have hand washing facilities

From the above independent data, it can be concluded that there is an opportunity to achieve the following improvements of the sanitation level of service (as prescribed by the sanitation ladder) in the Districts of Musanze, Burera, Nyabihu and Rubavu:

- 4) Construction of 26,170 new ventilation improved latrines;
- 5) Upgrading of 146,012 latrines from unimproved latrines to ventilation improved latrines;
- 6) Fabrication and installation of 352,102 hand washing units

This study has recommended seven different technologies of demonstration ventilated improved pit latrines and three hand washing units which are to be constructed and tested. Based on the feedback from the households and other stakeholders, it can be concluded that a minimum of three latrine and hand washing designs be further improved and promoted as Standard Ventilated Improved Pit Designs.

By standardising and actively promoting and marketing the latrine and hand washing designs, it is possible to create and develop a sustainable market in the whole of Rwanda.

### **12.3. Aggregation of Supply Chain and Development of WASH Shops**

The main WASH supply chain demand side actors in the study area are:

- The private water providers (AQUA-VIRUNGA, AGEOH and REDEC)
- The local contractors and artisans
- The individual households

Discussions with the private water providers revealed that purchasing decisions for planned and emergency spare parts is not formally documented in a procurement management system. This results in poor spare parts management resulting in long downtime of the affected water supply systems and low contract performance.

Part of the problem is the dis-aggregation of the water spare parts supply chain. Spare parts and consumables (water treatment chemicals) are either:

- Imported directly from the manufacturers in Europe, Asia and US,
- Imported from manufacturers in the other East African countries (especially Kenya and Uganda),
- Locally purchased from manufacturers and agents in Kigali City
- Locally purchased from retailers in Musanze and Rubavu

However, it was noted that some water treatment chemicals are imported from the manufacturer in Europe yet there are manufacturer agents in Kigali or Nairobi. Also some spare parts (especially pipes and fittings) are purchased from retailers in Kigali City whilst the same spare parts are available from retailers in Musanze or Rubavu.

Similarly, it was observed from the findings that basic construction materials, for example, cement, corrugated iron sheets are not being retailed by some of the well-established hard ware shops.

Plastic latrines products are only retailed by the main manufacturers, however, most of the hard ware shops in Kigali City and the Districts are retailing the ceramic toilets and ceramic hand basins.

From the findings of the WASH supply side assessment interviews, it can be concluded that:

1) The Rwanda WASH supply chain (manufacturers, agent importers, wholesale retailers and local retailers) is capable of meeting the WASH demand side (private water providers, local contractors and artisans and individual households). However, it is necessary to improve the procurement efficiencies by re-aligning and aggregating the supply side model. One way of achieving this would be to develop “SANIMARK SHOPS”. This will be “one-stop” shops located at the District and Sector levels, where all the key sanitation and hand washing products and services will be available. These products will include but not limited to:

- Local hand washing units - complete fabrication - (tippy tap or otherwise)
- Hand washing soaps and detergents
- Plastic latrine pans,
- Pre-cast concrete latrine slabs
- Cement
- Roofing materials (corrugated iron sheets)
- Wooden poles and planks

- PVC vent pipes
- Quality mud bricks
- Burnt bricks
- Nails and other construction materials
- Latrine construction services by trained local artisans

#### **12.4. Development of a National WASH Supply Chain Information System**

One of the conclusions of this study has recommended the aggregation and re-alignment of the WASH supply chain, however, this will be difficult to achieve in the absence of a documented system which contains all the information about the individual supply chain actors. This documented information system will then be regularly updated to reflect the prevailing structure of the supply chain.

One of the key outputs of this study is the publishing of a baseline Rwanda WASH supply chain directory. This baseline directory is presented in Part B of this report. This directory contains the following information:

- Listing of all the key WASH stakeholders (individuals and organisation),
- Listing of all the relevant WASH standards published by the Rwanda Standards Board,
- Listing (baseline) by organisation of the key WASH suppliers (manufacturers, importers and retailers) in Kigali City,
- Listing (baseline) by organisation of the key WASH suppliers in Musanze and Rubavu Towns,
- Listing (baseline) by product of the key WASH suppliers in Kigali City, Musanze and Rubavu Towns.

It is concluded that:

- m) the baseline Rwanda WASH supply chain directory published under this study be upgraded by extending the scope to cover all the Districts of Rwanda,
- n) the Rwanda WASH supply chain directory be uploaded onto a dedicated website with an interactive online database system.

- o) The Rwanda water and sanitation sector working group be tasked with i) and ii) above.

**TABLE 9.3: RECOMMENDED DEMONSTRATION LATRINES**

Type	Pit construction	Floor Slab	Wall	Pan	Roof	Ventilation	Construction Cost (Rwf)
TYP E A	Straight/circular	Wooden (offcuts)	Mud bricks	No pan	Corrugated Iron Sheets	Bamboo	187,335
TYP E B	Straight/circular	Wooden (poles)	Wood offcuts	Plastic Pan	Corrugated Iron Sheets	PVC Pipe	225,285
TYP E C	Off-set/circular	In-situ Concrete	Mud bricks(local plaster)	No pan	Corrugated Iron Sheets	PVC Pipe	209,185
TYP E D	Straight/circular	Pre-cast Concrete	Mud bricks (cement mortar plaster)	No pan	Corrugated Iron Sheets	PVC Pipe	233,795
TYP E E	Straight/circular	Plastic pan/poles	Corrugated Iron Sheets	Plastic Pan	Corrugated Iron Sheets	PVC Pipe	311,535 <b>** (270,000)</b>
TYP E F	Straight/circular	Wooden (offcuts)	Mud bricks (traverse entry (no door)(local plaster)	No pan	Corrugated Iron Sheets	PVC pipe	186,645

Notes: **\*\***For “TYPE E” it is assumed that all the walling corrugated iron sheets are new, however, any type of used iron sheets (used corrugated sheets, sheets from used metal drums, etc.) could be used. In such cases, the “TYPE E” costing could come down to about RWF. 270,000.





### **13. REFERENCES**

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## **APPENDICES**

### **APPENDIX A: TERMS OF REFERENCE**

As per the consultancy terms of reference for the assignment “Assessment and Improvement of Sanitation and Hand Washing Supply Chain in Burera, Musanze, Nyabihu and Rubavu Districts in Rwanda”, the specific tasks to be performed by the consultant was to include but not be limited to the following:

Task 1: Meet with main stakeholders of the project to have clear understanding of the scope of the works and expectations of the assignment;

Task 2: Assess the supply chain of sanitation and hygiene products including, inter-alia, building materials e.g. PVC pipe, thatch, wood, and/or corrugated metal sheets; latrine slabs and pans; concrete rings; tippy taps; soap; water purification products; detergents for reducing smell in latrines; girls hygienic pads,) available nation-wide in Rwanda;

Task 3: Assess the supply chain of water supply spare parts available nation-wide in Rwanda;

Task 4: Review/assess the available sanitation and hand washing technology options used in Rwanda and in other developing countries will similar conditions;

Task 5: Identify a set of sanitation (latrines) and hand washing technological options that are appropriate and affordable to the target area (Burera, Nyabihu, Musanze and Rubavu districts);

Task 6: Assess pros and cons of the selected technology options, based on cost/affordability, suitability to local geographical conditions, cultural acceptability, durability, use of skilled labour, operation and maintenance, through site testing and feedback from the targeted population;

Task 7: Suggest recommendations for improvement of selected sanitation and hand washing options based on observations and feedback from key national WASH stakeholders; and prepare basic drawings and cost estimates for the most feasible improved options;

Task 8: Prepare the draft report in English based on the above;

Task 9: Facilitate a national-level stakeholders meeting to gather inputs on the draft report; and

Task 10: Produce a final assessment report integrating inputs of key WASH stakeholders.

The consultancy will require estimate duration of 30 working days.

The Inception report was submitted with the following objectives:

- 8) Conduct an in-depth literature review of similar studies in Rwanda and other countries;
- 9) Conduct consultations with the key stakeholders to understand their expectations;
- 10) Conduct preliminary field visit to meet the District officials related to the project and present the proposed fieldwork methodology and get the feedback on the appropriateness and feasibility;
- 11) Conduct preliminary field visit of the private water providers and establish the scope of the operation and maintenance spare parts needs;
- 12) Based on 1) to 4) above, review the project terms of reference to meet the stakeholders expectations whilst taking into considerations the actual situation in the field and data availability;
- 13) Establish a detailed data collection and survey methodology based on the project limitations
- 14) Review the initial work plan and prepare a firm project work plan to achieve the project objectives within the budget and time constraints.

## **APPENDIX B: SAMPLE QUESTIONNAIRES**

### **APPENDIX B1: SUPPLY CHAIN QUESTIONNAIRE (HOUSEHOLDS)**

- **GENERAL INFORMATION**

- a. **INTERVIEWER NAME:** .....
- b. **INTERVIEW DATE:** .....
- c. **HOUSEHOLD LOCATION:**

District: ....., Sector: ..... Cell: ..... Village: ..... Plot No: .....

**d. HOSEHOLD HEAD**

- i. Name: ....., Gender: .....

**II) HOUSEHOLD COMPOSITION**

- No of people in the household: ....., Adults....., Children under 18 yrs. ....

**III) SOCIO-ECONOMIC**

- What is the monthly income of the household head: .....
- Do you own the land you are residing in now? YES NO
- If it is rented, how much rent do you pay per month?
- **Type of house construction:**
  - **Walls:** 1. Mud 2. Bricks 3. Concrete blocks 4. Others
  - **Interior floor:** 1. Mud 2. Concrete 3. Others
  - **Roofing:** 1. Concrete 2. Tiles 3. Grass thatch 4. Corrugated iron sheet 5. Plastic sheeting 6. Others .....

**III) WATER SUPPLY**

- **What is your main source of water in the wet season:**
  - 1. Piped water in house 2. Borehole/well on site, 3. Rain water roof harvesting 4. Buy water from vendors, 5. River, 5. Others,
- **What is your main source of water in the dry season:**
  - 1. Piped water in house, 2. Borehole/well on site, 3. Rain water roof harvesting 4. Buy water from vendors, 5. River, 5. Others,
- **Do you treat your drinking water?**
  - a) Always, Sometimes, Never
- **What method do you use for treating your drinking water?**
  - b) Boiling
  - c) Point of Use chemicals (SUREAU, AQUAGUARD, WATERGUARD)
  - d) Other,
- **If you use Point of use chemicals, how much do you spend per month? .....**
- **Where do you store your drinking water? .....**

**II) LATRINE USE & PERCEPTION**

- **Do you own a latrine?** YES NO
- **How many people use the latrine** .....
- **Is the Latrine and bathroom combined?** YES NO
- **What type of latrine do you own:**

Non-improved pit latrine: Improved pit latrine: Urine diverting latrine/Ecosan toilet: Mobile toilet

- **Latrine sub-structure construction:**

Unlined pit, Concrete ring, Brick lined, Other

- **Latrine slab construction:**

Open hole –mud floor; Open-hole-wooden floor; Open-hole concrete floor; Plastic slab-mud floor; Plastic slab-wooden floor; Plastic slab-concrete floor

- **Latrine Superstructure wall construction:**

Concrete blocks; Brick; Wooden; Mud; Grass; Plastic sheeting; No wall; Others

- **Latrine roof construction:**

Corrugated iron sheets; Tiles; Grass thatch; Wooden; Plastic sheeting; No roof; Others

- **What do the household members use to clean after using the toilet?**

Water; Toilet paper; Used waste paper; Leaves; Nothing; Others

- **If you had the funds, what improvement/modification would you wish to give your latrine?**

.....  
...

- **How much can you afford to contribute towards constructing/improving your latrine?**

Can afford anytime; Can afford every month; Can afford by saving every 2 months; Can afford by saving per year; Can never afford

- **Who paid for the construction of your latrine:**

Self; NGO project; Government project; Community project; Others,

- **Who constructed your latrine:**

Self; Local artisan; NGO project; Government project; Community project; Others,

- **How much did it cost?** .....

- **Which year was it constructed?** .....

**II) HAND WASHING USE & PERCEPTION**

- **Do you own a hand washing facility? YES NO**

- **How many people use the hand washing facility**  
.....

- **What type of hand washing facility do you own:**

Piped water; Tippy tap; Others,

- **Do you use soap with you hand washing facility? YES NO**

- **What type of soap are you using?**

Bar soap; Powder soap; Liquid soap

- **If you had a choice, what type of soap would use prefer?**

Bar soap; Powder soap; Liquid soap

- **When did you install the hand washing facility? .....**

- **How much did you pay for the hand washing facility? .....**

- **Who fabricated the hand washing facility?**

Self; Local artisan; NGO; Government project; Community project

- **If you had the funds, what improvement/modification would you wish to make to your hand washing facility?**  
.....

- **How much can you afford to contribute towards constructing/improving your hand washing facility?**

Can afford anytime; Can afford every month; Can afford by saving every 2 months; Can afford by saving per year; Can never afford

**APPENDIX B2: SUPPLY CHAIN QUESTIONNAIRE (MANUFACTURER, IMPORTER, RETAILER)**

• **GENERAL INFORMATION**

e. **INTERVIEWER NAME:**

.....

f. **INTERVIEW DATE:** .....

g. **COMPANY:**

Name;..... Box No;..... Year started Operations: .....Other Branches: .....

h. **PRINCIPAL BUSINESS OPERATIONS:**

Manufacturer/Importer/ Authorised Agent/Wholesaler/Retailer/Others

i. **BUSINESS LOCATION:**

District: ..... Sector: ..... Cell: ..... Village: ..... Plot No: .....

j. **CONTACT PERSON:**

Name: ..... Position: ..... Tel No.: .....

**II) MARKET INFORMATION**

**2. WHERE DO YOU PURCHASE FROM (SELLERS)?**

i. Wholesalers/Dealers (Rwanda/East Africa/Overseas )

ii. Retailers (Rwanda/East Africa/Overseas)

iii. Manufacturers (Rwanda/East Africa/Overseas)

**3. DO YOU PURCHASE IN CASH/CREDIT? If Credit, what are the terms?**

**4. DO YOU SELL IN CASH/CREDIT? If Credit, what are the terms?**

**5. WHO ARE YOUR MAJOR COMPETITORS?**

.....

**WASH BUSINESS OPERATIONS: Do you deal in the following WASH Products: (Use the additional attached Price Lists)**

• **LATRINES**

**k. Plastic Latrine Slabs: YES NO**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

**l. Mobile Toilets: YES NO**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

**m. Plastic Toilet Cubicle: YES NO**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

**Others:**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

• **HAND WASHING DETERGENTS/SOAPS**

**Soaps: YES NO**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

**Detergents: YES NO**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

**i. WATER SUPPLY**

• **PIPES:**

**a. Plastic Pipes: YES NO**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

• **Steel Pipes: YES NO**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

• **Ductile Iron Pipes: YES NO**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

• **Galvanised Steel Pipes: YES NO**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

• **PLASTIC WATER TANKS**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

• **PIPE FITTINGS (Bends, unions, Tee, etc.) YES NO**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

• **PUMPS YES NO**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

- **VALVES YES NO**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

- **WATER METERS YES NO**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

- **HAND PUMPS YES NO**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

- **GENERATORS YES NO**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

- **POINT OF USE (POU) WATER DISINFECTION PRODUCTS YES NO**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

- **WATER TREATMENT CHEMICALS YES NO**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

- **SEPTIC TANK/LATRINE DIGESTERS YES NO**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

- **OTHER CONSTRUCTION PRODUCTS**

**n. Cement**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

**o. Roofing Sheets**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

**p. Concrete Products**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

**q. Brick Products**

Locally Manufactured: .....

Imported from which Company/Country: .....

(BRAND & PRICING IN THE ATTACHED PRICE LIST)

**APPENDIX C: HAND WASHING PROTOTYPE TESTING  
INSTALLATIONS**

## **APPENDIX D: DEMONSTRATION LATRINE DESIGN DRAWINGS**