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MINISTRE DE L'HYDRAULIQUE,  
DE L'ENERGIE ET DES MINES.



## GEOGRAPHIC INFORMATION SYSTEM (GIS) MAPPING STUDY OF DRINKING WATER AND BASIC SANITATION SERVICES IN URBAN AREAS

### FINAL REPORT

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Study conducted by Consulting and Logistics

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## ACRONYMS AND ABBREVIATIONS

|                        |                                                                                                                                                                                             |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>AHAMR</b>           | Agence Burundaise de l'Hydraulique et de l'Assainissement en Milieu Rural (Burundian Agency for Water and Sanitation in Rural Areas)                                                        |
| <b>AREEN</b>           | Regulatory Authority for the Drinking Water and Energy Sectors                                                                                                                              |
| <b>BAD</b>             | African Development Bank                                                                                                                                                                    |
| <b>CTB/SETEMU</b>      | Belgian Technical Cooperation/Municipal Technical Services                                                                                                                                  |
| <b>CWIS-SAP</b>        | Citywide Inclusive Sanitation Services Assessment and Planning                                                                                                                              |
| <b>BOD<sub>5</sub></b> | Biochemical Oxygen Demand over a 5-day period                                                                                                                                               |
| <b>COD</b>             | Chemical Oxygen Demand                                                                                                                                                                      |
| <b>ESAWAS</b>          | The Eastern and Southern Africa Water and Sanitation                                                                                                                                        |
| <b>INEA</b>            | 2007 National Water and Sanitation Inventory (INEA)                                                                                                                                         |
| <b>GIRE</b>            | Integrated Water Resources Management                                                                                                                                                       |
| <b>OBUHA</b>           | Office Burundais de l'Urbanisme et de l'Habitat et de la Construction (Burundi Office for Urban Planning, Housing and Construction)                                                         |
| <b>WHO</b>             | World Health Organisation                                                                                                                                                                   |
| <b>NGO</b>             | Non-Governmental Organisation                                                                                                                                                               |
| <b>PDA</b>             | Sanitation Master Plan                                                                                                                                                                      |
| <b>PPP</b>             | Public-Private Partnerships (PPP)                                                                                                                                                           |
| <b>REGIDESO</b>        | Régie de Production et de Distribution d'eau et d'électricité (Régie de Production et de Distribution d'eau et d'électricité (Water and electricity production and distribution Authority)) |
| <b>UNICEF</b>          | United Nations Children's Fund                                                                                                                                                              |
| <b>SETAG</b>           | Gitega Technical Sanitation Department                                                                                                                                                      |
| <b>SP</b>              | Pumping Station                                                                                                                                                                             |
| <b>STEP</b>            | Water treatment plant                                                                                                                                                                       |

## EXECUTIVE SUMMARY

The purpose of this work is to map the drinking water and basic sanitation infrastructures carried out by the Regulatory Authority for the Drinking Water and Energy Sectors (AREEN) in order to have a reliable database that will be used by the various partners in the sector. In this way, it serves as a strategic guidance tool for decision-making.

The methodological approach adopted by the study's commissioner and validated by the CTIS combines qualitative and quantitative research through an exhaustive census of drinking water and basic sanitation infrastructures using the mWater tool in a defined work area<sup>1</sup>. The statistical units surveyed are properties as well as facilities or institutions in all of Burundi's urban centers. For mapping purposes, a database was implemented in the PostgreSQL Database Management System (DBMS) with the PostGIS extension, which also links up with Geographic Information System (GIS) software. GIS software such as QGIS was used to carry out spatial analysis and mapping, and above all to establish a link with PostGIS so that the spatial information could be used.

On the basis of our analysis of qualitative data and information, we have identified the following elements, which serve as a reference for understanding the institutional arrangement and the operational regulatory framework:

- ✓ The institutional arrangement is made up of state actors, private actors, local actors and financial partners. Gaps due to insufficient cooperation and communication at the institutional level are bottlenecks that require an improvement of the laws and regulations or any other institutional reform in order to ensure the overall harmony, effectiveness and operational and functional efficiency of the entire institutional architecture of the drinking water and basic sanitation sector in Burundi.
- ✓ Of the 18 urban centers surveyed, only Bujumbura Municipality and the political capital of Gitega also have inadequate sanitation infrastructures. Autonomous or non-collective sanitation systems are more widespread and used. Public drinking water service is more widely available in all urban centers, but investments are still needed to improve quality, availability time, equitable access, hygiene and environment, etc.

In terms of quantitative and cartographic analysis, the following elements of decision-making and strategic information should be retained:

- ✓ Overall, 58,878 households (with an average of 1.9 households per plot) and 1,3337 facilities or institutions were surveyed, representing 95.1% and 4.9% respectively.
- ✓ A number of facilities and institutions were visited, including 800 schools, 202 health facilities and many others.

### In relation to autonomous sanitation:

- ✓ The rate of ownership of toilets is 99% at household level and 87% at the level of facilities or institutions.
- ✓ The five main types of toilets that are more commonly used in properties than in facilities or institutions are: Sitting toilet with flush connected to septic tank and cesspool, Turkish

<sup>1</sup> The defined working area can be viewed at the following link: <https://1drv.ms/f/s!AigwANgnciNWiwL4r5vFD05BC4CD?e=2kDukU>

flush toilet, sitting toilet with flush connected to septic tank, flush to pit toilet, dry pit toilet with reinforced concrete slab.

- ✓ 70.1% of households have latrines with septic tanks, compared with 29.9% who have latrines without septic tanks. In terms of infrastructures (facilities or institutions), 73.3% have latrines with septic tanks compared with 26.7% who have latrines without septic tanks.
- ✓ An average of 2 toilets per plot and 5 toilets per facility was calculated, and 1% of households share sanitary facilities with other households;
- ✓ Around 33% of households and 44% of facilities or institutions have an improved sanitation facility. 65.8% of residential properties and 43% of facilities have unimproved facilities. Open defecation occurs in about 1 in 10 facilities (12%) and in less than 1% of households.

#### Collective sanitation:

- ✓ The rate of connection to the public network is 4% for households, and 10% of all facilities or institutions are connected to the network (overall indicator for the 18 urban centers covered by the study).
- ✓ Only two provinces (Bujumbura Municipality and Gitega) have a public sewerage system. The majority of connected properties are in the city of Bujumbura, at a rate of 7% for households and 20% for facilities or institutions.
- ✓ In the province of Gitega, only the SHATANYA neighbourhood is connected to the network, representing 0.9% of households, and no facilities or institutions are connected to the network.

#### About drinking water:

- ✓ Around 67% of households are connected to the drinking water network, compared with 70% of structures or institutions.
- ✓ 7,9472 meters were identified in households compared with 8,627 meters in facilities or institutions, representing 58% and 64% respectively.
- ✓ Of these, 76643 meters counted at household level belong to REGIDESO, representing 96.4% of the total, and 8500 meters counted in facilities or institutions also belong to REGIDESO, representing 98.53% of the total.
- ✓ 2 households use 2 water installations in a plot with eight people.
- ✓ 86.6% of households have water sources that are managed safely, including 78.6% and 8.0% of households with piped and un-piped water respectively.
- ✓ A significant proportion of households (13.4%) draw water from unimproved sources such as rivers or surface water.

#### As for the hygiene situation:

- ✓ (24%) of households have a hand-washing facility at home, and around 5 out of 10 (47%) of facilities or institutions have a hand-washing facility.
- ✓ 69% of households reported that they had sanitary bins for menstrual hygiene, while another 29% did not.
- ✓ The majority of women use disposable pads for menstrual hygiene (76% of households), while 24% use reusable products.

Detailed information can be found in the report, not forgetting to mention that a Geoportal of the data was designed as part of this study and contains the entire database, tables and maps to be searched according to the needs of the reader or user.

At the end of the process, a number of recommendations were made, including improving the legal and regulatory framework, prioritising sanitation investment projects in national planning, improving mechanisms for collaboration and institutional communication, and many others.

## I. CONTEXT AND OBJECTIVES

### I.1. Introduction

Universal access to adequate drinking water and basic sanitation services, the construction of drinking water and basic sanitation infrastructures in urban, peri-urban and rural areas, and the establishment of a political, legal and regulatory framework supported by an appropriate institutional arrangement remain fundamental to sustainable development and the achievement of the Sustainable Development Goals (SDG6) at national and international level.

Geographic Information System (GIS) mapping of drinking water and basic sanitation services is of crucial importance in a world where access to safe drinking water and adequate sanitation is a major challenge for many communities. The issues driving this mapping are vast and varied, reflecting essential needs in terms of health, development and sustainability.

Access to drinking water is a fundamental human right, yet in Burundi, as in other countries around the world, millions of people do not have access to it. Setting up drinking water services contributes directly to reducing morbidity linked to water-borne diseases and improves living conditions for the population.

The aim of this work is to carry out GIS mapping of drinking water and basic sanitation services, based on the collection of geospatial data in the field, digitisation and integration into a geographic information system. This will enable various layers of information to be superimposed, data to be displayed on interactive maps, and spatial analysis to be carried out for informed decision-making.

The mapping of drinking water and basic sanitation services is motivated by a number of important issues, in particular:

- **Access to drinking water:** This work will enable us to identify the areas that do not yet have adequate access to drinking water, which is essential for improving the health and living conditions of the entire population of Burundi.
- **Adequate sanitation:** Given that sanitation is as crucial an issue as access to drinking water, GIS-based mapping shows whether people have access to safe sanitation facilities, thereby reducing health risks.
- **Efficient resource management:** Once the infrastructures have been mapped, the institutions from the ministries concerned can see how best to manage the financial, human and material resources needed to maintain and develop drinking water and basic sanitation services.
- **Informed decision-making:** Political decision-makers, policy makers, urban planners and other stakeholders will use this GIS data to make appropriate decisions in planning, directing investment and establishing the political, legal and regulatory framework for sustainable development of drinking water and basic sanitation services.

- **Reducing inequalities:** This mapping will highlight the disparities in access to drinking water and basic sanitation, which can be reduced by targeting the most vulnerable areas.
- **Sustainable development planning:** This mapping will provide useful information for effective urban planning. The institutions responsible for managing drinking water and basic sanitation services in urban areas will be aware of where new infrastructures should be built (the areas that are most vulnerable due to a lack or inadequacy of services) in order to properly manage issues linked to demographic change.

## I.2. Objectives of the study

In Burundi, the drinking water and basic sanitation sector suffers from a glaring lack of reference data and appropriate legal and regulatory texts. This poses a challenge in terms of effective planning and governance, aligning with best practices observed in other countries worldwide that have achieved significant progress in the management of drinking water and sanitation services, including those within the Eastern and Southern Africa Water and Sanitation (ESAWAS) region. In addition, some of these countries utilize tools such as CWIS-EQUISERVE (formerly known as CWIS-SAP) for planning and assessing sanitation services to enhance service quality. However, the effective utilization of such tools relies on the availability of data, making GIS mapping activities a top priority in this regard.

**Thus, the overall objective of this study is to conduct an inventory of basic drinking water and sanitation services in urban areas (refer to the delimited action zones in the appendix) in order to establish a reliable database that will be utilized by various sector partners according to their respective areas of intervention.**

The specific objectives of this study are as follows:

- Conducting GIS mapping of drinking water and basic sanitation services in the 18 urban centers of the country, as specified, in order to establish a reliable GIS database.
- Collecting information on the management of drinking water and basic sanitation services and creating a reference (baseline) database for decision-makers.
- Enhancing the technical capacities of the AREEN unit members responsible for managing the GIS database.
- Assessing the communication, collaboration, and information sharing system related to the planning, monitoring, and implementation of investment and governance actions in the sector by public institutions, including OBUHA, SETAG, REGIDESO, AHAMR, and others.

The study is focused on two target categories: (i) Households and (ii) Facilities. The household category includes all households located in urban and peri-urban centers<sup>2</sup>. The second category encompasses various types of facilities or institutions such as schools, health centers, shops, waste-producing industries (factories or processing units), sports centers like playgrounds, religious centers, military camps, administrative institutions, water infrastructures (reservoirs, standpipes, wells, and boreholes), as well as basic sanitation facilities (latrines, WCs, septic tanks, etc.). The survey covered the delimited areas in their entirety.

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<sup>2</sup> It should be noted that not all peri-urban areas surrounding each urban center were included in the data collection process. Only the zones deemed more relevant and validated by the study's sponsor were taken into account (see the delineation maps).

## II. METHODOLOGICAL APPROACH

### II.1 Introduction

Consideration of the methodology to be used for GIS-based mapping of drinking water and basic sanitation services was fundamental to ensuring that the objectives of the study were achieved. It enabled the design of approaches that were appropriate, sustainable and aligned with the real needs of the target communities. The study was based on an effective methodological approach that took account of regulatory issues, cultural barriers and specific needs. The methodological approach adopted and validated by the authorised technical services, including the National Ethics Committee and the public authority issuing the statistical visa, enabled data and information to be collected so that relevant indicators could be calculated in order to assess the rate of access to drinking water and basic sanitation, the availability of services, design a Geoportal and many other important aspects.

The database will enable service providers in general, and OBUHA and SETAG in particular, to test the CWIS-EQUISERVE tool, which has already been tested in countries such as Zambia (Lusaka), Kenya (Nakuru), Bangladesh (Khulna), Tanzania (Dar-Es-Salaam), Uganda (Kampala) and India (Trichy). It should be noted that the GIS mapping of drinking water and basic sanitation services is based on Burundi's former administrative configuration, which consisted of eighteen (18) provinces before the recent administrative reconfiguration that reduced them to five (5), which will be effective in 2025.

The exhaustive inventory provided a complete picture of all aspects of sanitation in urban areas, taking advantage of the benefits and opportunities offered by new information and communication technologies. This methodological approach also made it possible to guarantee the reliability of the data collected and the completeness of the information.

The stages of the study can be summarised as follows:

- A) Preparatory phase: Literature review, delimitation of the action zone<sup>3</sup>, drafting and configuration of the data and information collection questionnaire in the mWater application, drafting of the research protocol to seek the opinion of the National Ethics Commission and the statistical visa, recruitment and training of data collectors, testing (pre-testing) of the collection tool, participation in debriefing sessions and logistical preparation of the actual data collection.
- B) Data collection phase using the mWater application and Q-Field.

<sup>3</sup> The action zone is represented using polygon images

- C) Analysis and design of the GIS: Cleaning of the database, analysis of the data and production of indicators, design of the GIS database and the Geo-portal.
- D) Preparation of deliverables: Drafting of the provisional report, training of AREEN's internal technical committee on the management and operation of the GIS database, diagnosis of the server purchased by AREEN.
- E) Presentation of the provisional report to the technical committee responsible for monitoring the study for validation.
- F) Preparation of the final deliverables: Integration into the report of the observations and recommendations made by the technical monitoring committee, finalisation of the Geo-portal and loading of the database onto the server, transmission of the final report and delivery of the Geo-portal access and security codes to AREEN.

## **II.2. Study Preparation**

### **II.2.1. Literature review and questionnaire design**

Given that the aim of the study is to set up a GIS database that will enable decision-makers to make informed decisions, not forgetting the use of the "CWIS-EQUISERVE" planning tool by sanitation service operators, the first stage of the research was devoted to exploiting and reviewing reference documents that could be used in similar assignments, analysing the policy, legal, regulatory and institutional framework and the regulatory instruments of the sectors covered by this study.

A draft questionnaire, based on other similar studies carried out in the area covered by the ESAWAS association, was drawn up by the sponsor of the study and then validated by an ad hoc Interministerial Technical Committee in the presence of the Consultant.

### **II.2.2. Research protocol and statistical visa**

In accordance with the regulations in force in Burundi, a research protocol for this study was drawn up by the team of experts from All Consulting and Logistics in accordance with the rules of the art, to enable the commissioner of the study to submit requests for an ethical opinion and a statistical visa to the authorised bodies. Subsequently, after AREEN had submitted these various requests, a favourable opinion was issued by the National Ethics Committee for the Protection of Human Subjects of Biomedical and Behavioural Research, and a statistical visa No. 540/95/4232/2023, dated 6 September 2023, was issued by the Ministry of Finance, Budget and Economic Planning, which has the National Institute of Statistics of Burundi (INSBU) under its supervision.

### **II.2.3. Training of data collectors**

Training data collectors is an essential investment to ensure that data collection is carried out professionally, efficiently and ethically. This guarantees the high quality of the data collected and is crucial to the reliability of the study results.

The training of data collectors was based on the following main objectives:

- Understanding the objectives enabled them to understand the scope of the study, the research questions and the importance of each topic to be investigated; this led the data collectors to align themselves with the objectives and issues of the study.
- The data collectors' mastery of standardised data collection methods, which contributes to the coherence and consistency of the information gathered in the field.
- Conducting the survey based on mastery of specific tools, such as electronic questionnaires, the mWater questionnaire mobile application and how to take GPS coordinates from properties (use of tools and technology). Interviewing and communication techniques were emphasised during the training so that interviewers could interact effectively with respondents, gather information objectively and avoid bias.
- The data collectors' adaptation to the cultural context, which enabled them to adapt to local contexts while taking into account cultural variations and the specificities of the communities surveyed (adaptation to the local context).



Figure 1: Data collectors' training

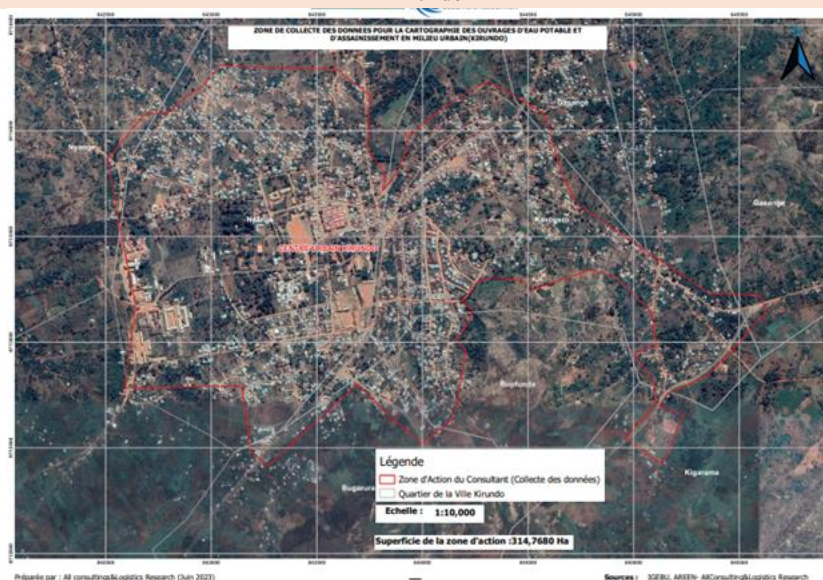
## II.2.4. Delimitation of the collection zone

In preparation for the actual data collection phase, a team of GIS technicians delimited the action area and took GPS coordinates of the boundaries of the urban and peri-urban centers. This was followed by vectorisation, the creation of polygon files and the creation of ortho-photo background maps of the 18 urban centers.

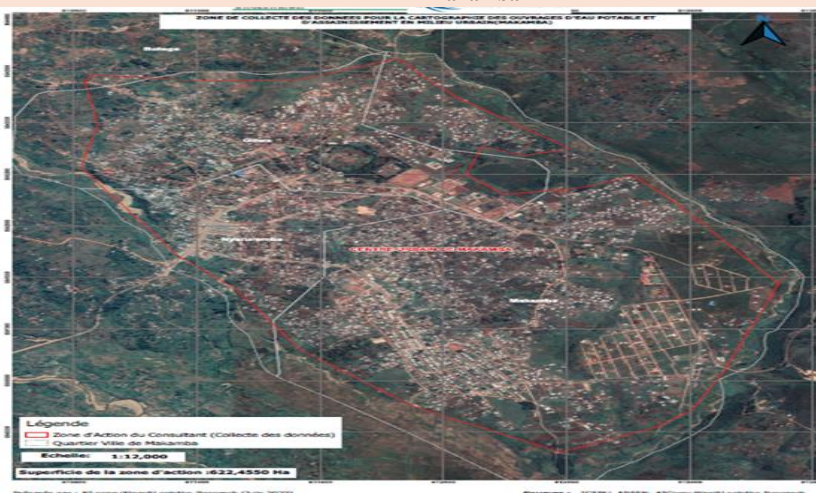
(<https://1drv.ms/f/s!AigwANgncjNWiw14r5vFD05BC4CD?e=2kDukU>).

The following maps illustrate<sup>4</sup> the working area as defined. The maps are included in the report for illustrative purposes, while the entire database can be found on the Geo-portal.

**Kirundo**

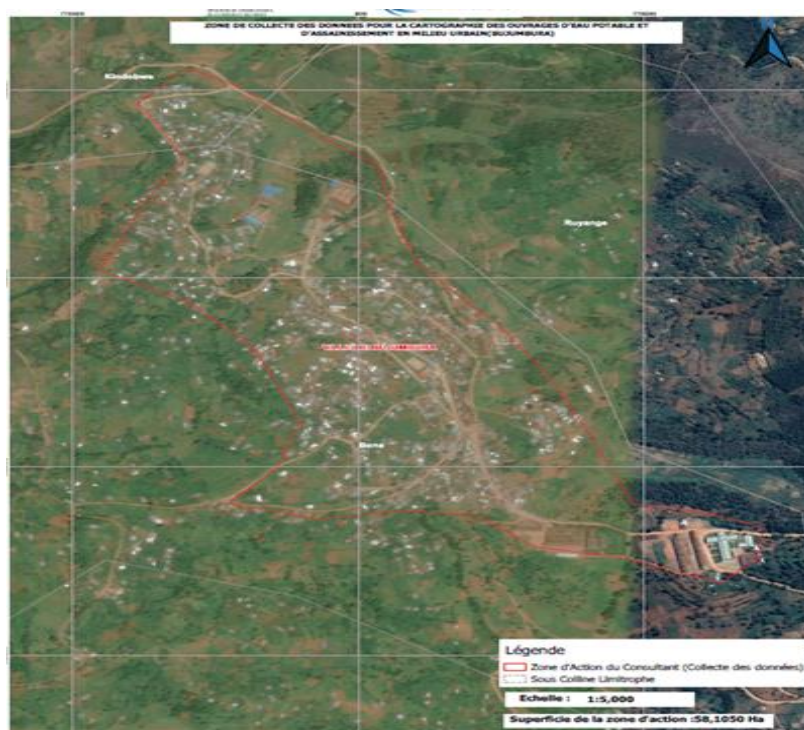


**Makamba**

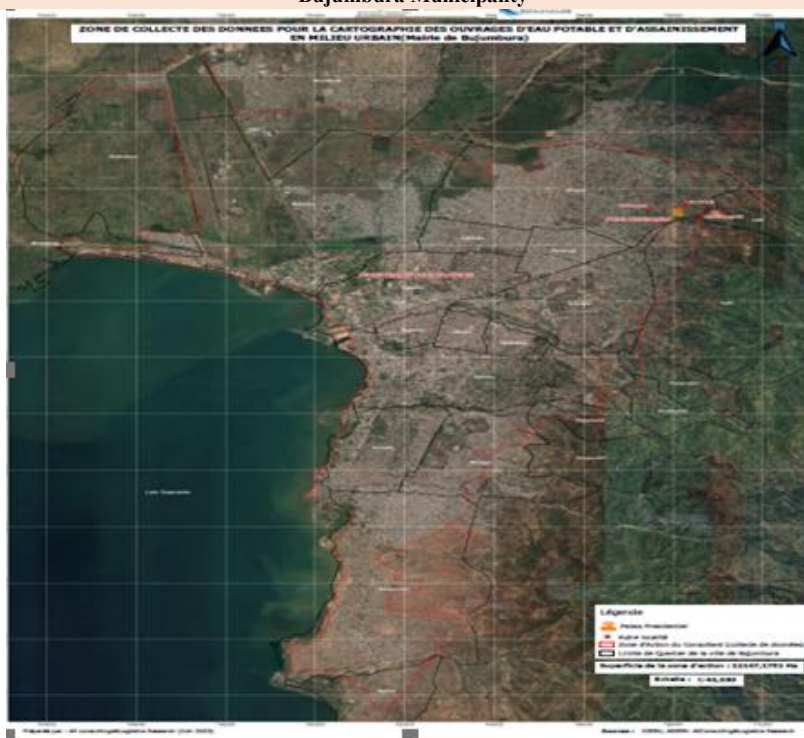


**Bujumbura**

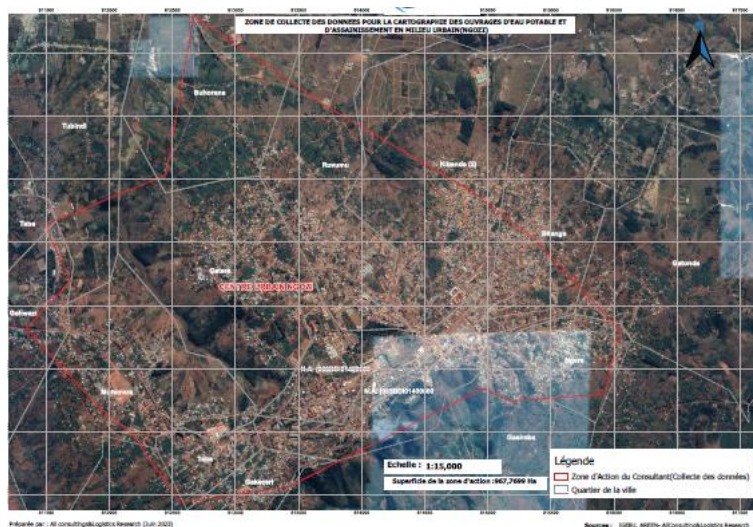
<sup>4</sup> A link is provided in the appendix to download the maps resulting from the delimitation.



Bujumbura Municipality



Ngozi



## Gitega



Figure 2: Delimitation of the study area

## II.3. Data collection process

### II.3.1. Collection tool (mWater)

In order to make the operation efficient and fast, the questionnaire used in the field was configured on the data collectors' smartphones using the electronic application (mWater) just like a paper version with identifiers for the different variables contained in the questionnaire. The tool used is designed to map drinking water and basic sanitation services such as water points, sanitation facilities, standpipes, schools, etc. and monitor them over time by means of mobile surveys. The application works both online and offline.

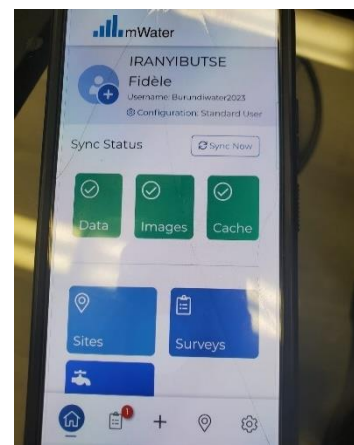


Figure 3: Data collection tool

### II.3.2. Collection with QField

The Qfield application collects all the different types of data using online Google images or offline embedded maps as well as the GPS tool. This approach is applicable in the case of collecting linear data, such as structures located on the sanitation network (sewer system).

### II.3.3. Data collection proper

Collecting data from households is important in the context of mapping drinking water and basic sanitation services. It contributes to a more holistic approach to the planning and management of drinking water and sanitation infrastructure, taking into account specific needs and local realities.

The survey was organised into two target categories: a household survey and a survey of facilities or institutions. The survey covered all households in the urban areas of Burundi's 18 provincial capitals. Each provincial capital was assigned a controller, except for Bujumbura Municipality, where five controllers were assigned due to its larger area and complexity compared to the country's other provinces. The interviewers were allocated as shown in the table below:

| N# | Province               | Commune          | Number |
|----|------------------------|------------------|--------|
| 1  | Bubanza                |                  | 3      |
| 2  | Bujumbura              |                  | 6      |
| 3  | Bujumbura Municipality | 3 communes       | 98     |
|    |                        | <i>Muha</i>      | 31     |
|    |                        | <i>Mukaza</i>    | 35     |
|    |                        | <i>Ntahangwa</i> | 32     |
| 4  | Bururi                 |                  | 2      |
| 5  | Cankuzo                |                  | 2      |
| 6  | Cibitoke               |                  | 4      |
| 7  | Gitega                 |                  | 8      |
| 8  | Karusi                 |                  | 2      |
| 9  | Kayanza                |                  | 6      |
| 10 | Kirundo                |                  | 4      |
| 11 | Makamba                |                  | 5      |
| 12 | Muramvya               |                  | 3      |
| 13 | Muyinga                |                  | 7      |
| 14 | Mwaro                  |                  | 2      |
| 15 | Ngozi                  |                  | 8      |
| 16 | Rumonge                |                  | 7      |
| 17 | Rutana                 |                  | 3      |
| 18 | Ruyigi                 |                  | 4      |

Table 1: Distribution of data collectors by province

✓ **Household surveys:** The household survey (target 1: all households in urban areas<sup>5</sup> in Burundi's 18 provincial centers) was used to assess the specific needs of communities in terms of drinking water and basic sanitation.

It was during this survey that areas with low levels of access to drinking water and adequate sanitation facilities were identified.

✓ **Facilities or institutions:** The survey assessed the availability, accessibility and condition of drinking water and sanitation facilities in each zone. The facilities or institutions targeted by the survey are mainly:

- Schools;
- Health facilities (hospitals and health centers);
- Commercial structures (markets, restaurants and bars, etc.)
- Industrial establishments producing waste (factories or processing units);

<sup>5</sup> Geographically defined work area

- Sports facilities such as stadiums and playgrounds;
- Religious communities;
- Military and police camps;
- Administrative institutions;
- ✓ **Water infrastructure:** reservoirs, wells, boreholes and standpipes;
- ✓ **Supervision and quality control:** Every evening, the data was sent to an mWater server whose access codes were managed by the firm's experts (one statistician, one GIS expert). The statistician carried out downloads to check the quality of the data sent. The elements checked included the completeness (exhaustiveness) and internal consistency of the responses. Once the data had been collected, a final check was carried out on external consistency, i.e. the conformity of the data with other existing information. The GIS expert checked the coverage of the action zone using the GIS monitoring tools. All these steps ensured that the data was of good quality. Supervision was provided by the consultancy firm and AREEN.

## II.4. Data analysis and GIS design

Data analysis for this study combines statistical and GIS expertise. The statistical analysis, carried out using Stata software, mainly covers themes related to the general characteristics of the property, basic sanitation, drinking water and hygiene. Details are given in the results chapter.

For mapping purposes, a database is implemented in the PostGreSQL Database Management System (DBMS) with the PostGIS extension, which also provides a link with the Geographic Information System (GIS) software. GIS software such as QGIS was used to carry out spatial analysis and mapping, and above all to establish a link with PostGIS so that the spatial information could be used.



The Geo-portal, which is a public web portal providing access to search and display services for geographical or geolocalised data, has been designed. The consultant also provided training for the managers of the spatial database for drinking water and basic sanitation services.

### III. PRESENTATION OF THE CURRENT SITUATION IN THE SECTORS

#### III.1. Institutional and regulatory framework

##### III.1.1. Institutional framework

In Burundi, the urban drinking water and sanitation sector is attracting the attention of political decision-makers. This is reflected in the initiatives of the Government, which has already put in place a National Water Policy and a National Sanitation Policy and their implementation strategies, which provide general guidance on the implementation of programmes and projects in the water and sanitation sector.

REGIDESO, a government institution, is responsible for producing and distributing drinking water in urban areas. As for inclusive urban sanitation, the Government has initiated a reform by setting up OBUHA with a Department in charge of the Environment, Hygiene and Urban Sanitation (DEHA), whose main mission is to manage sanitation services in all the country's towns and urban centers, in the light of what the Rural Water and Sanitation Agency (AHAMR) does.

Through its DEHA Department, OBUHA acts as Burundi's implementing agency in this sector, working closely with the sectoral institutions of the Ministry of the Environment, Agriculture and Livestock (DGEREA) and the Ministry of Hydraulics, Energy and Mines (DGEPA), which are responsible for drawing up policies and strategies for the management of the sector. As for the regulation of the drinking water and basic sanitation sector, the Government has set up the Drinking Water and Energy Regulatory Authority (AREEN), which is exclusively mandated to fulfil this vital role.

As a reminder, urban sanitation has always been dealt with only in the two cities of BUJUMBURA with the Municipal Technical Services (SETEMU) and the city of Gitega with the creation of the Technical Sanitation Services of Gitega (SETAG), which still has no administrative and financial management autonomy.

In addition, the Rural Water and Sanitation Agency (AHAMR) was set up to help improve access to basic sanitation and drinking water in collaboration with local authorities. It is against this backdrop that AHAMR has built sewage sludge management facilities that will serve the population of urban and peri-urban areas in some of the country's provinces. It should be emphasised that the drinking water and sanitation sector cuts across the various sectoral ministries, which is why the Ministry of Public Health and the Fight against AIDS, through the Directorate of Health Promotion, Care Demand, Community and Environmental Health (DPS-DSCE), plays an important role in developing policies relating to wastewater management.

### III.1.2. Regulatory framework

Drinking water and basic sanitation services are essential public services par excellence that need to be regulated in terms of tariffs, quality of service, competition and, in some cases, consumer protection. The intervention of the public authorities in the water and sanitation sectors is considered necessary by economists in order to address a number of market failures that indicate that the free play of competition in these sectors does not meet the expectations of society as a whole.

In Burundi, the Regulatory Authority for the Drinking Water and Energy Sectors (AREEN) was created under Decree No. 100/159 of 5 November 2018 on the statutes of the Regulatory Authority for the Drinking Water and Energy Sectors (AREEN), in order to ensure the regulation of the provision of drinking water supply and basic sanitation services for the efficiency and sustainability of these services.

AREEN has contributed to improving the management of drinking water and basic sanitation services by ensuring their regulation, mainly in urban and peri-urban areas, without forgetting the organisation of workshops or conferences to raise awareness among all stakeholders (the population, the administration, operators and other actors, etc.) about the proper management of these services.

However, despite the successes achieved over more than 8 years of the Regulatory Authority's existence, autonomous sanitation has yet to receive deserved attention in service provision and regulation. This is due to the fact that the regulation of sanitation services is recent (since 5 November 2018).

Moreover, most of the policies, laws and other texts governing the sanitation sector do not rightly recognise these services throughout the sanitation value chain. The absence of clear regulation for autonomous sanitation services, particularly concerning the handling of faecal sludge, has resulted in inadequately constructed facilities, unauthorized disposal of faecal sludge, hazardous and unhygienic emptying practices, overall environmental pollution, and specifically, contamination of water resources. Additionally, both public and private operators charge for emptying services without any official regulations in place.

In the Eastern and Southern Africa region, there is an association of water and sanitation regulators whose members are the regulators of the drinking water and sanitation sectors of the various countries in this region, called "ESAWAS". The tasks of this regulatory association include:

- Promoting high-quality regulation, monitoring, and evaluating regulatory practices.
- Sharing the benefits of expertise to improve the effectiveness of regulation and exchange best practices on regulatory implementation and compliance.

- Providing a framework for exchanging regulatory issues, sharing information and experiences to facilitate the exchange of views and common positions, where appropriate.
- Promoting research and development in various aspects of regulation to encourage the adoption of best practices, enhance harmonization, and improve the effectiveness of the regulatory framework

AREEN, as a member of this association, has carried out experience-sharing visits to regulatory institutions in the ESAWAS region in order to learn about good practices in regulating the provision of drinking water and basic sanitation services. As part of the implementation of the good practices acquired, AREEN has encouraged public institutions to use a planning and guidance tool for safe and sustainable investment called "CWIS -EQUISERVE" at the city level in Burundi. Inclusive urban sanitation, commonly known as "CWIS", is an approach to urban sanitation where all populations must have access to adequate and affordable sanitation services (with or without sewers) without the risk of environmental contamination throughout the sanitation value chain.

### III.1.3. Interactions between actors

At the heart of the crucial issues surrounding the drinking water and sanitation sector, institutional communication between stakeholders plays a crucial role, as a lack of effective communication between actors can significantly hamper the achievement of common objectives. The lack of ongoing dialogue can have consequences for the coordination of efforts, the quality of services provided and the sustainability of infrastructures. The drinking water, hygiene and sanitation sector is managed by a multiplicity of actors, each with specific responsibilities and no close coordination.

#### a. State actors at central level

The government players involved in the water, hygiene and sanitation sector are spread across four ministries via their directorates in charge of sector issues.

- ✓ The Ministry of Public Health and the Fight against AIDS (MSPLS), through the Department of Health Promotion, Hygiene and Sanitation (DPSHA). This institution helps to guide national sanitation policy by monitoring and supervising domestic sanitation, waste treatment and the definition of technical standards and norms for the potability and quality control of drinking water.
- ✓ The Ministry of Water, Energy and Mines (MINHEM) with the Directorate General of Drinking Water and Basic Sanitation (DGEPA) and the Burundian Rural Water and Sanitation Agency (AHAMR). These institutions are responsible for planning and building drinking water and basic sanitation infrastructure. AHAMR is also responsible for supervising decentralised bodies in the implementation of projects and programmes and the management of basic sanitation infrastructure. In urban areas, public drinking water services are the responsibility of REGIDESO.

- ✓ The Ministry of the Environment, Agriculture and Livestock, through the Directorate General for the Environment, Water Resources and Sanitation (DGREA). As such, it is responsible for designing and implementing national sanitation policy in collaboration with other departments.
- ✓ The Ministry of Infrastructure, Public Works and Social Housing through the Department of the Environment, Hygiene and Sanitation (DEHA).

For these actors, mandates are allocated in different institutions without having an overall vision or without prior consultation with the other players with a view to overall harmony. This can lead to overlapping responsibilities, sometimes resulting in inefficiencies and duplication of human, material and financial resources. Another no less important institutional challenge is the lack of coherent data or information, as several actors may be entrusted with similar tasks without clarity as to who is responsible for what.

### **b. Private actors**

Most of the private actors in the sanitation sector in Burundi operate on a formal basis. These private operators focus more on sludge emptying, and work directly with OBUHA via the Department of the Environment, Hygiene and Sanitation (DEHA). However, there is another category of informal operators who carry out the same work in different parts of the city. The main clients of these informal operators are households, and they carry out a large volume of emptying work. To improve this situation and promote safer and more sustainable practices for these informal actors, DEHA should take steps to offer training to informal actors in good sludge management practices, including aspects relating to safety, hygiene and the environment.

When it comes to building latrines, some construction companies are also involved in the sanitation sector.

### **c. Local actors**

In sanitation management, the main stakeholder is always the local population of each town. Given that in Burundi, autonomous sanitation covers a large part of the urban and peri-urban environment, the population is considered to be the central and most active stakeholder in sanitation management. This category of stakeholder should not be considered as a beneficiary, but rather as the stakeholder who deserves to be involved in proposing solutions to local challenges adapted to reality.

### **d. Development partners**

Multilateral cooperation from Development partners working in the sanitation sector in Burundi is largely represented by initiatives from UNICEF, the African Development Bank, the World Bank and the World Health Organisation. As far as bilateral cooperation is concerned, the sanitation sector is marked by Belgian cooperation, which finances several projects (e.g. Latawama) linked to equipment supplies and capacity building.

All these actors need a framework for collaboration and communication (within the framework of a Sectoral Working Group, for example) to promote institutional and multi-sectoral dialogue. This framework is all the more important during the phases of reform of regulatory and legislative frameworks, strategic planning, preparation of vision documents, etc.

### **III.2. Legislation governing the drinking water and basic sanitation sector**

The drinking water and basic sanitation sector in Burundi is governed by laws and regulations designed to reframe, coordinate and guide the actions of the various stakeholders. Some of these texts are as follows:

- ✓ Decree-Law no. 1/41 of 26 November 1992 on the establishment and organisation of the Public Hydraulic Domain. It is considered the basic text of Burundian legislation on water resources and contains provisions designed to ensure better protection and rational and balanced use of water resources;
- ✓ Decree-Law no. 100/241 of December 31, 1992, regulating the disposal of wastewater in urban areas, which aims to preserve the environment and ensure public hygiene and sanitation;
- ✓ Law no. 1/010 of 30 June 2000 on the Environmental Code, which stipulates that all major works, structures and developments likely to alter hydraulic balances, watercourses or the configuration of banks, or to harm the preservation of aquatic species, must be subject to the impact assessment procedure;
- ✓ Law no. 1/014 of 11 August 2000 on the liberalisation and regulation of the public drinking water service. This law provides for the liberalisation of the sector with a view to opening it up to private players or investors.
- ✓ The National Water Policy adopted in December 2009, the overall objective of which is to guarantee sustainable coverage of the needs of all users through the harmonious development of water resources.
- ✓ The adoption of the National Sanitation Policy (Politique Nationale d'Assainissement - PNA) in 2013, the aim of which is to provide guidelines for the development of the sanitation sector in the broadest sense of the term.
- ✓ The policy and strategy documents have been improved over the years.

Despite the existence and promulgation of these texts, the majority of them are not applied because they are not accompanied by other texts promoting their application. At present, only the National Water Policy is being implemented, although it is behind schedule in terms of its action plan. The law liberalising and regulating the public drinking water service is also being amended, but its adoption is still eagerly awaited, given the crying needs in terms of investment and governance.

### III.3. The sanitation sector

#### III.3.1. Urban sanitation sector

In Burundi's urban centers, wastewater management leaves much to be desired. In the city of Bujumbura, there is a collective wastewater evacuation network, with a certain percentage of households, establishments open to the public and industries connected to it, giving rise to a non-separated collective network where domestic wastewater and industrial wastewater are mixed.

The treatment plant is located to the north of the city of Bujumbura (at BUTERERE) on an area of 42ha and was built to accommodate a capacity of 40,000 m<sup>3</sup> per day, but currently only receives an average of around 22,000 m<sup>3</sup> per day. There are also sludge drying beds covering an area of 4,000 m<sup>2</sup>, 4 pumping or lifting **stations** and a wastewater analysis laboratory.

Apart from households in some neighbourhoods that are connected to communal wastewater networks, other households use independent sanitation systems.

As for the country's other urban centers, only four towns have already benefited from sanitation infrastructures such as faecal sludge disposal sites, a wastewater treatment plant and a control dump. These sites have been built in the town of GITEGA in SHATANYA and MASENGA in NTOBWE, in the Province of RUYIGI in DUTWE, in the Province of KAYANZA in MUYANGE, in the Province of NGOZI in GATONGE and in the Province of MUYINGA in CUMBA. Of these sites, only those in GITEGA, NGOZI and RUYIGI are functioning at best, while the remaining two are in a deplorable state.

Town center sites in the provinces of KAYANZA, NGOZI and MUYINGA have been built as part of Burundi's reintegration into the EAC, and these towns have benefited from an East African Community project called Lake Victoria Water Supply and Sanitation (LVWATSAN II) financed by the African Development Bank. It is against this backdrop that the communes of the provincial capitals benefiting from the project have been provided with some of the equipment they need to operate these various sanitation facilities, including emptying trucks, refuse containers and tractors with trailers, which unfortunately remain unused for the time being.

For other towns, including those on the shores of Lake TANGANYIKA, such as NYANZA-LAC, with the exception of RUMONGE Province, where construction of the sewage sludge disposal site is underway at KIZUKA, management of the wastewater treatment sector is in a precarious situation, as there are no treatment facilities. The system used in these towns is called autonomous, but it is not managed in complete safety.

### III.3.1. 1. History of sanitation in the city of Bujumbura

The first sewage network in Bujumbura was built between 1952 and 1960. This network served around 2,000 homes in the five neighbourhoods of the Office des Cités Africaines (OCAF, in NGAGARA), with the outlet being Lake TANGANYIKA, very close to the mouth of the River KINYANKONGE, without any water treatment. Another network served part of the town centers and also discharged untreated into Lake TANGANYIKA at BUYENZI, near the port of BUJUMBURA.

When the waters of the lake rose in 1964, the two outlets of these networks were completely blocked, then broken: the wastewater that flowed freely upstream from the lake then created marshy areas in the lower part of the city. At the same time, Bujumbura's public abattoir was served by a section of sewer leading into a natural thalweg (now called the KAMENGE stream or ravine) about a kilometre upstream from its confluence with the NTAHANGWA river, which also flows into Lake Tanganyika.

In the 1970s, major studies were carried out into the development of rainwater and wastewater networks, but due to funding problems, the work was not undertaken until later. In 1980, a wastewater drainage network was built in a new housing estate in MUTANGA SUD. The network was built by the Société Immobilière Publique (SIP) and consists of concrete pipes with diameters ranging from 200 to 300 mm. At the end of this network, the wastewater was discharged into the NTAHANGWA river, after passing through a decanter and being disinfected with calcium hypochlorite. This was the first wastewater treatment in Bujumbura.

In 1989, following the malfunctioning of the autonomous sanitary installations in the multi-family buildings of NGAGARA VI, a collective network was built there, with the NTAHANGWA river again as the discharge point, via two stabilisation basins built near the central bridge (not far from the Place des Nations Unies roundabout).

In 1993-1994, work was finally carried out to drain the city of BUJUMBURA's wastewater, which, along with a major expansion of the rainwater network, led to the installation of around a hundred kilometres of primary, secondary and tertiary networks and the current BUTERERE wastewater treatment plant. The four old outfalls were removed and the networks leading to them were connected to the new network. Pumping station no. 1 also dates from this period, although its actual operation was delayed due to a lack of connection to the electricity network.

In 1995-1996, the BWIZA and NYAKABIGA networks were built which, along with those of NGAGARA, constitute the densest wastewater networks in BUJUMBURA. In 2006-2007, the old NGAGARA network (wards I to V) was rehabilitated and extended to wards VI and VIII. This work of building new networks and rehabilitating old ones posed problems for SETEMU, which was hardly involved in their implementation. Not all plots were connected, so some are still

connected to the old network. The parallel operation of the two networks complicates maintenance work, especially as the alignment plans are not accurate.

In 2009, the section serving the slaughterhouse was rehabilitated and connected to the new NGAGARA network leading to the wastewater treatment plant. In 2012, a new network serving Ngagara V neighbourhood was brought into service. In 2013, work was carried out to connect certain neighbourhoods in Buyenzi, funded by the UNDP-GEF project, and around 1,300 m of secondary pipes and 800 m of tertiary pipes, all in PVC 200, were laid. In 2023, with funding from the Burundian government, OBUHA will extend the network to the KIGOBE NORD-EST neighbourhood over a distance of around 2.5 km.

At present, some areas of the city of Bujumbura, notably parts of the Ngagara, Bwiza, Buyenzi, Rohero, Asiatique, Industriel, Nyakabiga, Mutanga Sud and Kigobe Nord neighbourhoods, are covered by the collective wastewater drainage network.

The issue of connection to the public sewer remains problematic, as the urban population is not sufficiently aware of this. In most cases, residents of certain neighbourhoods were not even aware that the sewer system passed through their homes, while others took it upon themselves to connect their wastewater to the rainwater system, sometimes even in an open gutter, thereby polluting the environment and Lake Tanganyika, which is the natural outlet for these rainwater collectors.

### III.3.1.2. Sanitation infrastructure managed by OBUHA

The city of Bujumbura has a large number of sanitation facilities. In addition to the manholes located at various points in the network, the city of Bujumbura has major infrastructures for collecting, transporting and purifying wastewater, and for treating faecal sludge:

#### III.3.1.2.1. Pumping stations (SP1, 2 & 3 and 4)

The city of Bujumbura's sewer network is equipped with four pumping stations operating in series. Pumping station No. 1 is equipped with three Flyght pumps.

The station had experienced a breakdown in which all three of its pumps were damaged, but for the time being the situation has been normalised, as the Government was able to bring the situation under control by purchasing other pumps, which cost more than two hundred and eighty-one thousand euros (EUR 281,000) and are operational.



**Figure 3: Pumping stations**

Stations 2&3 are equipped with a total of four pumps, including two submersible pumps for each station, and operate automatically.

While the two pumps at each station will have to operate in relay, only one pump for each station was working when we visited, but another new pump has been installed at SP2 to boost the station's delivery capacity.



Pumping station no. 4 is located at the BUTERERE wastewater treatment plant and consists of a system for lifting effluent to the lagoons using Archimedes screws.

### III.3.1.2.2. Lagoon treatment plant

The treatment plant is located in the Buterere urban area of Ntahangwa Commune, which is bordered to the south by the Ngagara industrial zone. The sizing and design of the stabilisation basins are broadly in line with the rules for lagoon-based treatment plants.

This station comprises the following structures:

- The arrival of raw wastewater through a 1200 mm diameter pipe
- Coarse screening (with a bar spacing of 10 cm) manually cleaned in two parallel rows
- Grit removal in two parallel rows using trapezoidal-shaped static grit chambers
- Lift station with three Archimedes screws, each with a capacity of 350 l/s and a lift height of 4.5 m
- Two sets of three successive lagoon basins

**Arrival and Spill****Screens****Desander****Archimedes screws and distribution channel**

*Figure 5: Wastewater entering the WWTP*

|                                                                                                                                                                                  |                                                                                                                                                                                                 |                                                                                                                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Two anaerobic tanks:</b><br><b>Depth: 2 metres</b><br>$V = 2\text{m} \times 90\text{m} \times 150\text{m}$ Volume =<br>$54\,000\text{m}^3$<br><b>Retention time: 1.5 days</b> | <b>Two optional pools: Depth:</b><br><b>1.5m</b><br>$V = 1.5\text{m} \times 150\text{m} \times 528\text{m}$<br><b>Volume = <math>237\,600\text{m}^3</math></b><br><b>Retention time: 6 days</b> | <b>Two maturities</b><br><b>Depth: 1m</b><br>$V = 1\text{m} \times 731\text{m} \times 150\text{m}$<br><b>V = <math>219\,300\text{m}^3</math></b><br><b>Retention time: 5.5 days</b> |
|                                                                                                 |                                                                                                               |                                                                                                  |

**Figure 5: Lagoon treatment**

The treatment plant has been designed with a treatment capacity of 760,000 population equivalent, of which 380 population equivalent (50%) is attributable to the domestic population and the remainder to the industrial population and various economic activities. The treatment plant has a hydraulic capacity of 140,000 cubic metres per day and an organic load of 42,000 kg BOD<sub>5</sub> per day. It also ensures a discharge level at a temperature of 24°C.

The treatment basins currently collect 20,000 cubic metres per day, whereas they are designed for 40,000 cubic metres per day, which means there is an opportunity to extend the network.

Another important area is the discharge site at the wastewater treatment plant, which handles a daily discharge of 120 to 150 cubic metres by the OBUHA sewage disposal services (using hydro-cure trucks) and private sewage disposal companies (more than 20 private sewage disposal trucks).

### III.3.1.2.3. Sludge drying beds

Sewage sludge from the city of Bujumbura is treated at the Buterere treatment plant. The sludge is pumped by a sludge pump to the drying beds to allow time for drying. For the time being, the sludge is not being reused for agricultural purposes, as it has not been treated and is said to contain heavy metals that the wastewater analysis laboratory has been unable to characterise.



Figure 6: Drying beds

### III.3.1.2.4. Wastewater analysis laboratory

The wastewater analysis laboratory is an important part of the wastewater infrastructure managed by OBUHA. It plays an essential role in monitoring compliance with environmental regulations, environmental protection and public health, by analysing the quality of wastewater entering the plant and leaving it after treatment. This includes measuring parameters such as biochemical oxygen demand (BOD), chemical oxygen demand (COD), suspended solids, heavy metals, organic contaminants, etc.

The laboratory is involved in monitoring the plant's purification performance. OBUHA monitors water quality by identifying the concentrations of various pollutants. The analyses also identify the presence of pollutants and harmful substances in the wastewater, which is crucial for protecting the

environment and public health. Following the laboratory analysis reports, OBUHA makes an assessment and takes corrective action if necessary.

### III.3.2. Sanitation in the city of Gitega

Apart from Bujumbura, Gitega also has a mini wastewater treatment plant in the SHATANYA neighbourhood and a sludge dumping site in the NTOBWE neighbourhood of MASENGA. Sanitation in the town of Gitega is managed by the Gitega Technical Sanitation Service (SETAG). OBUHA is also involved in large-scale maintenance work that the Commune cannot manage.



Figure 7: NTOBWE sewage sludge disposal site at GITEGA

#### III.3.2.1. Shatanya wastewater treatment plant

The Shatanya WWTP is designed for a maximum flow of 7.78 cubic metres per hour. All the works are made up of the following structures:

- Transport hoses,
- Strainer,
- Multi-wall septic tank,
- Filtering marsh' type lagooning.

The plant is operating normally, but the only problem is the lack of a functional laboratory to analyse the wastewater leaving the plant for the Buhororo river. During our mission, we were unable to find any information on the concentrations and organic loads of the Shatanya wastewater treatment plant.



Figure 8 : Shatanya wastewater treatment plant

### III.3.2.2. Gitega slaughterhouse treatment plant

The mini-treatment plant at the Gitega slaughterhouse operates in the same way as the one at Shatanya, with the same treatment systems:

- Strainer,
- Degreaser,
- Septic tank,
- Filtering marshes.

This plant provides good treatment of the sludge leaving the abattoir. However, there is a risk of clogging in the filtering marshes as a result of floating and muddy substances leaving the septic tanks.

### III.3.2.3. Emptying service

In order to maintain a healthy and safe life for the urban population of Gitega, SETAG has its own two emptying trucks and another belonging to the Agence burundaise de l'hydraulique et de l'Assainissement en Milieu Rural (AHAMR). The three trucks are available to the people of Gitega for a fee of BIF 25,000/m<sup>3</sup>. This has a negative impact on the rate of access to this service, given that the majority of households have a low income.



Figure 9: SETAG Emptying Trucks

### III.3.2.4. Depositing faecal sludge at Ntobwe

The city of Gitega also has a sewage sludge dumping site in the Ntobwe area. It was commissioned at the beginning of 2013 and no operational problems were observed during the mission.

All the works at this discharge point are made up of:

- Eight drying beds planted with reeds
- Three optional basins
- A grit chamber with a filtering marsh

The sludge dumping station is lightly loaded in relation to its capacity.

This shows that the majority of households using on-site sanitation dig another latrine when the first is full, or resort to clandestine emptying.



Figure : Waste sludge disposal unit

The sludge drying and stabilisation process still needs to be promoted in order to reduce the environmental impact of this plant. Nevertheless, farmers living in the Ntobwe area are recovering

the sewage sludge before it has been dried. This poses a major challenge, with the risk of contamination, unpleasant odours and pathogen proliferation.

### III.3.2.5. Public toilets

To ensure basic physiological needs, the town of Gitega has seven different types of public latrines. This ensures the comfort, public health and mobility of individuals, while reducing contamination of the environment in general and water resources in particular, and preventing people from resorting to inappropriate practices such as urinating in public.



Figure 10: Public toilets in Gitega

The management of these latrines is privatised by SETAG. The maintenance and use of these latrines still need to be taken into consideration, especially as there is a major water shortage in the town of Gitega.

#### ✓ Latrine model presentation area :

The town of Gitega has latrine exhibition areas. This is an important educational and awareness-raising strategy in sanitation programmes to encourage the construction, use and maintenance of hygienic latrines.

It helps to promote good hygiene practices, improve public health and strengthen community involvement.



is

Figure 11: Latrine model presentation area

### III.4. The water sector

Burundi's water sector offers a wide range of water resources, with two main catchment basins (Congo and Nile) and sub-catchment basins such as Lake Tanganyika, which is the best water resource in the country's capital. Lake Tanganyika covers a large area of 6,555 km<sup>2</sup>, which represents 24% of the country's surface area.

Burundi has great potential for water resources in both urban and rural areas. Although resources are deemed to be sufficient, they are unevenly distributed, with certain regions such as Kumoso, Bugesera and Imbo-Nord suffering droughts that are causing major water shortages.

#### III.4.1. Water sources in the city of Bujumbura

##### III.4.1.1. Lake Tanganyika plant

This plant receives water from Lake Tanganyika, 3.5km from the eastern shore and is pumped from the No. 1 (SP 1) pumping station. Before 1987, the water was collected 800 m from the eastern shore at a depth of 40 m, but the pollution threatening the lake has caused the collection point to be moved 3.5 km from the beaches to a depth of 30 metres. The pollution threatening the lake has resulted in excessive treatment costs.

The plant's theoretical production capacity is more than 85,000 cubic metres per day. This production capacity is totally dependent on the electricity supplied by the Bujumbura grid, which drives the pumping stations. The numerous disruptions to the Bujumbura electricity network and the lack of a back-up power source at the plant are affecting the operation of the station, resulting in rationing of distribution.

During the rainy season, the lake water becomes too turbid, causing the filters to clog. This clogging means that the plant has to be shut down for regular maintenance, which always leads to rationing of the supply.

##### III.4.1.2. Ntakangwa river fed plant

The second source of drinking water for the city of Bujumbura, which has not been operational since 2017, is the Ntakangwa river, from which its plant used to receive water by gravity.

The city's other equally important sources of drinking water, such as GATUNGURU, BUHONGA, RUGAZI, ISALE and MISUMBA, are located in the mountains overlooking the city of Bujumbura and the surrounding area. These springs produce good quality water and reach Bujumbura by gravity at a low production cost.

### III.4.2. Production and distribution of drinking water

The production and distribution of drinking water in Bujumbura, Gitega and the twenty-four (24) other urban centers of Burundi is carried out by REGIDESO, a public institution whose mission is the collection, treatment, production and distribution of drinking water in urban centers and centers deemed important by the Board of Directors.

In Bujumbura, the current drinking water situation is alarming in several parts of the city, with interruptions lasting from 5 to 8 hours a day. According to information provided by REGIDESO staff, the main problem is the expansion of the city, which is not keeping pace with the extension of the drinking water supply network. Since 2012, daily production has been 110,000 cubic metres.

Although water supplies are considered abundant in Bujumbura, REGIDESO points out that the supply networks are seriously inadequate. In a country where rivers abound, lakes sparkle in the sunshine and seasonal rainfall is generous, it is paradoxical that many communities continue to struggle to access a weak and secure source of drinking water. This complex reality raises essential questions about the factors underlying this persistent problem, as well as the strategies and policies needed to tackle it effectively. REGIDESO will have to analyse the socio-economic factors that contribute to solving these challenges, emphasising the need for sustainable management of water resources and an inclusive approach aimed at guaranteeing equitable access to this vital resource for all. Finally, planning the water sector to meet growing demand will ensure that the population's water needs are met in an equitable manner.

#### III.4.2.1. Water infrastructures and their capacities

REGIDESO has water infrastructures from the catchment to the distribution reservoir. Most of this infrastructure is made up of supply pipes from catchment sources and pumping stations that deliver water to the balancing and distribution reservoirs. The city's main water resource is Lake Tanganyika, which supplies over 80% of the city. It is supplemented by other sources as listed above. The diagram below shows how all the infrastructure works and the operating principle of the entire REGIDESO network.

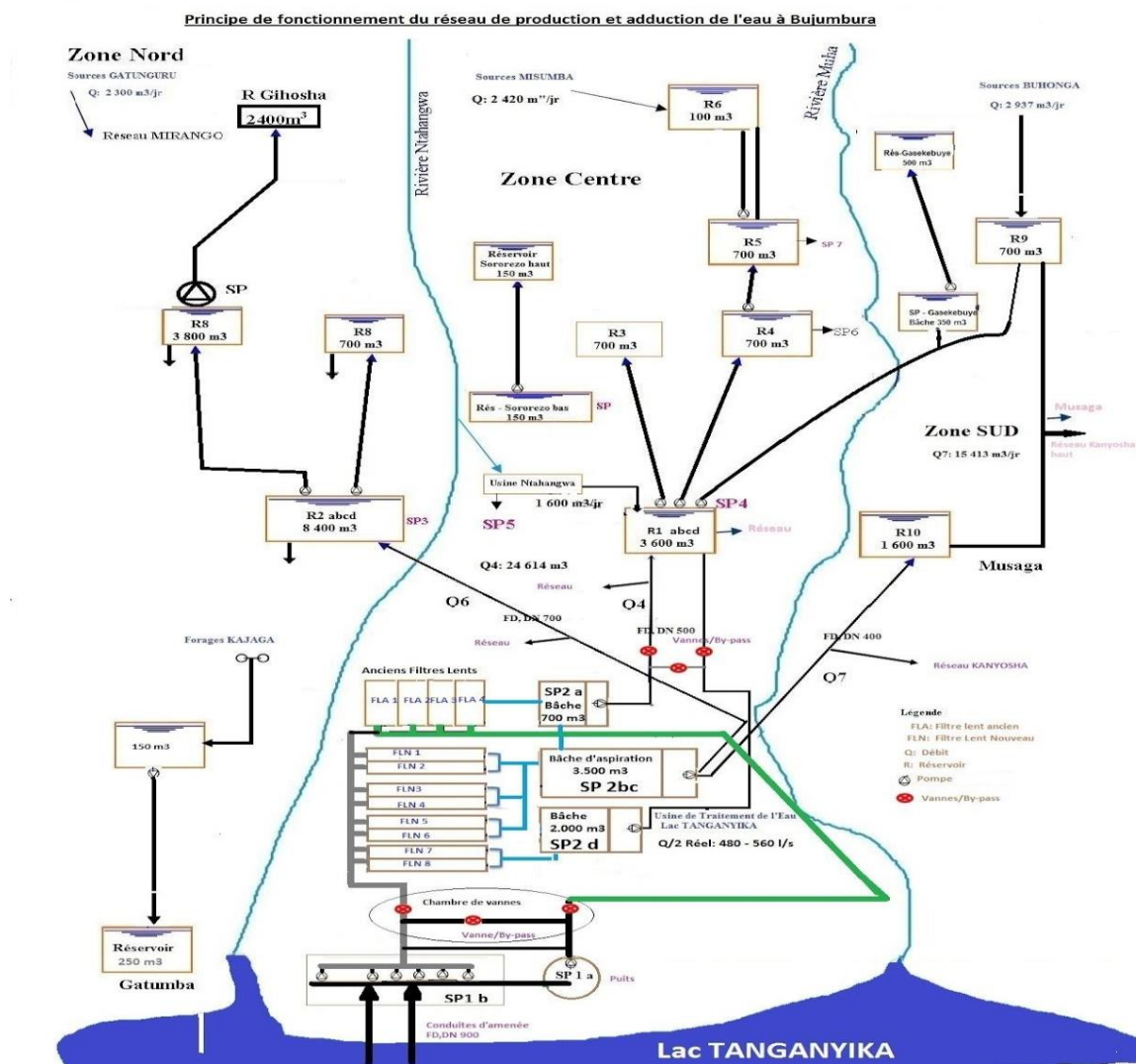


Figure 12: Bujumbura production and supply network

REGIDESO has twenty-seven water distribution reservoirs of different capacities, which help to maintain constant pressure in the distribution network. They also help to compensate for variables in demand by storing water during periods of low demand and releasing it during periods of high demand.

All the reservoirs connected to the Lake Tanganyika plant network are supplied by the pumping system. This is a challenge that causes water rationing in the event of a power cut.

Table 3 below shows all the distribution reservoirs and their capacities.

Table 2 : Distribution tanks

| The tanks |      | Volume in m³ |
|-----------|------|--------------|
| 1         | R1ab | 1000         |
| 2         | R1c  | 500          |

|    |                        |      |
|----|------------------------|------|
| 3  | Suction cover          | 3500 |
| 4  | SP2 tarpaulin          | 70   |
| 5  | R2ab                   | 1400 |
| 6  | R1d                    | 1600 |
| 7  | R2c                    | 3000 |
| 8  | R8                     | 700  |
| 9  | NMR                    | 700  |
| 10 | Castle                 | 100  |
| 11 | R10                    | 1600 |
| 12 | R9                     | 700  |
| 13 | R3                     | 700  |
| 14 | R4                     | 700  |
| 15 | R5                     | 700  |
| 16 | R6                     | 100  |
| 17 | SOROREZO suction cover | 150  |
| 18 | R SOROREZO             | 150  |
| 19 | Suction cover          | 150  |
| 20 | R KAJAGA               | 240  |
| 21 | Tanker                 | 700  |
| 22 | R1e                    | 500  |
| 23 | R SP Gasekebuye        | 500  |
| 24 | Gasekebuye Haut        | 350  |
| 25 | Suction cover          | 2000 |
| 26 | R8 bis                 | 3800 |
| 27 | R Gihosha Rural        | 2400 |

Source: REGDIGESDO 2022

## IV. MAIN STUDY FINDINGS

This chapter presents the main results of the study on the mapping of drinking water and basic sanitation facilities in the 18 urban centers as delimited. The analysis is structured around the following themes: (i) the sanitation situation, (ii) the drinking water situation, (iii) hygiene facilities, (iv) description of the Geoportal and mapping, and (v) strategic recommendations. A characterisation of the study's statistical units, made up of properties and infrastructures, was carried out at the start of the analysis.

The analysis was supplemented by data collected from other stakeholders operating in the two sectors, local authorities and the general public. Statistical analysis enables this raw data to be transformed into usable information, providing a more in-depth understanding of the current challenges and opportunities in the field of water, hygiene and sanitation. It should be emphasised that the analysis highlights relevant indicators such as:

- The spatial distribution of drinking water, hygiene and sanitation infrastructures,
- The level of connection to drinking water and sanitation infrastructures,
- The availability of drinking water and sanitation services,
- Gaps in the quality and quantity of infrastructure.

This study, which represents a first in the mapping (GIS) of drinking water and basic sanitation services in urban areas, will help to provide a useful information base for decision-makers, non-governmental organisations and, more generally, other local stakeholders in their efforts to improve access to drinking water and, more specifically, sanitation.

### IV.1. Study area and characteristics of data collection units

Data collection was carried out in the 18 urban centers that were delimited at the start of the survey. The survey therefore covered all properties and infrastructure in urban and peri-urban areas in all provinces of Burundi. The types of property surveyed are grouped into the following categories: (i) residential (households), and (ii) infrastructure (commercial, institutional, industrial, community and public). Data collection in a residential property was carried out in a single household to represent the entire plot. The information collected was weighted according to the number of households in the plot in order to transpose the analysis to the household approach.

The urban environment was chosen for strategic reasons, firstly because of the high concentration of drinking water and sanitation infrastructures, but also because of the high concentration of the population. On the whole, it is in urban areas that the need for water and sanitation services is most acute.

Once the data had been processed, 272,215 items were surveyed, 95.1% of them residential properties and 4.9% institutions or structures, as shown in the table below.

In terms of places of residence, the results show that 84.6% of the properties surveyed were in urban areas, while 15.4% were in peri-urban areas. Bujumbura (89%), Ngozi (56%) and Bubanza (43%) were the provinces with the largest proportion of properties surveyed in peri-urban areas, reflecting the expansion of these provinces. This justifies substantial levels of investment to support the development of these towns.

*Table 3 : Surveyed properties by type*

|                        | Residential    |              | Commercial   |             | Institutional |             | Industrial |             | Community    |          | Public     |             | Total         |            |
|------------------------|----------------|--------------|--------------|-------------|---------------|-------------|------------|-------------|--------------|----------|------------|-------------|---------------|------------|
|                        | Number         | %            | Number       | %           | Number        | %           | Number     | %           | Number       | %        | Number     | %           | Number        | %          |
| Bubanza                | 4191           | 96,54        | 72           | 1,66        | 53            | 1,22        | 1          | 0,02        | 22           | 0,51     | 2          | 0,05        | 4341          | 100        |
| Bujumbura              | 25171          | 96,34        | 728          | 2,79        | 77            | 0,29        | 24         | 0,09        | 117          | 0,45     | 10         | 0,04        | 26127         | 100        |
| Bururi                 | 1249           | 85,78        | 127          | 8,72        | 59            | 4,05        | 3          | 0,21        | 16           | 1,1      | 2          | 0,14        | 1456          | 100        |
| Cankuzo                | 2039           | 91,76        | 122          | 5,49        | 38            | 1,71        | 2          | 0,09        | 18           | 0,81     | 3          | 0,14        | 2222          | 100        |
| Cibitoke               | 6237           | 97,65        | 78           | 1,22        | 45            | 0,70        | 3          | 0,05        | 23           | 0,36     | 1          | 0,02        | 6387          | 100        |
| Gitega                 | 15114          | 94,14        | 619          | 3,86        | 219           | 1,36        | 8          | 0,05        | 86           | 0,54     | 9          | 0,06        | 16055         | 100        |
| Karusi                 | 2511           | 93,21        | 94           | 3,49        | 59            | 2,19        | 0          | 0           | 26           | 0,97     | 4          | 0,15        | 2694          | 100        |
| Kayanza                | 6463           | 96,43        | 166          | 2,48        | 37            | 0,55        | 4          | 0,06        | 30           | 0,45     | 2          | 0,03        | 6702          | 100        |
| Kirundo                | 3589           | 86,61        | 450          | 10,86       | 78            | 1,88        | 1          | 0,02        | 21           | 0,51     | 5          | 0,12        | 4144          | 100        |
| Makamba                | 6110           | 93,44        | 283          | 4,33        | 94            | 1,44        | 9          | 0,14        | 21           | 0,32     | 22         | 0,34        | 6539          | 100        |
| Muramvya               | 2102           | 88,92        | 207          | 8,76        | 29            | 1,23        | 1          | 0,04        | 19           | 0,8      | 6          | 0,25        | 2364          | 100        |
| Muyinga                | 8213           | 94,23        | 358          | 4,11        | 99            | 1,14        | 6          | 0,07        | 36           | 0,41     | 4          | 0,05        | 8716          | 100        |
| Mwaro                  | 750            | 85,52        | 86           | 9,81        | 19            | 2,17        | 2          | 0,23        | 17           | 1,94     | 3          | 0,34        | 877           | 100        |
| Ngozi                  | 10992          | 92,23        | 684          | 5,74        | 146           | 1,23        | 13         | 0,11        | 75           | 0,63     | 8          | 0,07        | 11918         | 100        |
| Rutana                 | 2093           | 91,28        | 114          | 4,97        | 64            | 2,79        | 3          | 0,13        | 17           | 0,74     | 2          | 0,09        | 2293          | 100        |
| Ruyigi                 | 2403           | 91,61        | 117          | 4,46        | 74            | 2,82        | 0          | 0           | 27           | 1,03     | 2          | 0,08        | 2623          | 100        |
| Bujumbura Municipality | 147082         | 95,66        | 4590         | 2,99        | 1150          | 0,75        | 150        | 0,1         | 702          | 0,46     | 75         | 0,05        | 153749        | 100        |
| Rumonge                | 12569          | 96,63        | 292          | 2,24        | 78            | 0,60        | 12         | 0,09        | 51           | 0,39     | 6          | 0,05        | 13008         | 100        |
| <b>Total</b>           | <b>258 878</b> | <b>95,10</b> | <b>9 187</b> | <b>3,37</b> | <b>2 418</b>  | <b>0,89</b> | <b>242</b> | <b>0,09</b> | <b>1 324</b> | <b>0</b> | <b>166</b> | <b>0,06</b> | <b>272215</b> | <b>100</b> |

*Source: Study data*

In the institutions or facilities visited, we found a total of 800 schools, 202 health facilities (hospitals and health centers) and 1057 churches, as shown in the table below. It should be noted that there were high concentrations of observations in the urban centers (Bujumbura-Mairie, Gitega, Ngozi, Bujumbura), while the urban centers (Cankuzo, Bururi, Mwaro, etc.) had fewer.

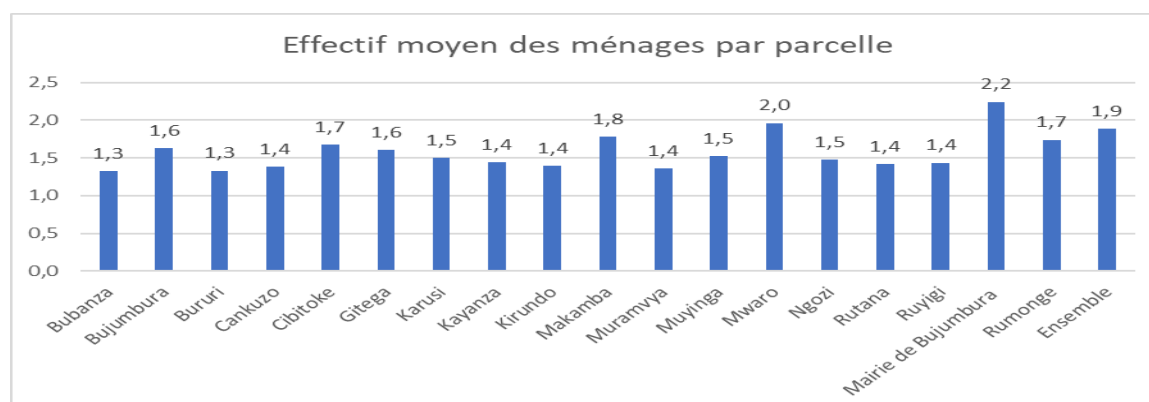
*Table 4 : Number of students in schools, health centers and churches*

| City centers | Schools | Health centers | Churches |
|--------------|---------|----------------|----------|
| Bubanza      | 23      | 3              | 19       |
| Bujumbura    | 43      | 15             | 113      |

|                        |            |            |             |
|------------------------|------------|------------|-------------|
| Bururi                 | 16         | 1          | 9           |
| Cankuzo                | 9          | 1          | 9           |
| Cibitoke               | 22         | 2          | 22          |
| Gitega                 | 83         | 16         | 62          |
| Karusi                 | 18         | 2          | 24          |
| Kayanza                | 13         | 2          | 24          |
| Kirundo                | 12         | 5          | 19          |
| Makamba                | 28         | 7          | 16          |
| Muramvya               | 11         | 3          | 14          |
| Muyinga                | 26         | 7          | 21          |
| Mwaro                  | 3          | 1          | 12          |
| Ngozi                  | 48         | 16         | 53          |
| Rutana                 | 18         | 2          | 12          |
| Ruyigi                 | 21         | 4          | 13          |
| Bujumbura Municipality | 372        | 101        | 571         |
| Rumonge                | 34         | 14         | 44          |
| <b>Total</b>           | <b>800</b> | <b>202</b> | <b>1057</b> |

Source: Study data

In terms of the average number of households per plot, the data from show an average number of households per plot of 1.9. The provinces with an above-average number of households are Bujumbura Municipality, with 2.2 households, and Mwaro, with 2 households, as shown in the graph below.



Source: Study data

Figure 13: Average number of households per plot

## IV.2. State of basic sanitation

The content of the analysis of the basic sanitation situation covers both independent and collective sanitation.

### IV.2.1. Independent sanitation

Autonomous sanitation covers a system in which each unit (residence, business, etc.) treats its own wastewater locally, without being connected to a centralised sanitation network. This analysis includes the following elements: (i) access to latrines, (ii) sludge management and emptying and (iii) condition of latrines.

#### IV.2.1.1. Access to latrines in households and infrastructure

Improved access to latrines (or toilets) is crucial for health, the environment, human dignity and the overall development of communities. Efforts to improve sanitation must take these aspects into account to ensure equitable and universal access to sanitation facilities. The survey conducted in urban and peri-urban centers in all the country's provinces shows access rates at household and infrastructure level.

In the country's urban and peri-urban areas as a whole, with reference to INEA data from 2012 and ENHAB from 2014, significant progress has been made in terms of availability of toilets and the rate of ownership of toilets is 99% at household level and 87% at the level of facilities or institutions as shown in the table below. Some provinces, such as Bubanza and Ngozi, have high levels of property ownership declaring that they do not have toilets (more than 2%).

In terms of facilities or institutions, the following provinces have low levels of latrine ownership: Kirundo (65%), Muramvya (62%), Ngozi (71%) and Bujumbura (74%).

*Table 5 : Percentage of households and facilities or institutions in properties with toilets*

| Variables       | Residential |      | Facility or Institution |       | Total  |      |
|-----------------|-------------|------|-------------------------|-------|--------|------|
|                 | Number      | %    | Number                  | %     | Number | %    |
| <b>Province</b> |             |      |                         |       |        |      |
| Bubanza         | 4105        | 98,0 | 143                     | 95,3  | 4248   | 97,9 |
| Bujumbura       | 24923       | 99,0 | 716                     | 74,9  | 25639  | 98,1 |
| Bururi          | 1248        | 99,9 | 204                     | 98,6  | 1452   | 99,7 |
| Cankuzo         | 2035        | 99,8 | 162                     | 88,5  | 2197   | 98,9 |
| Cibitoke        | 6161        | 98,8 | 150                     | 100,0 | 6311   | 98,8 |
| Gitega          | 15050       | 99,6 | 886                     | 94,2  | 15936  | 99,3 |
| Karusi          | 2508        | 99,9 | 177                     | 96,7  | 2685   | 99,7 |
| Kayanza         | 6448        | 99,8 | 228                     | 95,4  | 6676   | 99,6 |

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|                        |               |             |              |             |               |             |
|------------------------|---------------|-------------|--------------|-------------|---------------|-------------|
| Kirundo                | 3578          | 99,7        | 365          | 65,8        | 3943          | 95,2        |
| Makamba                | 6074          | 99,4        | 367          | 85,6        | 6441          | 98,5        |
| Muramvya               | 2078          | 98,9        | 164          | 62,6        | 2242          | 94,8        |
| Muyinga                | 8131          | 99,0        | 399          | 79,3        | 8530          | 97,9        |
| Mwaro                  | 745           | 99,3        | 122          | 96,1        | 867           | 98,9        |
| Ngozi                  | 10745         | 97,8        | 666          | 71,9        | 11411         | 95,8        |
| Rutana                 | 2074          | 99,1        | 185          | 92,5        | 2259          | 98,5        |
| Ruyigi                 | 2384          | 99,2        | 207          | 94,1        | 2591          | 98,8        |
| Bujumbura Municipality | 146404        | 99,5        | 6147         | 92,2        | 152551        | 99,2        |
| Rumonge                | 12431         | 98,9        | 423          | 96,4        | 12854         | 98,8        |
| <b>Total</b>           | <b>257122</b> | <b>99,3</b> | <b>11711</b> | <b>87,8</b> | <b>268833</b> | <b>98,8</b> |

Source: Study data

#### IV.2.1.2. Condition of latrines

Checking the condition of latrines ensures that they are working properly and helps to optimise their use, avoiding emergencies, obstructions and breakdowns that could compromise access to sanitation facilities.

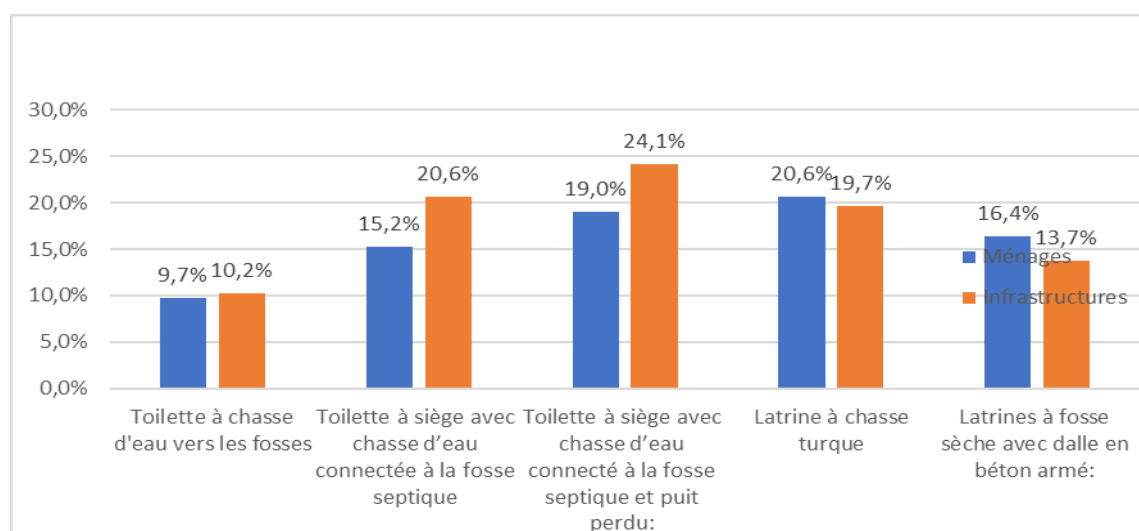
The analysis of the availability of toilets should therefore be supplemented by other analyses of the quality of latrines in order to assess the level of service.

*On this subject, given the research standards to be respected, the aim was not to make a visual check as to whether the latrines were good, clean or bad, but rather to explain what the study understands by the state of the latrines and let the respondent make the best choice. It should be pointed out that respondents' assessment can be so subjective, especially as we cannot believe that all proportions of toilets are in good condition, but this proportion is not far from reality given that the study took place in an urban environment.*

#### IV.2.1.3. Types of latrines

The main types of latrines or toilets used also provide information about the quality and credibility of the sanitation service. Toilets connected to septic tanks and cesspits offer greater service security. The graph below shows that the 5 main types of toilets used more in properties at household level than at infrastructure level are: Seated toilet with flush connected to septic tank and pit, Turkish flush latrine, Seated toilet with flush connected to septic tank, Toilet with flush to pits, Dry pit toilet with reinforced concrete slab.

*An important lesson to be learned from this graph is that around 36% of households use non-credible types of toilets that are not connected to septic tanks, compared with 38% of those using facilities or institutions.*



Source: Study data

Figure 14: Type of toilets used by households and in facilities or institutions

The results of this inventory also show huge disparities in the quality of the toilets used at spatial level, which highlights the fact that the level of credibility or security of the sanitation system within households and in infrastructures varies from province to province, as shown in the annexed tables for households and infrastructures.

The proportion at household level shows that in Bujumbura town hall, 25% of households have Turkish flush latrines, 27% have flush toilets connected to the septic tank and pit, and 15% have flush toilets connected to the septic tank. Bururi province also has a high rate of Turkish flush latrine use, with a rate of 57%, and a low rate of less than 0.1% of flush-to-pit latrines.

Dry pit latrines with reinforced concrete slabs are used more by households in the provinces of Cibitoke (45%) and Kayanza (41%). In addition to Bururi province, which has a low rate of use of dry pit latrines with reinforced concrete slabs, Rutana province also has a low rate of use (0.05%) of dry pit latrines with reinforced concrete slabs. Detailed information can be found in Table 6.

Facilities and institutions also use the same five types of latrines as households. In Bujumbura Municipality, 33% of facilities use seat latrines with a flush connected to the septic tank and a soak pit, while 23% use Turkish flush latrines, as shown in table 24 in the appendix.

Grouping these types of toilets into 3 categories (lined latrines with septic tanks, unlined latrines with septic tanks and unlined latrines without septic tanks) shows that 51.9%, 18.2% and 29.9% of households respectively have lined latrines with septic tanks, unlined latrines with septic tanks and unlined latrines without septic tanks. In terms of infrastructure, 59.3% have latrines with septic

tanks and lining, 14.1% have latrines with septic tanks but without lining, and 26.7% have latrines without septic tanks. Detailed information can be found in tables 25 and 26 in the appendix.

Furthermore, when these toilet types are grouped into two types: latrines with septic tanks (lined latrines with septic tanks and unlined latrines with septic tanks) and latrines without septic tanks, the same tables show that 70.1% of households have latrines with septic tanks, compared with 29.9% that have latrines without septic tanks. In terms of infrastructure, 73.3% have latrines with septic tanks compared with 26.7% who have latrines without septic tanks.

*Table 6: Type of toilet used by households in the provinces*

| Variables              | Flush-to-pit toilet |             | Seated toilet with flush connected to the septic tank |              | Seated toilet with flush connected to the septic tank and cesspit |              | Turkish flush toilet |              |
|------------------------|---------------------|-------------|-------------------------------------------------------|--------------|-------------------------------------------------------------------|--------------|----------------------|--------------|
|                        | Total               | %           | Total                                                 | %            | Number                                                            | %            | Total                | %            |
| Bubanza                | 28                  | 0,83        | 93                                                    | 2,76         | 223                                                               | 6,61         | 20                   | 0,59         |
| Bujumbura              | 1864                | 10,31       | 2373                                                  | 13,12        | 4457                                                              | 24,64        | 5002                 | 27,65        |
| Bururi                 | 1                   | 0,07        | 574                                                   | 41,93        | 5                                                                 | 0,37         | 789                  | 57,63        |
| Cankuzo                | 253                 | 15,13       | 258                                                   | 15,43        | 1                                                                 | 0,06         | 376                  | 22,49        |
| Cibitoke               | 62                  | 1,59        | 117                                                   | 3,00         | 224                                                               | 5,74         | 266                  | 6,82         |
| Gitega                 | 1025                | 8,14        | 2366                                                  | 18,78        | 948                                                               | 7,52         | 1614                 | 12,81        |
| Karusi                 | 58                  | 2,74        | 290                                                   | 13,70        | 81                                                                | 3,83         | 570                  | 26,92        |
| Kayanza                | 20                  | 0,39        | 162                                                   | 3,18         | 518                                                               | 10,17        | 7                    | 0,14         |
| Kirundo                | 700                 | 23,79       | 433                                                   | 14,71        | 30                                                                | 1,02         | 290                  | 9,85         |
| Makamba                | 1406                | 32,66       | 694                                                   | 16,12        | 341                                                               | 7,92         | 929                  | 21,58        |
| Muramvya               | 18                  | 0,96        | 124                                                   | 6,64         | 320                                                               | 17,14        | 8                    | 0,43         |
| Muyinga                | 594                 | 9,13        | 1007                                                  | 15,48        | 285                                                               | 4,38         | 1783                 | 27,41        |
| Mwaro                  | 3                   | 0,57        | 127                                                   | 24,05        | 55                                                                | 10,42        | 7                    | 1,33         |
| Ngozi                  | 586                 | 5,95        | 2017                                                  | 20,47        | 360                                                               | 3,65         | 1230                 | 12,48        |
| Rutana                 | 761                 | 41,20       | 23                                                    | 1,25         | 549                                                               | 29,72        | 184                  | 9,96         |
| Ruyigi                 | 177                 | 8,64        | 301                                                   | 14,69        | 273                                                               | 13,32        | 81                   | 3,95         |
| Bujumbura Municipality | 7547                | 9,04        | 13808                                                 | 16,55        | 23111                                                             | 27,69        | 21192                | 25,39        |
| Rumonge                | 1373                | 17,81       | 957                                                   | 12,41        | 450                                                               | 5,84         | 521                  | 6,76         |
| <b>Total</b>           | <b>16476</b>        | <b>9,73</b> | <b>25724</b>                                          | <b>15,20</b> | <b>32231</b>                                                      | <b>19,04</b> | <b>34869</b>         | <b>20,60</b> |

Source: Study data

Table 6: Type of toilets used by households (continued)

| Variables              | Open pit latrine |       | Dry pit toilet with dome slab |      | Dry pit toilet with urine separation (AKASUGA) |     | Compost toilet - Double pit with slab |      |
|------------------------|------------------|-------|-------------------------------|------|------------------------------------------------|-----|---------------------------------------|------|
|                        | Number           | %     | Number                        | %    | Number                                         | %   | Number                                | %    |
| Bubanza                | 28               | 0,83  | 0                             | 0,00 | 0                                              | 0,0 | 331                                   | 9,81 |
| Bujumbura              | 287              | 1,59  | 216                           | 1,19 | 9                                              | 0,0 | 68                                    | 0,38 |
| Bururi                 | 0                | 0,00  | 0                             | 0,00 | 0                                              | 0,0 | 0                                     | 0,00 |
| Cankuzo                | 778              | 46,53 | 0                             | 0,00 | 0                                              | 0,0 | 0                                     | 0,00 |
| Cibitoke               | 57               | 1,46  | 3                             | 0,08 | 2                                              | 0,1 | 7                                     | 0,18 |
| Gitega                 | 95               | 0,75  | 386                           | 3,06 | 12                                             | 0,1 | 38                                    | 0,30 |
| Karusi                 | 143              | 6,75  | 37                            | 1,75 | 1                                              | 0,0 | 14                                    | 0,66 |
| Kayanza                | 89               | 1,75  | 11                            | 0,22 | 4                                              | 0,1 | 29                                    | 0,57 |
| Kirundo                | 5                | 0,17  | 76                            | 2,58 | 0                                              | 0,0 | 61                                    | 2,07 |
| Makamba                | 81               | 1,88  | 11                            | 0,26 | 9                                              | 0,2 | 4                                     | 0,09 |
| Muramvya               | 1                | 0,05  | 0                             | 0,00 | 2                                              | 0,1 | 15                                    | 0,80 |
| Muyinga                | 282              | 4,33  | 51                            | 0,78 | 2                                              | 0,0 | 156                                   | 2,40 |
| Mwaro                  | 14               | 2,65  | 11                            | 2,08 | 0                                              | 0,0 | 9                                     | 1,70 |
| Ngozi                  | 3881             | 39,38 | 30                            | 0,30 | 5                                              | 0,1 | 49                                    | 0,50 |
| Rutana                 | 9                | 0,49  | 1                             | 0,05 | 1                                              | 0,1 | 1                                     | 0,05 |
| Ruyigi                 | 38               | 1,85  | 7                             | 0,34 | 3                                              | 0,1 | 4                                     | 0,20 |
| Bujumbura Municipality | 3707             | 4,44  | 310                           | 0,37 | 40                                             | 0,0 | 329                                   | 0,39 |
| Rumonge                | 498              | 6,46  | 593                           | 7,69 | 5                                              | 0,1 | 26                                    | 0,34 |
| Total                  | 9993             | 5,90  | 1743                          | 1,03 | 95                                             | 0,1 | 1141                                  | 0,67 |

Source: Study data

Table 6 : Type of toilets used by households (continued)

| Variables              | Dry pit latrine with wooden, plastic or metal slab |       | Dry pit latrines with reinforced concrete slab |       | Compost toilet-Double pit with urine separation (ECOSAN) |      | Mobile toilet |      | Other |      |
|------------------------|----------------------------------------------------|-------|------------------------------------------------|-------|----------------------------------------------------------|------|---------------|------|-------|------|
|                        | Total                                              | %     | Total                                          | %     | Total                                                    | %    | Total         | %    | Total | %    |
| Bubanza                | 1190                                               | 35,27 | 1445                                           | 42,83 | 6                                                        | 0,18 | 0             | 0,00 | 10    | 0,30 |
| Bujumbura              | 1857                                               | 10,27 | 1836                                           | 10,15 | 116                                                      | 0,64 | 2             | 0,01 | 1     | 0,01 |
| Bururi                 | 0                                                  | 0,00  | 0                                              | 0,00  | 0                                                        | 0,00 | 0             | 0,00 | 0     | 0,00 |
| Cankuzo                | 3                                                  | 0,18  | 3                                              | 0,18  | 0                                                        | 0,00 | 0             | 0,00 | 0     | 0,00 |
| Cibitoke               | 1384                                               | 35,47 | 1776                                           | 45,52 | 4                                                        | 0,10 | 0             | 0,00 | 0     | 0,00 |
| Gitega                 | 2063                                               | 16,37 | 4037                                           | 32,04 | 6                                                        | 0,05 | 4             | 0,03 | 5     | 0,04 |
| Karusi                 | 470                                                | 22,20 | 453                                            | 21,40 | 0                                                        | 0,00 | 0             | 0,00 | 0     | 0,00 |
| Kayanza                | 2125                                               | 41,71 | 2120                                           | 41,61 | 6                                                        | 0,12 | 1             | 0,02 | 3     | 0,06 |
| Kirundo                | 268                                                | 9,11  | 1076                                           | 36,56 | 4                                                        | 0,14 | 0             | 0,00 | 0     | 0,00 |
| Makamba                | 151                                                | 3,51  | 668                                            | 15,52 | 5                                                        | 0,12 | 4             | 0,09 | 2     | 0,05 |
| Muramvya               | 732                                                | 39,21 | 647                                            | 34,65 | 0                                                        | 0,00 | 0             | 0,00 | 0     | 0,00 |
| Muyinga                | 873                                                | 13,42 | 1462                                           | 22,47 | 4                                                        | 0,06 | 1             | 0,02 | 6     | 0,09 |
| Mwaro                  | 114                                                | 21,59 | 188                                            | 35,61 | 0                                                        | 0,00 | 0             | 0,00 | 0     | 0,00 |
| Ngozi                  | 596                                                | 6,05  | 1092                                           | 11,08 | 6                                                        | 0,06 | 2             | 0,02 | 1     | 0,01 |
| Rutana                 | 310                                                | 16,78 | 7                                              | 0,38  | 1                                                        | 0,05 | 0             | 0,00 | 0     | 0,00 |
| Ruyigi                 | 538                                                | 26,26 | 626                                            | 30,55 | 0                                                        | 0,00 | AQ            | 0,00 | 1     | 0,05 |
| Bujumbura Municipality | 3801                                               | 4,55  | 9193                                           | 11,02 | 39                                                       | 0,05 | 35            | 0,04 | 341   | 0,41 |
| Rumonge                | 2223                                               | 28,83 | 1055                                           | 13,68 | 5                                                        | 0,06 | 2             | 0,03 | 3     | 0,04 |
| Total                  | 18698                                              | 11,05 | 27684                                          | 16,35 | 202                                                      | 0,12 | 51            | 0,03 | 373   | 0,22 |

Source: Study data

#### IV.2.1.4. Shared toilets

Having sanitary facilities dedicated to a household ensures the privacy and dignity of the members of that household and is one of the important dimensions of service quality. Sharing toilets or latrines can compromise privacy, particularly in families where confidentiality is important, such as those with members of different genders or with special needs.

The data show an average of two household toilets per plot and 5 toilets per infrastructure, as shown in Table 7.

*The province below the national average is Bujumbura Municipality, where the average number of toilets per plot is 2.6.*

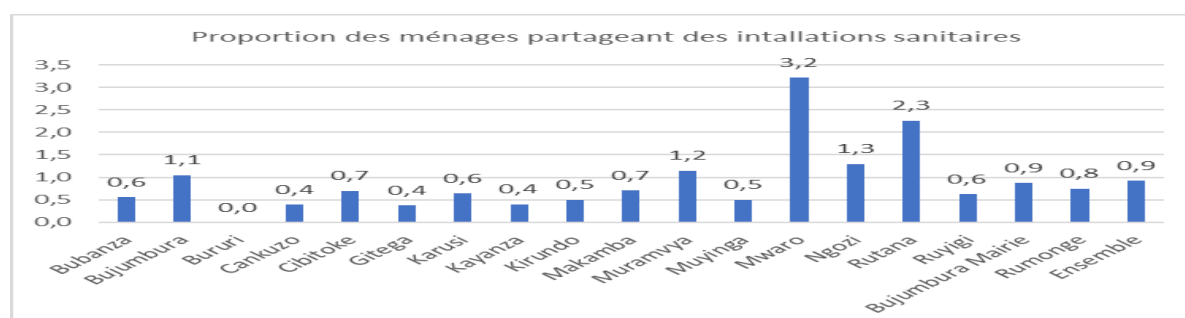
Table 7: Average number of toilets per property

|                        | Residential   |            | Facility or institution |            | Total         |            |
|------------------------|---------------|------------|-------------------------|------------|---------------|------------|
|                        | Total         | Average    | Total                   | Average    | Total         | Average    |
| Bubanza                | 3737          | 1,2        | 756                     | 5,3        | 4493          | 1,4        |
| Bujumbura              | 28353         | 1,9        | 2271                    | 3,2        | 30624         | 1,9        |
| Bururi                 | 1671          | 1,8        | 1024                    | 5,0        | 2695          | 2,4        |
| Cankuzo                | 1980          | 1,3        | 630                     | 3,9        | 2610          | 1,6        |
| Cibitoke               | 4601          | 1,3        | 867                     | 5,8        | 5468          | 1,4        |
| Gitega                 | 17733         | 1,9        | 6007                    | 6,8        | 23740         | 2,3        |
| Karusi                 | 2394          | 1,4        | 970                     | 5,5        | 3364          | 1,8        |
| Kayanza                | 6210          | 1,4        | 896                     | 3,9        | 7106          | 1,5        |
| Kirundo                | 3703          | 1,4        | 1277                    | 3,5        | 4980          | 1,7        |
| Makamba                | 5633          | 1,7        | 1581                    | 4,3        | 7214          | 1,9        |
| Muramvya               | 2382          | 1,6        | 1207                    | 7,4        | 3589          | 2,1        |
| Muyinga                | 8348          | 1,6        | 1922                    | 4,8        | 10270         | 1,8        |
| Mwaro                  | 714           | 1,9        | 591                     | 4,8        | 1305          | 2,6        |
| Ngozi                  | 14037         | 1,9        | 4183                    | 6,3        | 18220         | 2,3        |
| Rutana                 | 2174          | 1,5        | 1025                    | 5,5        | 3199          | 1,9        |
| Ruyigi                 | 2867          | 1,7        | 1880                    | 9,1        | 4747          | 2,5        |
| Bujumbura Municipality | 150265        | 2,3        | 33878                   | 5,5        | 184143        | 2,6        |
| Rumonge                | 9125          | 1,3        | 1878                    | 4,4        | 11003         | 1,5        |
| <b>Total</b>           | <b>265927</b> | <b>2,0</b> | <b>62843</b>            | <b>5,4</b> | <b>328770</b> | <b>2,2</b> |

Source: Study data

As for sharing toilets with other households, the data shows that on average almost 1% of households share sanitary facilities with other households as shown in Figure 17.

In the province of Mwaro, at least 3% of households share latrines, followed by the province of Rutana with a rate of 2% of households, as shown in the following graph:



Source: Study data

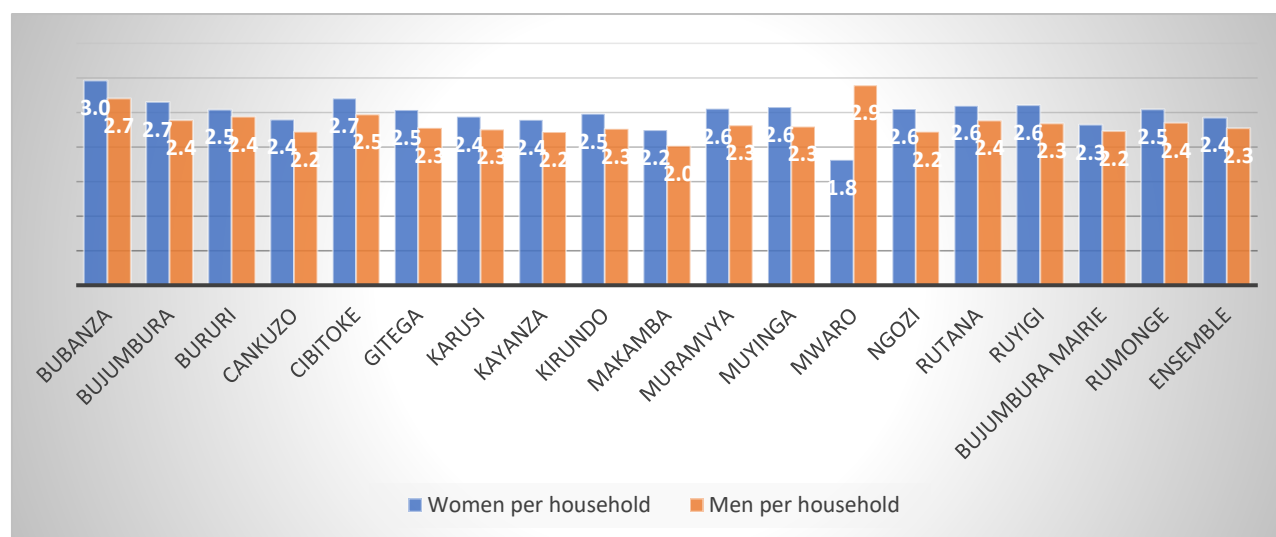
Figure 15: Sharing toilets with other households

#### IV.2.1.5. Gender and access to toilets

The gender issue is part of the wider context of reducing inequalities in access to sanitation services. Addressing gender disparities in sanitation helps to create more equitable and inclusive communities.

The results of this survey show that on average 2 men and 2 women per household share the same sanitation facilities, which does not reveal many inequalities in terms of access. The following graph shows the average number of men and women sharing sanitation facilities for each province.

*The graph shows that there are no major inequalities between men and women in the use of toilets in urban areas in Burundi.*



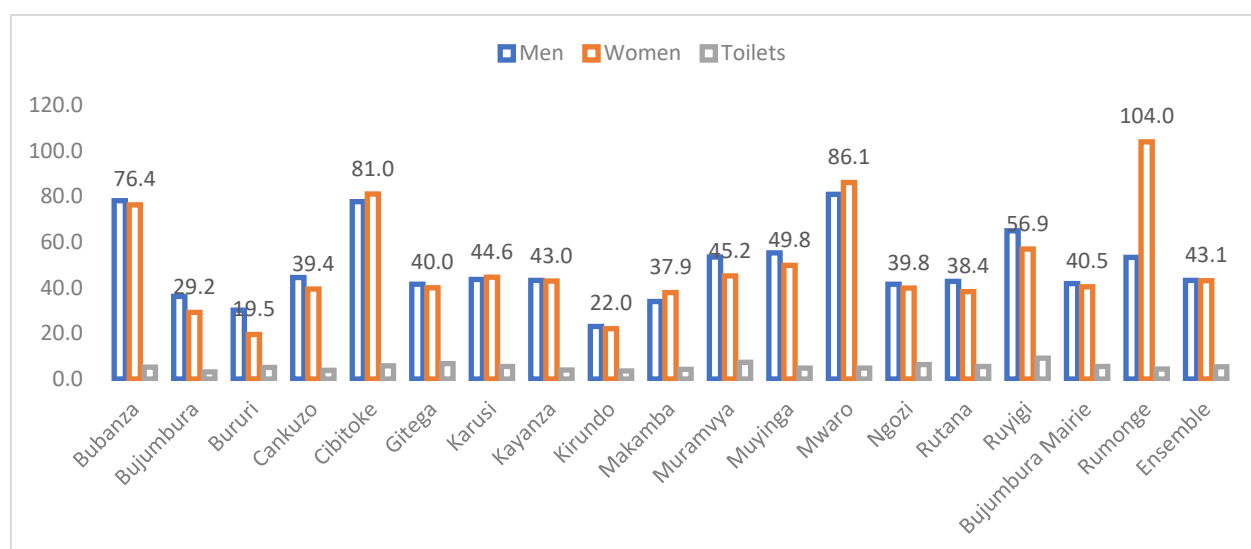
Source: Study data

Figure 18: Toilet sharing by gender (average M/F)

Apart from the province of Mwaro, which shows below-average equity (around 3 men and 2 women), the other provinces show near-average equity in the sharing of sanitation facilities between men and women.

Graph 19 also shows that, on average, 43 men and 43 women per facility or institution have access to sanitary facilities. The same graph shows huge disparities between the provinces of Rumonge, Mwaro and Cibitoke, which record high levels of toilet use (104 men in Rumonge and more than 80 men/women in the other two provinces).

*Apart from the particular focus on inequalities, other researches can investigate the use of gender-specific toilets in public environments such as bars, restaurants, hotels and markets.*



Source: Study data

Figure 19: Gender distribution of toilets in facilities or institutions (average M/F)

#### IV.2.1.6. Management of faecal sludge

Managing human waste through good emptying practices makes a significant contribution to promoting public health, preserving the environment and ensuring the sustainability of sanitation systems. Households will have to monitor their latrines and make sure they are emptied at the right time.

The surveys carried out during this study clearly showed the level of understanding of sludge management and the decisions made by households once their latrines are full. Table 8 shows that 63% of households empty their latrines when they are full. The majority of households that empty their latrines do so in Bujumbura municipality (75%), followed by Bujumbura (54%) and Rumonge (50%) provinces. The provinces of Cibitoke and Karuzi rank last for the decision to empty latrines, with rates of less than 2%.

*These decisions to empty toilets may be linked to the unavailability of emptying services in these provincial centers.*

Table 8: Proportion of households by decision to use a full toilet

|                        | Drain        |             | Burying and digging |              | Abandon     |             | No measures |             | DK          |             |
|------------------------|--------------|-------------|---------------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                        | Total        | %           | Total               | %            | Total       | %           | Total       | %           | Total       | %           |
| Bubanza                | 36           | 7,06        | 339                 | 66,47        | 130         | 25,49       | 4           | 0,78        | 1           | 0,2         |
| Bujumbura              | 1196         | 54,71       | 405                 | 18,53        | 175         | 8,01        | 11          | 0,5         | 399         | 18,25       |
| Bururi                 | 5            | 4,31        | 110                 | 94,83        | 0           | 0           | 1           | 0,86        | 0           | 0           |
| Cankuzo                | 50           | 10,78       | 350                 | 75,43        | 61          | 13,15       | 0           | 0           | 3           | 0,65        |
| Cibitoke               | 16           | 1,76        | 867                 | 95,27        | 23          | 2,53        | 1           | 0,11        | 3           | 0,33        |
| Gitega                 | 440          | 24,77       | 877                 | 49,38        | 427         | 24,04       | 5           | 0,28        | 27          | 1,52        |
| Karusi                 | 1            | 1,28        | 0                   | 0            | 77          | 98,72       | 0           | 0           | 0           | 0           |
| Kayanza                | 25           | 5,71        | 295                 | 67,35        | 106         | 24,2        | 6           | 1,37        | 6           | 1,37        |
| Kirundo                | 3            | 10          | 17                  | 56,67        | 9           | 30          | 1           | 3,33        | 0           | 0           |
| Makamba                | 188          | 43,82       | 218                 | 50,82        | 17          | 3,96        | 3           | 0,7         | 3           | 0,7         |
| Muramvya               | 9            | 8,11        | 93                  | 83,78        | 0           | 0           | 0           | 0           | 9           | 8,11        |
| Muyinga                | 119          | 30,51       | 208                 | 53,33        | 47          | 12,05       | 5           | 1,28        | 11          | 2,82        |
| Mwaro                  | 6            | 13,95       | 1                   | 2,33         | 27          | 62,79       | 9           | 20,93       | 0           | 0           |
| Ngozi                  | 13           | 5,08        | 174                 | 67,97        | 63          | 24,61       | 1           | 0,39        | 5           | 1,95        |
| Rutana                 | 36           | 17,82       | 152                 | 75,25        | 14          | 6,93        | 0           | 0           | 0           | 0           |
| Ruyigi                 | 40           | 32,52       | 48                  | 39,02        | 31          | 25,2        | 1           | 0,81        | 3           | 2,44        |
| Bujumbura Municipality | 19490        | 75,61       | 4050                | 15,71        | 1236        | 4,8         | 173         | 0,67        | 827         | 3,21        |
| Rumonge                | 939          | 50,48       | 877                 | 47,15        | 32          | 1,72        | 6           | 0,32        | 6           | 0,32        |
| <b>Total</b>           | <b>22612</b> | <b>63,3</b> | <b>9081</b>         | <b>25,44</b> | <b>2475</b> | <b>6,93</b> | <b>227</b>  | <b>0,64</b> | <b>1303</b> | <b>3,65</b> |

Source: Study data

Another management decision for full latrines is to bury or dig another latrine once one is full, as shown in the table above. The survey shows that 25% of households bury or dig another latrine once another is full. This decision to bury or dig is more frequent in Cibitoke province, where 95% of households bury or dig, followed by Bururi and Muramvya provinces with 94% and 83% respectively. The decision to bury sludge can contribute to risks of contamination of groundwater, soil and nearby water sources. This causes the same problems as digging another latrine, which means moving the soil or groundwater contamination problems to a new location when the water table is shallow in the area.

Table 9 shows that nearly 8 out of 10 facilities or institutions empty their latrines once they are full. Facilities or institutions in the Bujumbura municipality come first with a rate of 86%, followed by structures or institutions in Ngozi and Cibitoke, all with 85%. The provinces of Bururi and

Kayanza are the ones that record bad decisions in terms of full latrines with facilities or institutions, with 63% and 44% respectively burying or digging.

Table 9: Proportion of facilities or institutions according to the decision made for solid toilets

|                        | Drain      |              | Burying and digging |             | Abandon   |             | No measures |             | DK        |             |
|------------------------|------------|--------------|---------------------|-------------|-----------|-------------|-------------|-------------|-----------|-------------|
|                        | Total      | %            | Total               | %           | Total     | %           | Total       | %           | Total     | %           |
| Bubanza                | 12         | 70,59        | 4                   | 23,53       | 1         | 5,88        | 0           | 0           | 0         | 0           |
| Bujumbura              | 46         | 79,31        | 5                   | 8,62        | 1         | 1,72        | 0           | 0           | 6         | 10,34       |
| Bururi                 | 8          | 36,36        | 14                  | 63,64       | 0         | 0           | 0           | 0           | 0         | 0           |
| Cankuzo                | 14         | 56           | 10                  | 40          | 1         | 4           | 0           | 0           | 0         | 0           |
| Cibitoke               | 6          | 85,71        | 1                   | 14,29       | 0         | 0           | 0           | 0           | 0         | 0           |
| Gitega                 | 77         | 78,57        | 12                  | 12,24       | 6         | 6,12        | 1           | 1,02        | 2         | 2,04        |
| Karusi                 | 3          | 37,5         | 0                   | 0           | 3         | 37,5        | 2           | 25          | 0         | 0           |
| Kayanza                | 5          | 55,56        | 4                   | 44,44       | 0         | 0           | 0           | 0           | 0         | 0           |
| Kirundo                | 0          | 0            | 1                   | 50          | 0         | 0           | 0           | 0           | 1         | 50          |
| Makamba                | 23         | 71,88        | 8                   | 25          | 0         | 0           | 1           | 3,13        | 0         | 0           |
| Muramvya               | 6          | 54,55        | 4                   | 36,36       | 0         | 0           | 0           | 0           | 1         | 9,09        |
| Muyinga                | 15         | 57,69        | 8                   | 30,77       | 1         | 3,85        | 1           | 3,85        | 1         | 3,85        |
| Mwaro                  | 3          | 23,08        | 1                   | 7,69        | 7         | 53,85       | 2           | 15,38       | 0         | 0           |
| Ngozi                  | 34         | 85           | 3                   | 7,5         | 1         | 2,5         | 0           | 0           | 2         | 5           |
| Rutana                 | 12         | 70,59        | 5                   | 29,41       | 0         | 0           | 0           | 0           | 0         | 0           |
| Ruyigi                 | 6          | 66,67        | 1                   | 11,11       | 2         | 22,22       | 0           | 0           | 0         | 0           |
| Bujumbura Municipality | 669        | 86,1         | 31                  | 3,99        | 29        | 3,73        | 5           | 0,64        | 43        | 5,53        |
| Rumonge                | 41         | 63,08        | 23                  | 35,38       | 0         | 0           | 1           | 1,54        | 0         | 0           |
| <b>Total</b>           | <b>980</b> | <b>79,29</b> | <b>135</b>          | <b>10,9</b> | <b>52</b> | <b>4,21</b> | <b>13</b>   | <b>1,05</b> | <b>56</b> | <b>4,53</b> |

Source: Study data

#### IV.2.1.7. Draining mechanism

Appropriate emptying mechanisms are essential to ensure the proper operation, safety, durability and efficiency of wastewater treatment facilities. They also play a crucial role in protecting public health and the environment.

The drainage service providers used in Burundi are grouped into five categories:

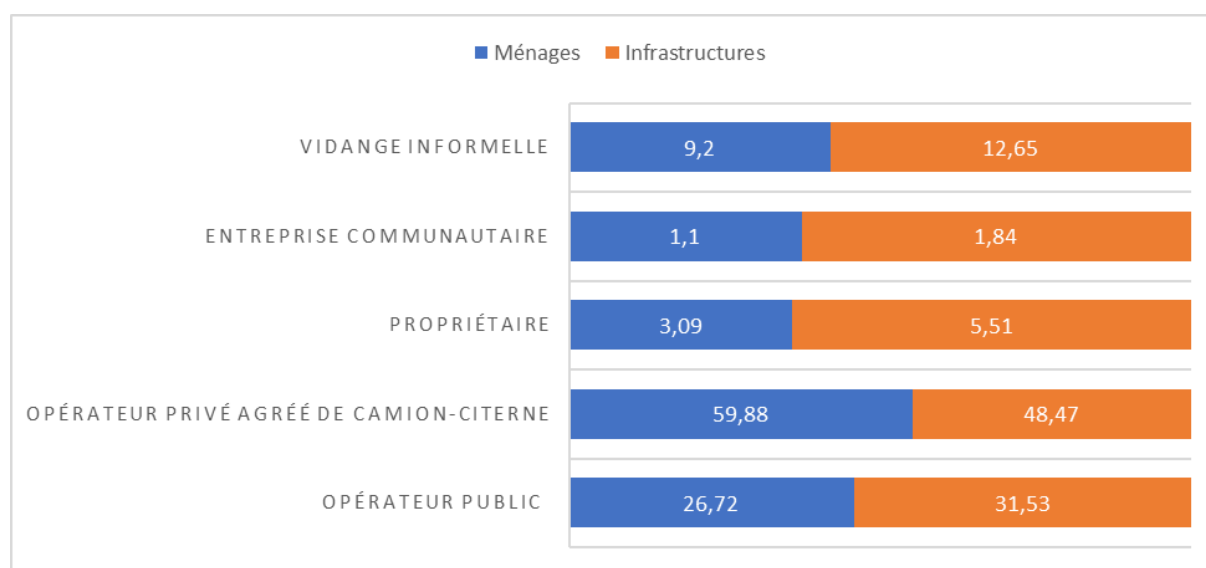
- Public operators;
- Private operators ;
- Communal administration;
- Informal emptiers.

The following graph shows that private and public operators are the two main providers of emptying services (6/10 households and 5/10 facilities or institutions use these operators, while nearly 3 out of 10 households and facilities or institutions use public operators). Nearly 9% of households and 13% of institutions use an informal system for emptying waste, which is not secure.

At provincial level, Bubanza, Bururi, Muramvya and Ruyigi are provinces where the informal drainage system accounts for 100% of the total.

*The level of use of a type of drainage could be positively correlated with the availability or unavailability of these services in each province.*

Details of the use of each drainage mechanism can be found in the appendix (Tables 27 and 28).



Source: Study data

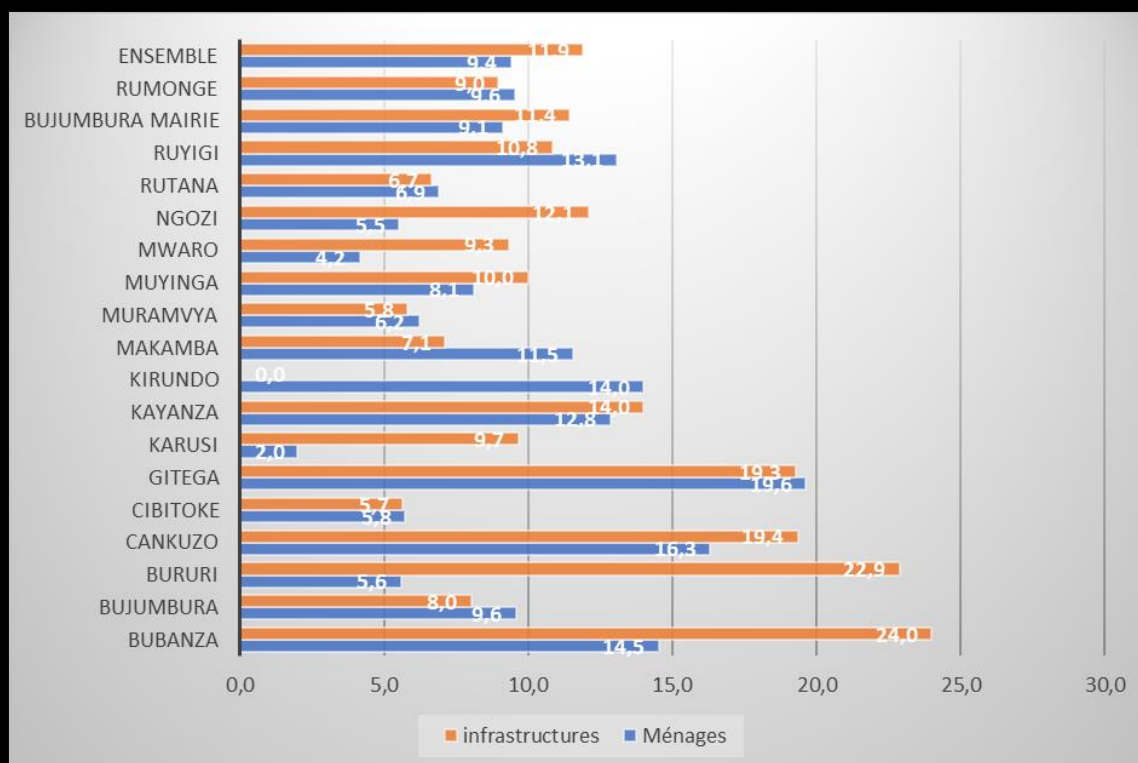
Figure 16: Types of operations for emptying toilets

#### IV.2.1.8. Frequency of emptying

Scheduling emptying at appropriate intervals is an important aspect of sanitary facility management. This helps to prevent blockages that disrupt the proper functioning of the sanitation system. The survey results show an average delay of 11 months for infrastructure and 9 months for households, as shown in the graph below.

In terms of provincial disparities, the longest emptying times were observed in the provinces of Gitega (11 months), Cankuzo (16 months) and Bubanza (14 months). As for institutions, the longest periods were observed in the provinces of Bubanza (24 months), Bururi (22 months), Gitega and Cankuzo (19 months). These timescales will be important in providing guidance to potential investors in toilet emptying.

*In view of these results, we may well wonder about the existence or monitoring of norms and standards for the construction of latrines, particularly those relating to the size of septic tanks, given that, on average, four years can go by without an emptying.*



Source: Study data

Figure 17: Average time taken to empty toilets by province

#### IV.2.1.9. Accessibility to flushable toilets

In addition to the frequency of emptying, which must be planned, the availability of access to toilets is an important factor in the management of sanitation facilities. Table 10 shows that 8 out of 10 households have no difficulty in accessing sanitation facilities, with only 17% saying that the roads are impassable. Households with good access are found in the provinces of Rumonge (89%), Mwaro (88%) and Bujumbura Municipality (86%). The least accessible households for emptying are in the provinces of Karusi (94%) and Ngozi (65%).

Institutions or facilities do not seem to be experiencing any difficulties in terms of accessibility, with 94% reporting good accessibility to sanitary facilities, as shown in table 11.

*This points to the need for integrated urban development planning, including access roads to sanitation infrastructure, as part of interministerial communication or collaboration, given that the two sectors come under different ministerial portfolios.*

Table 10: Percentage of households and toilets accessible for emptying

| Variables              | Accessibility to drainable households |                   |             | Access to flushable toilets |                |
|------------------------|---------------------------------------|-------------------|-------------|-----------------------------|----------------|
|                        | Passable road                         | Road not passable | Other       | Accessible                  | Not accessible |
| <b>Province</b>        |                                       |                   |             |                             |                |
| Bubanza                | 65,88                                 | 34,12             | 0           | 50,23                       | 49,77          |
| Bujumbura              | 75,94                                 | 23,88             | 0,18        | 82,46                       | 17,54          |
| Bururi                 | 70,69                                 | 29,31             | 0           | 48,95                       | 51,05          |
| Cankuzo                | 87,07                                 | 12,93             | 0           | 37,44                       | 62,56          |
| Cibitoke               | 70,44                                 | 29,56             | 0           | 34,13                       | 65,87          |
| Gitega                 | 51,63                                 | 48,37             | 0           | 60,43                       | 39,57          |
| Karusi                 | 5,13                                  | 94,87             | 0           | 3,24                        | 96,76          |
| Kayanza                | 40,41                                 | 56,62             | 2,97        | 9,52                        | 90,48          |
| Kirundo                | 43,33                                 | 20                | 36,67       | 6,25                        | 93,75          |
| Makamba                | 86,01                                 | 13,99             | 0           | 33,33                       | 66,67          |
| Muramvya               | 52,25                                 | 47,75             | 0           | 12,57                       | 87,43          |
| Muyinga                | 62,31                                 | 37,44             | 0,26        | 40,87                       | 59,13          |
| Mwaro                  | 88,37                                 | 11,63             | 0           | 37,5                        | 62,5           |
| Ngozi                  | 37,11                                 | 61,72             | 1,17        | 18,11                       | 81,89          |
| Rutana                 | 79,21                                 | 20,79             | 0           | 64,49                       | 35,51          |
| Ruyigi                 | 68,29                                 | 31,71             | 0           | 44,08                       | 55,92          |
| Bujumbura Municipality | 86,16                                 | 13,07             | 0,76        | 79,66                       | 20,34          |
| Rumonge                | 89,19                                 | 10,81             | 0           | 80,35                       | 19,65          |
| <b>Total</b>           | <b>81,65</b>                          | <b>17,7</b>       | <b>0,64</b> | <b>73,52</b>                | <b>26,48</b>   |

Source: Study data

Table 11: Percentage of infrastructure and toilets accessible for waste disposal

| Variables              | Accessibility to drainable infrastructures |                   |             | Access to flushable toilets |                |
|------------------------|--------------------------------------------|-------------------|-------------|-----------------------------|----------------|
|                        | Passable road                              | Road not passable | Other       | Accessible                  | Not accessible |
| <b>Province</b>        |                                            |                   |             |                             |                |
| Bubanza                | 100                                        | 0                 | 0           | 93,33                       | 6,67           |
| Bujumbura              | 89,66                                      | 10,34             | 0           | 91,04                       | 8,96           |
| Bururi                 | 81,82                                      | 18,18             | 0           | 91,67                       | 8,33           |
| Cankuzo                | 100                                        | 0                 | 0           | 75                          | 25             |
| Cibitoke               | 100                                        | 0                 | 0           | 93,75                       | 6,25           |
| Gitega                 | 91,84                                      | 8,16              | 0           | 88,04                       | 11,96          |
| Karusi                 | 37,5                                       | 62,5              | 0           | 42,86                       | 57,14          |
| Kayanza                | 66,67                                      | 33,33             | 0           | 30,77                       | 69,23          |
| Kirundo                | 100                                        | 0                 | 0           | 23,81                       | 76,19          |
| Makamba                | 90,63                                      | 9,38              | 0           | 54,1                        | 45,9           |
| Muramvya               | 100                                        | 0                 | 0           | 22,22                       | 77,78          |
| Muyinga                | 88,46                                      | 11,54             | 0           | 69,44                       | 30,56          |
| Mwaro                  | 100                                        | 0                 | 0           | 50                          | 50             |
| Ngozi                  | 100                                        | 0                 | 0           | 56,67                       | 43,33          |
| Rutana                 | 52,94                                      | 47,06             | 0           | 83,33                       | 16,67          |
| Ruyigi                 | 100                                        | 0                 | 0           | 40,63                       | 59,38          |
| Bujumbura Municipality | 96,27                                      | 3,6               | 0,13        | 76,16                       | 23,84          |
| Rumonge                | 96,92                                      | 3,08              | 0           | 93,62                       | 6,38           |
| <b>Total</b>           | <b>94,26</b>                               | <b>5,66</b>       | <b>0,08</b> | <b>73,3</b>                 | <b>26,74</b>   |

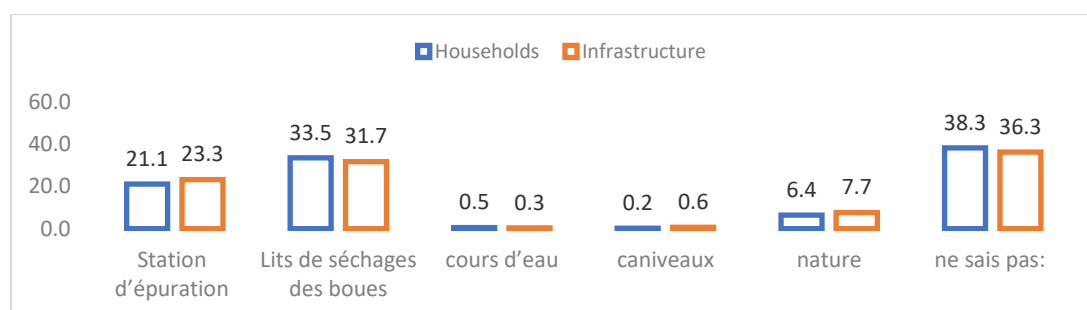
Source: Study data

#### IV.2.1.10. Destination of faecal sludge

The sludge drying process helps to stabilise the sludge by reducing the water content. This has a positive impact on sludge management, minimising the risks of anaerobic fermentation, malodorous gas production and pathogen proliferation. The correct destination of the sludge improves environmental conditions and potential odour nuisance.

The survey results reveal clear difficulties in managing faecal sludge, with only 1 in 5 households and facilities reporting that their faecal sludge is sent to a treatment plant. A significant proportion of households and facilities (33% of households and 31% of facilities) said that their faecal sludge was sent to drying beds, as shown in Figure 22.

Another important piece of information is that nearly 4 out of 10 households and infrastructures say they know nothing about faecal sludge. The most plausible hypothesis is that this category is confused with nature, which means that a total of around 40% throw their faecal sludge into nature, contributing to the deterioration of living conditions. ***This is a major challenge for sanitation, and could explain the existence of several mountains of waste in different neighbourhoods, with all the consequences this has for public health and the environment.***



Source: Study data

Figure 18: Disposal of sewage sludge (% of properties)

#### IV.2.1.11. Water installation system managed safely

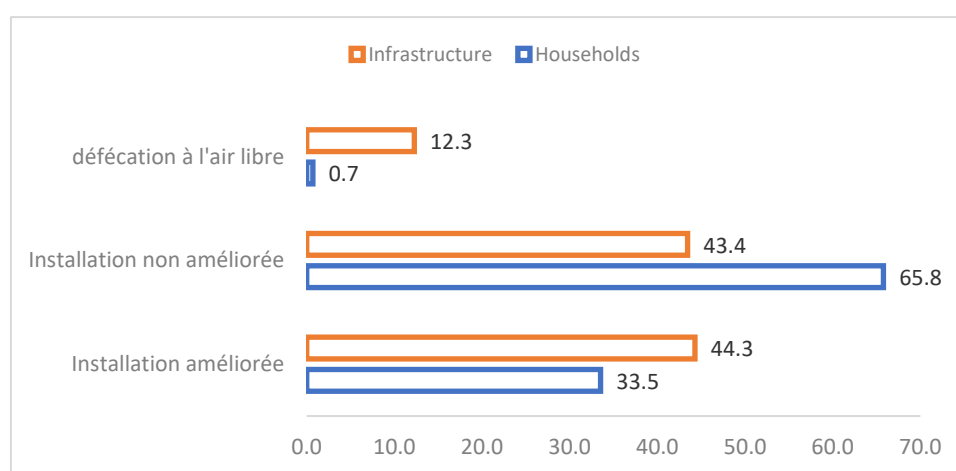
A description of the sanitary facilities, based on specific criteria, shows how hygiene conditions and health risks can be improved.

Improved sanitation facilities are generally considered to be safer, more hygienic and more effective than less developed alternatives. For the purposes of this study, the definition of improved sanitation facilities is based on the 2017 WHO/UNICEF definition of progress towards safe water, hygiene and sanitation. According to this definition, improved sanitation facilities refer to a safe system where excreta are managed and treated in on-site or off-site systems. As for unimproved

sanitation facilities, these households do not have waste treatment facilities and share sanitation facilities. Finally, open defecation refers to situations where properties have no sanitation facilities.

Applying this grouping, the data highlights low levels and major concerns in terms of the safety of sanitation facilities within households. Only around 33% of households and 44% of infrastructures have an improved sanitation system. A large proportion of residential properties surveyed (65.8%) and 43% of infrastructure properties have unimproved facilities, as shown in graph 23.

Open defecation is a practice associated with areas where access to sanitation facilities is limited or non-existent. This method is also observed in certain urban and peri-urban areas of Burundi. It occurs in around 1 in 10 facilities (12%). Of course, the lack of public awareness and education about responsible behaviour may also be among the causes of the persistence of open defecation.



Source: Study data

Figure 19: Overall state of sanitation in urban areas (%)

Maps 1 and 2 show the state of sanitation in all the country's provinces for households and infrastructures.

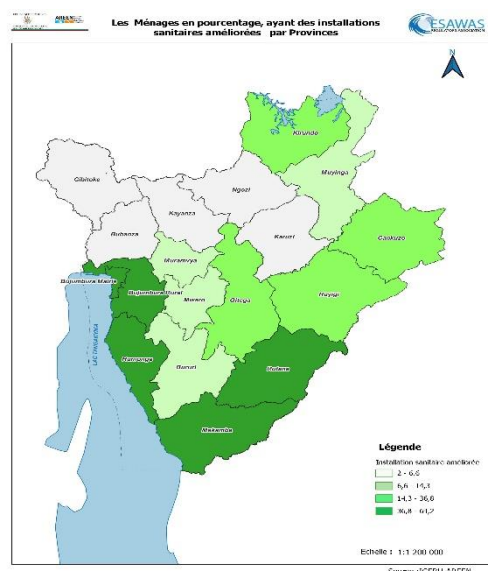


Figure 20: Map of households with improved sanitation facilities

This map shows that the provinces of Bujumbura Mairie, Bujumbura, Rumonge, Makamba and Rutana seem to warrant a high level of improved sanitation facilities.

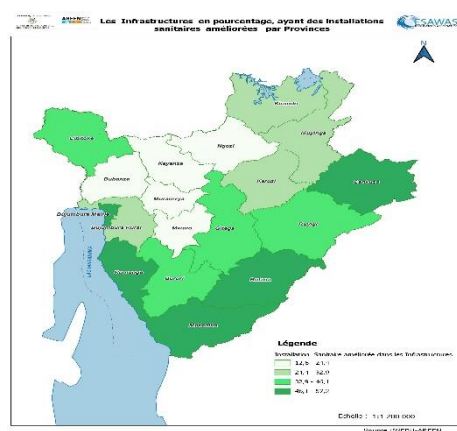


Figure 21: Status of improved sanitation infrastructure by province (%)

The map above shows that the provinces of Bujumbura Municipality, Bujumbura, Rutana, Makamba and Rumonge have high levels of improved infrastructure facilities.

## IV.2.2. Collective sanitation

### IV.2.2.1. Connection to the public sewerage system

Collective sanitation is another type of sanitation that is often used in large cities. It covers the collection and treatment of wastewater on the scale of a community or urban area. This type of sanitation requires households to be connected to the public sewer network available in an area. Setting up this network is very costly, even though its benefits contribute to sustainable management of water resources by minimising pollution of watercourses and promoting responsible use of water resources. Public authorities are finding it difficult to make this type of investment, and the reality is that the growth of towns and cities is not being accompanied by an expansion of the sewerage network.

The Bujumbura Municipality's current network, which dates back several years, is outdated enough to meet the growing sanitation needs arising from the emergence of new neighbourhoods. There are not even any structuring projects financed by financial partners, and this is an area where the public authorities need to raise awareness or express urgent needs.

According to the results of the study, only two provinces have public sewerage systems: Bujumbura Municipality and Gitega province. The rate of connection to the network is 4% for households. The structures or institutions that are connected to the network also represent a rate of 10% of the total, as shown in the table below. The majority of connected properties are in the city of Bujumbura, with 7% for households and 20% for structures or institutions. In the province of Gitega, only the SHATANYA neighbourhood, which is connected to the network, accounts for 0.9% of households, and no structures or institutions are connected to the sewerage network. It should be noted that the analysis considers properties and structures where respondents claim to be connected to the sewer system as the primary inclusion criterion. It also takes into account three types of toilets: flush toilets towards septic tanks, seated toilets with flush connected to the septic tank, or seated toilets with flush connected to the sewer system.

This study also revealed that some households do not even know that these networks exist, which explains the low connection rate, and that others are supposed to be connected to the public sewer network in a neighbourhood where this network does not even exist. This shows that there are households that illegally connect to the stormwater network believing that they are connecting to the public sewer network, on the one hand, while others do so knowingly, on the other. In all cases, these bad practices should be discouraged to prevent any risk of environmental pollution due to the poor management of faecal matter.

Table 7 : Proportion of properties connected to sewerage networks

| Variables              | Residential |      | Infrastructure |       | Total  |     |
|------------------------|-------------|------|----------------|-------|--------|-----|
|                        | Number      | %    | Number         | %     | Number | %   |
| <b>Province</b>        |             |      |                |       |        |     |
| Bubanza                | 0           | 0    | 0              | 0     | 0      | 0   |
| Bujumbura              | 0           | 0    | 0              | 0     | 0      | 0   |
| Bururi                 | 0           | 0    | 0              | 0     | 0      | 0   |
| Cankuzo                | 0           | 0    | 0              | 0     | 0      | 0   |
| Cibitoke               | 0           | 0    | 0              | 0     | 0      | 0   |
| Gitega                 | 144         | 0,95 | 0              | 0     | 144    | 0,9 |
| Karusi                 | 0           | 0    | 0              | 0     | 0      | 0   |
| Kayanza                | 0           | 0    | 0              | 0     | 0      | 0   |
| Kirundo                | 0           | 0    | 0              | 0     | 0      | 0   |
| Makamba                | 0           | 0    | 0              | 0     | 0      | 0   |
| Muramvya               | 0           | 0    | 0              | 0     | 0      | 0   |
| Muyinga                | 0           | 0    | 0              | 0     | 0      | 0   |
| Mwaro                  | 0           | 0    | 0              | 0     | 0      | 0   |
| Ngozi                  | 0           | 0    | 0              | 0     | 0      | 0   |
| Rutana                 | 0           | 0    | 0              | 0     | 0      | 0   |
| Ruyigi                 | 0           | 0    | 0              | 0     | 0      | 0   |
| Bujumbura Municipality | 10781       | 7,33 | 1363           | 20,44 | 12144  | 7,9 |
| Rumonge                | 0           | 0    | 0              | 0     | 0      | 0   |
| Total                  | 10925       | 4,2  | 1363           | 10,2  | 12288  | 4,5 |

Source : Study data

The low rates of connection to the public sewerage system are the result of low public investment in developing public sewerage networks. Some countries have liberalised the sanitation sector by introducing legislation to liberalise the sector. This liberalisation is essential to attract private investors who could develop new sanitation infrastructures in Bujumbura and other urban centers. This can allocate sufficient financial resources for the design, financing, construction, operation and maintenance of sanitation infrastructure. This strategy may include public funding, public-private partnerships (PPPs) or international funding as part of economic cooperation.

Given that Burundi has quite a few texts and laws governing the sector, those involved in sanitation need to establish a clear and coherent policy at national level, defining the objectives, priorities and funding mechanisms for the sanitation sector. To this point we can also add the integration of urban

planning with the sanitation sector to anticipate future needs in order to avoid problems linked to uncontrolled urban growth.

Another important point is raising public awareness. An aware population is more likely to support sanitation initiatives, especially as it is informed about the importance of sanitation and the consequences of a lack of these services.

#### IV.2.2.2. Public latrines

Public latrines are one of the most important sanitation facilities. By definition, a public latrine is a sanitary facility accessible to the public, generally located in busy places such as urban areas, markets, parks, railway stations, shopping areas or other places where there is a concentration of people. It is designed to provide access to basic sanitation for those who do not have a private toilet at home or who are travelling. The provinces of Burundi have public latrines in certain shopping centers and other places where there is a high concentration of people.

The results of the study show low levels of investment in public latrines (less than one toilet for every 1,000 households), even though they are an important component of public and collective sanitation. The table below shows an uneven spatial distribution, with 35% of latrines located in Bujumbura Municipality and 32% in the north of the country, mainly in the provinces of Kayanza (4%), Ngozi (18%) and Muyinga (10%).

*Table 13: Distribution of public latrines by province*

| Variables       | Public toilets | Number of households | Public latrines per 1000 households |
|-----------------|----------------|----------------------|-------------------------------------|
| <b>Province</b> |                |                      |                                     |
| Bubanza         | 1              | 4191                 | 0,2                                 |
| Bujumbura       | 10             | 25171                | 0,4                                 |
| Bururi          | 0              | 1249                 | 0,0                                 |
| Cankuzo         | 1              | 2039                 | 0,5                                 |
| Cibitoke        | 0              | 6237                 | 0,0                                 |
| Gitega          | 16             | 15114                | 1,1                                 |
| Karusi          | 1              | 2511                 | 0,4                                 |
| Kayanza         | 6              | 6463                 | 0,9                                 |
| Kirundo         | 7              | 3589                 | 2,0                                 |
| Makamba         | 2              | 6110                 | 0,3                                 |
| Muramvya        | 0              | 2102                 | 0,0                                 |
| Muyinga         | 14             | 8213                 | 1,7                                 |
| Mwaro           | 1              | 750                  | 1,3                                 |
| Ngozi           | 26             | 10992                | 2,4                                 |
| Rutana          | 1              | 2093                 | 0,5                                 |

|                        |            |               |            |
|------------------------|------------|---------------|------------|
| Ruyigi                 | 6          | 2403          | 2,5        |
| Bujumbura Municipality | 51         | 147082        | 0,3        |
| Rumonge                | 2          | 12569         | 0,2        |
| <b>Total</b>           | <b>145</b> | <b>258878</b> | <b>0,6</b> |

Source: Study data

### IV.3. Drinking water situation

This section looks at the drinking water situation in the 18 urban centers. Drinking water is an essential component of sanitation and is positively correlated with the health of the population. The analysis is structured around the following sections: (i) drinking water supplier, (ii) accessibility to drinking water and sources used, (iii) availability and quality of water, including aspects such as the cost of water, distance travelled in search of water, permanent availability, functionality of facilities, sharing of water installations, time taken to fill a 20-litre container, (iv) cost of water, (v) water situation in households.

#### IV.3.1 Properties connected to the drinking water network

In urban centers, the study shows that 67% of households are connected to the drinking water network, compared with 70% of facilities or institutions. Cibitoke (23%), Muramvya (39%), Makamba (38%), Bubanza (40%), Kirundo (45%) and Kayanza (47%) are the provinces least connected to the drinking water network (less than 50% of households). In contrast, the provinces of Bujumbura Municipality and Bururi have high rates of drinking water connection for 76% and 79% of households respectively.

Table 14: Proportion of properties connected to the drinking water network

| Variables       | Residential |       | Structure or institution |       | Total  |       |
|-----------------|-------------|-------|--------------------------|-------|--------|-------|
|                 | Number      | %     | Number                   | %     | Number | %     |
| <b>Province</b> |             |       |                          |       |        |       |
| Bubanza         | 1714        | 40,9  | 114                      | 76    | 1828   | 42,11 |
| Bujumbura       | 15133       | 60,12 | 425                      | 44,46 | 15558  | 59,55 |
| Bururi          | 993         | 79,5  | 146                      | 70,53 | 1139   | 78,23 |
| Cankuzo         | 1117        | 54,78 | 111                      | 60,66 | 1228   | 55,27 |
| Cibitoke        | 1452        | 23,28 | 93                       | 62    | 1545   | 24,19 |
| Gitega          | 10718       | 70,91 | 754                      | 80,13 | 11472  | 71,45 |
| Karusi          | 1301        | 51,81 | 121                      | 66,12 | 1422   | 52,78 |
| Kayanza         | 3517        | 54,42 | 178                      | 74,48 | 3695   | 55,13 |
| Kirundo         | 1641        | 45,72 | 218                      | 39,28 | 1859   | 44,86 |
| Makamba         | 2349        | 38,45 | 221                      | 51,52 | 2570   | 39,3  |
| Muramvya        | 821         | 39,06 | 98                       | 37,4  | 919    | 38,87 |

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|                        |        |       |      |       |        |       |
|------------------------|--------|-------|------|-------|--------|-------|
| Muyinga                | 4504   | 54,84 | 334  | 66,4  | 4838   | 55,51 |
| Mwaro                  | 520    | 69,33 | 79   | 62,2  | 599    | 68,3  |
| Ngozi                  | 7374   | 67,09 | 521  | 56,26 | 7895   | 66,24 |
| Rutana                 | 1377   | 65,79 | 142  | 71    | 1519   | 66,25 |
| Ruyigi                 | 1557   | 64,79 | 178  | 80,91 | 1735   | 66,15 |
| Bujumbura Municipality | 112202 | 76,29 | 5379 | 80,68 | 117581 | 76,48 |
| Rumonge                | 6849   | 54,49 | 280  | 63,78 | 7129   | 54,8  |
| <b>Total</b>           | 175139 | 67,65 | 9392 | 70,42 | 184531 | 67,79 |

Source: Study data

### IV.3.2. Drinking water suppliers

Burundi has different drinking water suppliers in rural, urban and peri-urban areas. At present, REGIDESO is the main supplier in almost all the country's urban centers. The list of water suppliers in other areas, especially in rural areas and small communities, is as follows: (i) AHAMR, (ii) SOREGEHA, (iii) Communes (RCEs), (iv) NGOs and (v) communities. Among these service providers, there is little development of services by private operators to meet the ever-increasing demand for water. Connection to the REGIDESO network, or to another supplier such as AHAMR, requires a water meter, the main role of which is to measure the quantity of water consumed but also to ensure good management of resources.

In fact, 79472 meters were identified in households compared to 8627 meters in institutions or facilities representing respectively 58% and 64% as shown in table 15.

The possession of water meters is an important indicator for measuring rational water management. These data reveal the extent of the phenomenon, with a large proportion of households not having meters, resulting in significant revenue shortfalls for service providers.

*Table 15: Existence of drinking water meters in properties*

|           | Residential |       | Facility or institution |       | Total  |       |
|-----------|-------------|-------|-------------------------|-------|--------|-------|
|           | Number      | %     | Number                  | %     | Number | %     |
| Bubanza   | 1120        | 35,51 | 108                     | 72,00 | 1228   | 37,17 |
| Bujumbura | 7054        | 45,73 | 374                     | 39,12 | 7428   | 45,35 |
| Bururi    | 650         | 69,30 | 137                     | 66,18 | 787    | 68,73 |
| Cankuzo   | 707         | 47,93 | 107                     | 58,47 | 814    | 49,10 |
| Cibitoke  | 675         | 18,15 | 86                      | 57,33 | 761    | 19,67 |
| Gitega    | 6248        | 66,49 | 728                     | 77,36 | 6976   | 67,48 |
| Karusi    | 762         | 45,60 | 118                     | 64,48 | 880    | 47,46 |

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|                        |               |              |              |              |               |              |
|------------------------|---------------|--------------|--------------|--------------|---------------|--------------|
| Kayanza                | 1966          | 43,97        | 142          | 59,41        | 2108          | 44,76        |
| Kirundo                | 1028          | 39,98        | 175          | 31,53        | 1203          | 38,48        |
| Makamba                | 1089          | 31,72        | 210          | 48,95        | 1299          | 33,64        |
| Muramvya               | 340           | 21,95        | 48           | 18,32        | 388           | 21,42        |
| Muyinga                | 2284          | 42,45        | 285          | 56,66        | 2569          | 43,67        |
| Mwaro                  | 228           | 59,69        | 79           | 62,20        | 307           | 60,31        |
| Ngozi                  | 4318          | 58,17        | 489          | 52,81        | 4807          | 57,58        |
| Rutana                 | 858           | 58,13        | 139          | 69,50        | 997           | 59,49        |
| Ruyigi                 | 1011          | 60,43        | 171          | 77,73        | 1182          | 62,44        |
| Bujumbura Municipality | 46414         | 70,79        | 4993         | 74,89        | 51407         | 71,16        |
| Rumonge                | 2720          | 37,70        | 238          | 54,21        | 2958          | 38,65        |
| <b>Total</b>           | <b>79 472</b> | <b>58,04</b> | <b>8 627</b> | <b>64,68</b> | <b>88 099</b> | <b>58,63</b> |

Source: Study data

As for the distribution of these water meters according to the various service providers, the data for residential properties show that the majority of meters belong to REGIDESO with 76643 meters counted, representing 96.4% of the total. The other suppliers, SOREGEHA, Commune, NGOs, Church and Community, account for 0.98%, 2.08%, 0.04%, 0.02% and 0.43% respectively. Detailed information can be found in table 16.

In terms of facilities or institutions, the data show 8500 meters counted by REGIDESO, which represent 98.53% of the total, as shown in table 17.

*Table 16: Distribution of water meters by supplier and province in residential properties*

|           | REGIDESO |       | SOREGEHA |       | Commune |       | NGO    |      | Church |      | Community |      |
|-----------|----------|-------|----------|-------|---------|-------|--------|------|--------|------|-----------|------|
|           | Number   | %     | Number   | %     | Number  | %     | Number | %    | Number | %    | Number    | %    |
| Bubanza   | 1104     | 98,57 | 0        | 0     | 16      | 1,43  | 0      | 0    | 0      | 0    | 0         | 0    |
| Bujumbura | 4852     | 68,78 | 721      | 10,22 | 1136    | 16,1  | 17     | 0,24 | 1      | 0,01 | 327       | 4,64 |
| Bururi    | 581      | 89,38 | 0        | 0     | 69      | 10,62 | 0      | 0    | 0      | 0    | 0         | 0    |
| Cankuzo   | 651      | 92,08 | 0        | 0     | 56      | 7,92  | 0      | 0    | 0      | 0    | 0         | 0    |
| Cibitoke  | 675      | 100   | 0        | 0     | 0       | 0     | 0      | 0    | 0      | 0    | 0         | 0    |
| Gitega    | 6239     | 99,86 | 0        | 0     | 5       | 0,08  | 3      | 0,05 | 0      | 0    | 1         | 0,02 |
| Karusi    | 459      | 60,24 | 0        | 0     | 303     | 39,76 | 0      | 0    | 0      | 0    | 0         | 0    |
| Kayanza   | 1962     | 99,8  | 0        | 0     | 4       | 0,2   | 0      | 0    | 0      | 0    | 0         | 0    |
| Kirundo   | 1028     | 100   | 0        | 0     | 0       | 0     | 0      | 0    | 0      | 0    | 0         | 0    |
| Makamba   | 1069     | 98,16 | 0        | 0     | 17      | 1,56  | 3      | 0,28 | 0      | 0    | 0         | 0    |
| Muramvya  | 339      | 99,71 | 0        | 0     | 0       | 0     | 1      | 0,29 | 0      | 0    | 0         | 0    |
| Muyinga   | 2282     | 99,91 | 0        | 0     | 1       | 0,04  | 0      | 0    | 1      | 0,04 | 0         | 0    |

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|                        |              |              |            |             |             |             |           |             |           |             |            |             |
|------------------------|--------------|--------------|------------|-------------|-------------|-------------|-----------|-------------|-----------|-------------|------------|-------------|
| Mwaro                  | 228          | 100          | 0          | 0           | 0           | 0           | 0         | 0           | 0         | 0           | 0          | 0           |
| Ngozi                  | 4313         | 99,88        | 0          | 0           | 1           | 0,02        | 2         | 0,05        | 1         | 0,02        | 1          | 0,02        |
| Rutana                 | 858          | 100          | 0          | 0           | 0           | 0           | 0         | 0           | 0         | 0           | 0          | 0           |
| Ruyigi                 | 999          | 98,81        | 0          | 0           | 12          | 1,19        | 0         | 0           | 0         | 0           | 0          | 0           |
| Bujumbura Municipality | 46287        | 99,73        | 59         | 0,13        | 32          | 0,07        | 9         | 0,02        | 11        | 0,02        | 16         | 0,03        |
| Rumonge                | 2717         | 99,89        | 0          | 0           | 1           | 0,04        | 0         | 0           | 2         | 0,07        | 0          | 0           |
| <b>Total</b>           | <b>76643</b> | <b>96,44</b> | <b>780</b> | <b>0,98</b> | <b>1653</b> | <b>2,08</b> | <b>35</b> | <b>0,04</b> | <b>16</b> | <b>0,02</b> | <b>345</b> | <b>0,43</b> |

Source: Study data

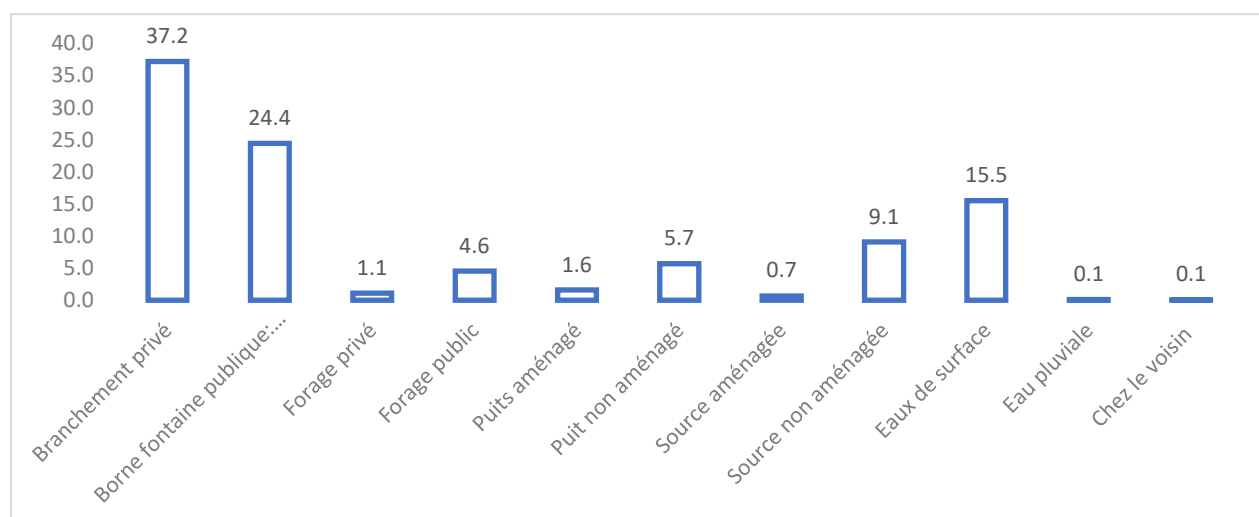
Table 17: Distribution of water meters by supplier and province in facilities or institutions

|                        | REGIDESO    |              | SOREGEHA  |             | Commune   |             | NGO      |             | Church   |             | Community |             |
|------------------------|-------------|--------------|-----------|-------------|-----------|-------------|----------|-------------|----------|-------------|-----------|-------------|
|                        | Number      | %            | Number    | %           | Number    | %           | Number   | %           | Number   | %           | Number    | %           |
| Bubanza                | 107         | 99,07        | 0         | 0           | 1         | 0,93        | 0        | 0           | 0        | 0           | 0         | 0           |
| Bujumbura              | 324         | 86,63        | 17        | 4,55        | 28        | 7,49        | 0        | 0           | 0        | 0           | 5         | 1,34        |
| Bururi                 | 130         | 94,89        | 0         | 0           | 7         | 5,11        | 0        | 0           | 0        | 0           | 0         | 0           |
| Cankuzo                | 104         | 97,2         | 0         | 0           | 3         | 2,8         | 0        | 0           | 0        | 0           | 0         | 0           |
| Cibitoke               | 86          | 100          | 0         | 0           | 0         | 0           | 0        | 0           | 0        | 0           | 0         | 0           |
| Gitega                 | 727         | 99,86        | 0         | 0           | 1         | 0,14        | 0        | 0           | 0        | 0           | 0         | 0           |
| Karusi                 | 83          | 70,34        | 0         | 0           | 35        | 29,66       | 0        | 0           | 0        | 0           | 0         | 0           |
| Kayanza                | 140         | 98,59        | 0         | 0           | 2         | 1,41        | 0        | 0           | 0        | 0           | 0         | 0           |
| Kirundo                | 175         | 100          | 0         | 0           | 0         | 0           | 0        | 0           | 0        | 0           | 0         | 0           |
| Makamba                | 208         | 99,05        | 0         | 0           | 2         | 0,95        | 0        | 0           | 0        | 0           | 0         | 0           |
| Muramvya               | 48          | 100          | 0         | 0           | 0         | 0           | 0        | 0           | 0        | 0           | 0         | 0           |
| Muyinga                | 284         | 99,65        | 0         | 0           | 1         | 0,35        | 0        | 0           | 0        | 0           | 0         | 0           |
| Mwaro                  | 79          | 100          | 0         | 0           | 0         | 0           | 0        | 0           | 0        | 0           | 0         | 0           |
| Ngozi                  | 488         | 99,8         | 0         | 0           | 0         | 0           | 0        | 0           | 1        | 0,2         | 0         | 0           |
| Rutana                 | 136         | 97,84        | 0         | 0           | 0         | 0           | 0        | 0           | 0        | 0           | 3         | 2,16        |
| Ruyigi                 | 171         | 100          | 0         | 0           | 0         | 0           | 0        | 0           | 0        | 0           | 0         | 0           |
| Bujumbura Municipality | 4972        | 99,58        | 6         | 0,12        | 8         | 0,16        | 1        | 0,02        | 2        | 0,04        | 4         | 0,08        |
| Rumonge                | 238         | 100          | 0         | 0           | 0         | 0           | 0        | 0           | 0        | 0           | 0         | 0           |
| <b>Total</b>           | <b>8500</b> | <b>98,53</b> | <b>23</b> | <b>0,27</b> | <b>88</b> | <b>1,02</b> | <b>1</b> | <b>0,01</b> | <b>3</b> | <b>0,03</b> | <b>12</b> | <b>0,14</b> |

### IV.3.3. Access to drinking water and sources

Access to drinking water is a fundamental right and a development goal. It plays an essential role in promoting health, education, gender equality, economic development and environmental conservation. It is always important to be aware of access to drinking water, so that network extensions can be planned to ensure access for all.

Accessibility is a fairly broad concept, including availability at all times, water quality, the distance households travel in search of water, protection of water sources, sharing of water facilities, and many others. In this section, the analysis is limited to the types of water source used by households, which is a fundamental component of water accessibility. The data shows that almost 70% of households use an improved and protected water source (private connection, standpipe, private borehole, public well and improved well). A significant proportion of households also use surface water, 15.5% of all households surveyed, as shown in the graph opposite.

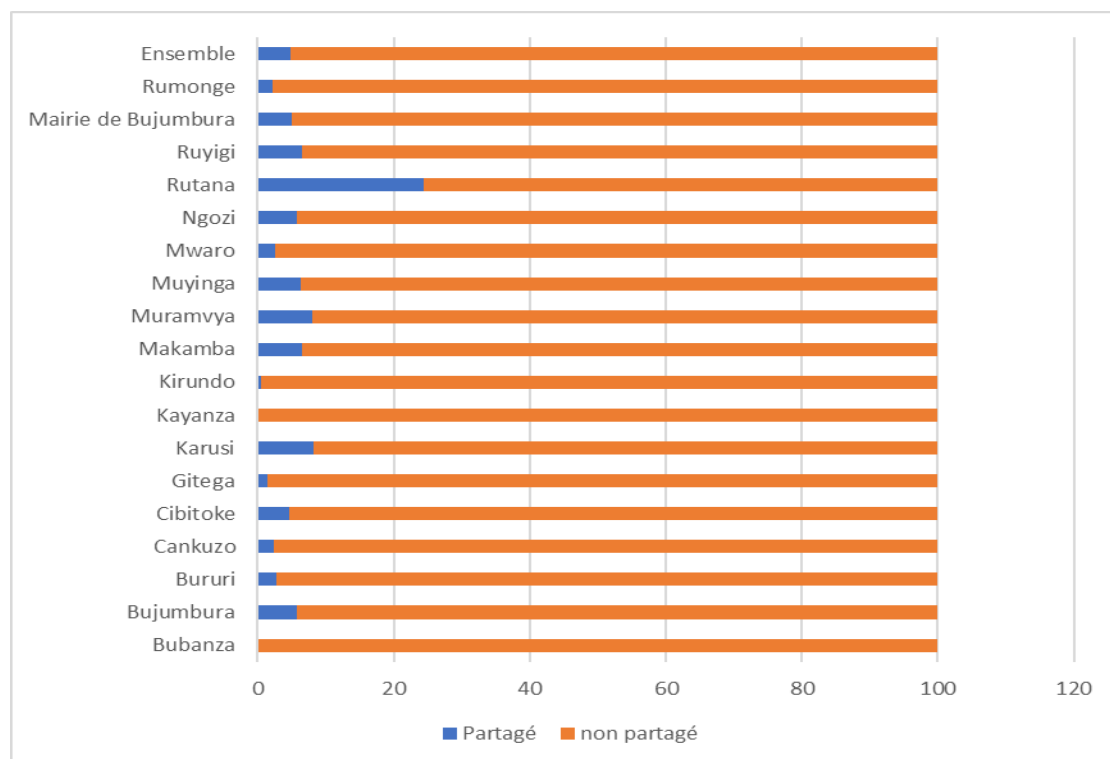


Source: Study data

Figure 24: Types of water resources used by households

Households that use private connections more than others are found in Bururi province (81%), Ngozi province (69%) and Mwaro province (63%). Cibitoke province leads the way in the use of standpipes, with a rate of 83%. Little use is made of public standpipes in the provinces of Bururi, Muramvya and Mwaro, all with an estimated rate of 1%, as shown in table 29 in the appendix. The number of water points in each province is shown in Table 30 in the appendix to the report.

**Sharing water facilities:** Another issue to consider is the sharing of water resources between neighbouring households. The study shows a low average proportion of households, around 5%, that share water facilities with others who are not members of their household. The highest proportion of households sharing water facilities with others is found in the provinces of Rutana (24%) and Karusi and Mwaro (8%), as shown in Figure 27.



Source: Study data

Figure 22: Proportion of households sharing water facilities

The number of people in a household also influences the total amount of water required to meet daily needs. The greater the number of household members, the greater the demand for water for daily activities such as drinking, cooking, washing, bathing, etc. During this study, we saw that overall, 2 households use 2 water installations in a plot of land with eight people, as shown in table 18. In Bujumbura Municipality, 2 households use 2 water facilities in a plot of 8 people. Kayanza province stands out as a province where 9 people in a single household can use a single water facility.

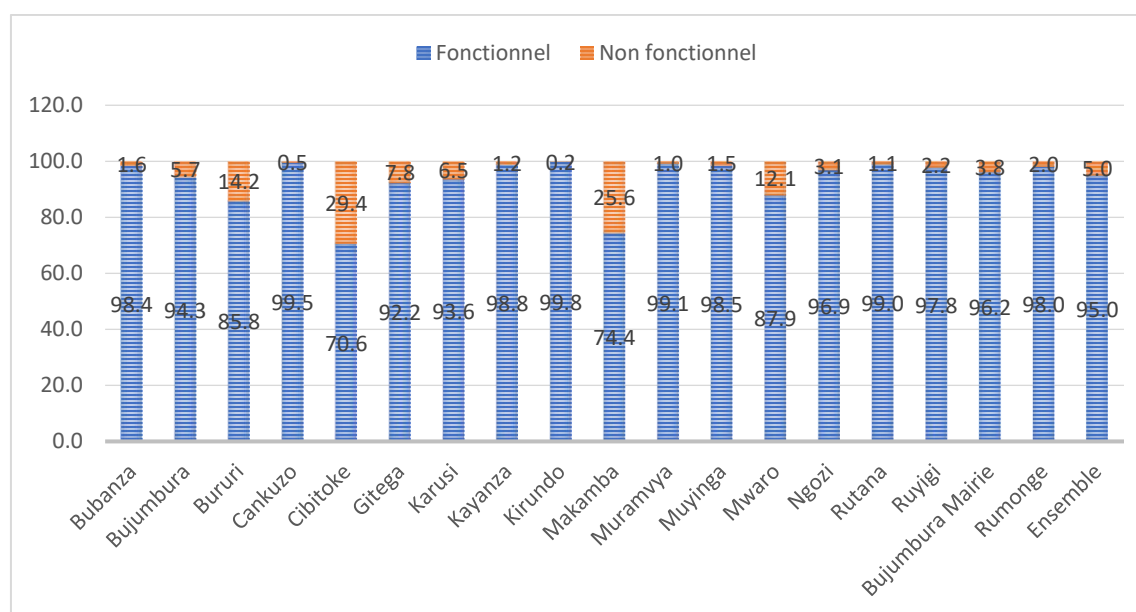
Table 18: Number of people in the household and access to water facilities

|                 | Households per plot | People per plot | Water installations per household |
|-----------------|---------------------|-----------------|-----------------------------------|
| <b>Province</b> |                     |                 |                                   |
| Bubanza         | 1,3                 | 8,8             | 1,5                               |
| Bujumbura       | 1,6                 | 8,3             | 2,6                               |
| Bururi          | 1,3                 | 6,9             | 2                                 |

|                        |            |          |            |
|------------------------|------------|----------|------------|
| Cankuzo                | 1,4        | 7,4      | 1,7        |
| Cibitoke               | 1,7        | 7,6      | 2          |
| Gitega                 | 1,6        | 7,7      | 2,4        |
| Karusi                 | 1,5        | 8,3      | 2          |
| Kayanza                | 1,4        | 9,1      | 1,5        |
| Kirundo                | 1,4        | 2,1      | 2,3        |
| Makamba                | 1,8        | 7,2      | 2,3        |
| Muramvya               | 1,4        | 6,8      | 2,7        |
| Muyinga                | 1,5        | 7,9      | 2,4        |
| Mwaro                  | 2,0        | 3,5      | 2,5        |
| Ngozi                  | 1,5        | 5,5      | 2,4        |
| Rutana                 | 1,4        | 7,3      | 1,7        |
| Ruyigi                 | 1,4        | 7        | 2,2        |
| Bujumbura Municipality | 2,2        | 8,5      | 2,6        |
| Rumonge                | 1,7        | 7,5      | 1,6        |
| <b>Total</b>           | <b>1,9</b> | <b>8</b> | <b>2,4</b> |

Source : Study data

**Functionality of facilities:** Another important indicator influencing water availability is the functionality of facilities. Only 5% of households said that their facilities were not in good condition, compared with 95% of the rest who said that their facilities were functional, as shown in Figure 28. The provinces of Cibitoke and Makamba have non-functionality rates of over 20%, while Bururi and Mwaro have rates of over 10%.



Source: Study data

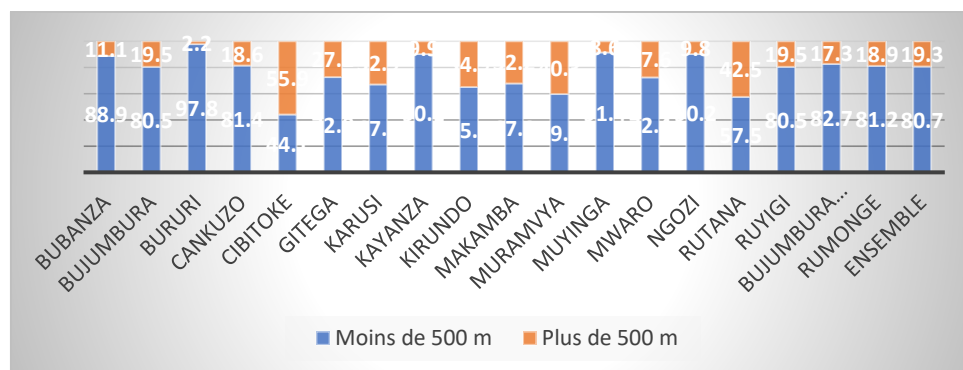
Figure 23: Functionality of facilities (%)

#### IV.3.4. Water availability and quality

**Water quality:** Water availability and quality are complex issues requiring an integrated approach involving sustainable management of water resources, effective regulation, constant monitoring of quality, cost, distance travelled and time taken to collect water.

**Water collection distance:** The distance people have to travel to fetch water has a direct impact on their daily lives and is an important dimension of water availability. A long distance can mean a considerable loss of time, limiting opportunities for education, work or leisure, and creating difficult living conditions for the women in charge of this work in most cases.

In our context, we assessed water stress at household level by estimating the distances travelled to find water. The results of the study showed that nearly 8 out of 10 households travel less than 500 metres to find water, while around 2 out of 10 households travel more than 500 metres. Compared with the other provinces, households in Cibitoke province 55% use more than 500 metres, followed by Muramvya 40% and Kirundo 34%, as shown in Figure 29.



Source: Study data

Figure 24: Water collection distance

**Time taken to collect water:** The time taken to collect water can be linked to the availability of drinking water sources. Understanding this dynamic can guide efforts to improve local infrastructure to make drinking water more accessible. The usual standard in this respect is a 30-minute round trip. The results of the study showed that around 9 out of 10 households surveyed said they used less than 30 minutes to collect water (61% used less than 5 minutes, 25% 5-20 minutes and almost 6.5% 20-30 minutes to fetch or find water). The province of Cibitoke reveals high levels of vulnerability in terms of water availability, with around 7 out of 10 households reporting using more than 30 minutes to find water. Often, the responsibility for fetching water falls on women and girls and understanding how much time is spent on this task can highlight gender inequalities and help design interventions to reduce the burden on these groups.

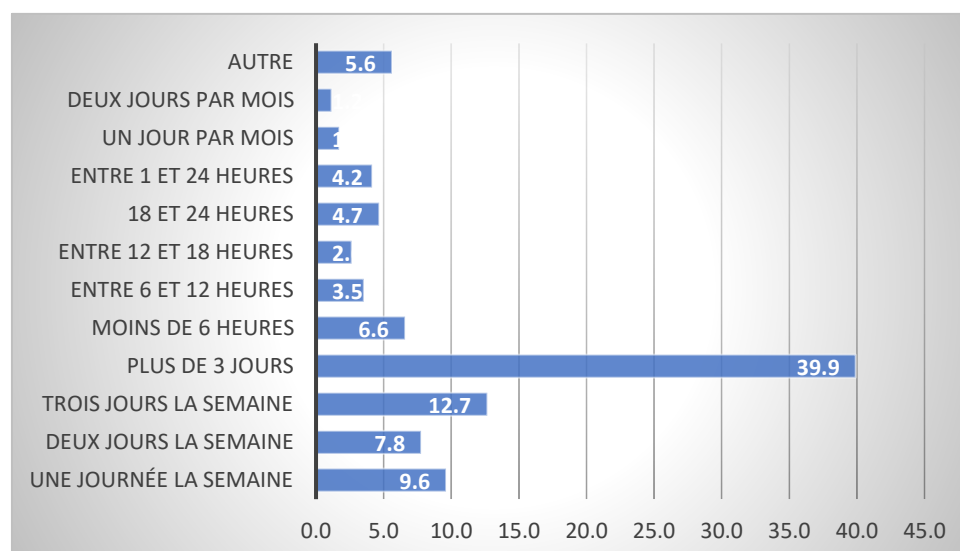
**Time taken to fill a 20-litre container:** In addition to the quality, distance and time taken by households to find water, the time taken to fill a 20-litre container is an important dimension in measuring the quality and availability of drinking water. Public policies aim at reducing collection time, filling time, distance travelled and water-breaking time, all of which are key factors in improving access to drinking water. The results of the study show that 80% of households take 0 to 5 minutes to fill a twenty-litre jug, while between 3% and 14% take ten to twenty minutes.

In terms of provincial disparities, households that take longer than others to fill a 20-litre jug are found in Bujumbura province, where 5.3% of households take 10 to 20 minutes to fill a 20-litre jug. In Kirundo province, 1.4% and 2.6% take 10 to 20 minutes and 20 to 30 minutes respectively, as shown in Table 31 in the annex.

### Period of water availability

The last important dimension for measuring accessibility to water is the time it takes for the water to break. The expansion of the city of Bujumbura and the other provinces is accompanied by a shortage of water infrastructure to serve an ever-growing population. People are faced with repeated water shortages, with some neighbourhoods going for more than a week without water.

The results for water availability exceed hours or some provinces or areas take days to wait for water. Graph 30 shows that around 4 out of 10 households say they wait for more than 3 days, while 12% say they wait for only 3 days a week and 9% one day a week.



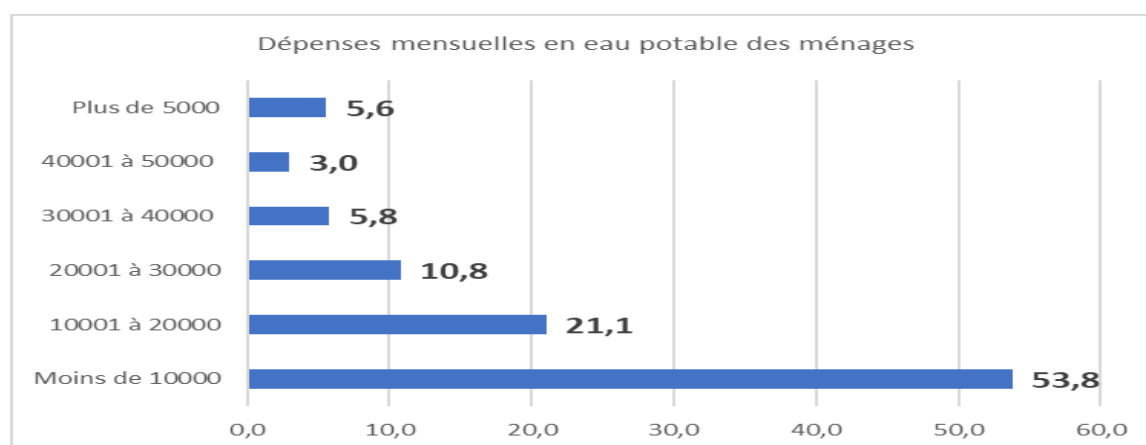
Source: Study data

Figure 25: Availability of drinking water in urban centers (%)

The timescales for water availability reveal huge disparities in terms of water availability, as shown in Table 33 in the appendix. According to the results contained in this table, for Bujumbura Municipality, which has many urban centers, around 4 out of 10 households wait 3 days to have drinking water and 12.3% talk about having drinking water three days a week, making a total of half the households that can spend 3 days without water.

An in-depth analysis could reveal further detailed information on the vulnerability of certain neighbourhoods, particularly new neighbourhoods that do not have water networks.

**Cost of water:** The water payment system incorporates incentives for water conservation to encourage more responsible use of this resource. Although some regions offer free or subsidised access to water, in Burundi payment for water is still required. This helps to maintain and improve infrastructure, guarantee water quality and meet drinking water needs. Household water costs and expenditure were estimated on a monthly basis. Around 5 out of 10 residential properties reported paying less than BIF 10,000 per month (53%), while 21% and 10% pay between BIF 20,000 and BIF 30,000 per month respectively, as shown in graph 31.



Source: Study data

Figure 26: Average household expenditure on drinking water

The data shows disparities at provincial level. In the province of Bujumbura Municipality, 46% of households pay less than BIF 10,000 per month. The category of households paying BIF 20,000 and BIF 30,000 per month is estimated at 20% and 13% respectively. In Rumonge province, 83% of households pay less than BIF 10,000 and 13% pay between BIF 10,000 and BIF 20,000, making a total of 96% of households.

In Gitega province, 66% of households pay a monthly amount of BIF 10,000 and 13% pay between BIF 20,000 and BIF 30,000. The proportion of households according to monthly expenditure by province is shown in Table 32 in the appendix.

#### IV.3.5. Overall assessment of the situation of safely managed water in households

We have tried to highlight the overall water situation by recoding the water sources that are safely managed and not exposed to contamination risks. The two main piped and un-piped water sources are considered to be safely managed and not at risk of contamination. The other undeveloped sources are considered to be unimproved, while rainwater and surface water have no facilities.

Graph 34 shows that 86.6% have water sources that are managed safely, with 78.6% and 8.0% of households respectively having piped or un-piped water. This represents significant progress towards the Sustainable Development Goals (SDGs).

Despite this progress, a significant proportion of households (13.4%) still draw water from unimproved sources such as rivers or surface water.

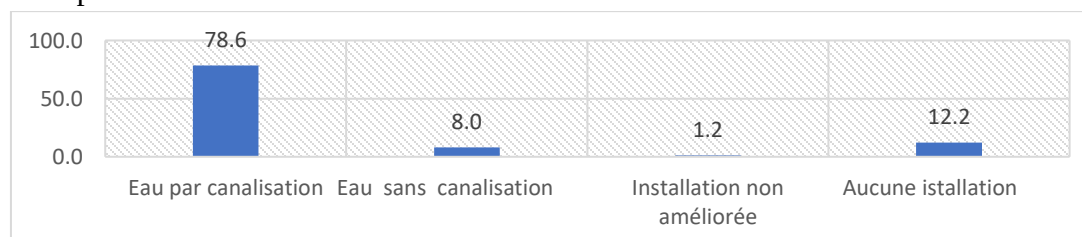


**Figure 27: Overall assessment of the drinking water situation in households**

[illegible]

**Figure 29** *Institutions with no water pipes*

## IV.4. Hygiene situation at properties

### IV.4.1. Hand washing

Hygienic hand washing is a simple but extremely effective way of preventing infectious diseases. It should be part of everyone's daily life, whether at home, at school, at work or in other social contexts. This practice requires education that is accompanied by appropriate facilities. The recent covid-19 pandemic confirmed the importance of implementing hand-washing facilities in households, infrastructures and public places, and confirmed that hand-washing is a best practice in the fight against pandemics.

The results of the study show that Burundi has not made enough progress, with only a quarter (24%) of households having a hand-washing facility at home. In terms of facilities, around 5 out of 10 (47%) have a hand-washing facility.

There are major disparities at provincial level, with the provinces of Cankuzo 0.5%, Bubanza 4%, Karusi 3%, Ngozi 6%, Rumonge 8% and Muyinga 8%.

Institutions or facilities with fewer handwashing facilities than others are found in the provinces of Bubanza 30%, Bujumbura 20%, Cankuzo 27%, Ngozi 26%, Muyinga 29% and Makamba 30%. Details can be found in table 19.

*Table 19: Hand-washing facilities in households and structures or institutions (%)*

|           | Residential |      | Facility or institution |      |
|-----------|-------------|------|-------------------------|------|
|           | Number      | %    | Number                  | %    |
| Bubanza   | 193         | 4,6  | 46                      | 30,9 |
| Bujumbura | 3975        | 15,8 | 225                     | 20,0 |
| Bururi    | 241         | 19,3 | 143                     | 69,1 |
| Cankuzo   | 11          | 0,5  | 51                      | 27,9 |
| Cibitoke  | 478         | 7,7  | 90                      | 60,0 |
| Gitega    | 3712        | 24,6 | 521                     | 55,3 |
| Karusi    | 86          | 3,4  | 61                      | 33,3 |
| Kayanza   | 1422        | 22,0 | 142                     | 59,4 |
| Kirundo   | 1556        | 43,4 | 250                     | 45,1 |
| Makamba   | 801         | 13,1 | 131                     | 30,5 |
| Muramvya  | 1269        | 60,4 | 135                     | 51,5 |
| Muyinga   | 674         | 8,2  | 150                     | 29,9 |
| Mwaro     | 155         | 20,7 | 70                      | 55,1 |
| Ngozi     | 721         | 6,6  | 245                     | 26,5 |
| Rutana    | 562         | 26,9 | 125                     | 62,5 |

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|                        |              |             |             |             |
|------------------------|--------------|-------------|-------------|-------------|
| Ruyigi                 | 505          | 21,0        | 86          | 39,1        |
| Bujumbura Municipality | 44636        | 30,4        | 3561        | 53,5        |
| Rumonge                | 1010         | 8,0         | 194         | 44,2        |
| <b>Total</b>           | <b>62007</b> | <b>24,0</b> | <b>6226</b> | <b>47,0</b> |

Source: Study data

The types of handwashing facilities surveyed were grouped into three categories: buckets with taps, washbasins and hanging jerry cans. The overall results show that 38% of households with handwashing facilities use buckets with taps, 57% use washbasins and 4% use hanging jerry cans. In Bujumbura town hall, 38.8% of households with hand-washing facilities use a bucket with a tap, 35% use washbasins and 4% use hanging jerry cans. In other provinces, such as Rumonge, 60% of households with hand-washing facilities use buckets with taps, 35% use washbasins and 4% use hanging jerry cans. Washing with hanging jerry cans is more widespread in Kirundo province, where 35% of households use this system.

Hand-washing facilities require water on a daily basis. The majority of households and facilities (95%) confirmed that these facilities often have water, and this is the case in almost all provinces. This is complemented by the use of soap, where 90% of households and facilities have soap in their handwashing facilities.

#### IV.4.2. Menstrual hygiene

Menstrual hygiene is an important component of reproductive health and overall healthcare, and provides an understanding of how individuals, particularly women and young girls, are educated about menstruation. It also encompasses self-care practices during menstruation. In the survey, 69% of households said they had sanitary bins for women's menstrual hygiene, while another 29% said they had no bins.

Households without menstrual waste bins are found in the provinces of Bubanza (68%), Cankuzo (79%), Cibitoke (79%), Kayanza (83%), Muyinga (68%), Ngozi (74%) and Gitega (52%), as shown in Table 20.

The study also identified the hygiene products used by households during menstruation. The majority of women use disposable pads as menstrual hygiene products, i.e. 76% of households, while 24% use reusable products as shown in Table 21.

*Table 20: Existence of waste bins in households*

| Province | Existent |       | Non-existent |       | Unknown |      |
|----------|----------|-------|--------------|-------|---------|------|
|          | Number   | %     | Number       | %     | Number  | %    |
| Bubanza  | 285      | 30,81 | 636          | 68,76 | 4       | 0,43 |

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|                        |              |             |              |           |            |            |
|------------------------|--------------|-------------|--------------|-----------|------------|------------|
| Bujumbura              | 3602         | 81,72       | 699          | 15,86     | 107        | 2,43       |
| Bururi                 | 526          | 93,43       | 32           | 5,68      | 5          | 0,89       |
| Cankuzo                | 97           | 20,68       | 372          | 79,32     | 0          | 0          |
| Cibitoke               | 210          | 18,01       | 924          | 79,25     | 32         | 2,74       |
| Gitega                 | 1429         | 46,7        | 1601         | 52,32     | 30         | 0,98       |
| Karusi                 | 319          | 97,26       | 9            | 2,74      | 0          | 0          |
| Kayanza                | 359          | 16,46       | 1820         | 83,45     | 2          | 0,09       |
| Kirundo                | 389          | 76,73       | 116          | 22,88     | 2          | 0,39       |
| Makamba                | 1367         | 59,28       | 910          | 39,46     | 29         | 1,26       |
| Muramvya               | 323          | 76,18       | 100          | 23,58     | 1          | 0,24       |
| Muyinga                | 628          | 30,35       | 1433         | 69,26     | 8          | 0,39       |
| Mwaro                  | 244          | 54,59       | 201          | 44,97     | 2          | 0,45       |
| Ngozi                  | 177          | 23,57       | 557          | 74,17     | 17         | 2,26       |
| Rutana                 | 410          | 83,33       | 78           | 15,85     | 4          | 0,81       |
| Ruyigi                 | 390          | 60,28       | 256          | 39,57     | 1          | 0,15       |
| Bujumbura Municipality | 28713        | 79,69       | 6611         | 18,35     | 709        | 1,97       |
| Rumonge                | 2097         | 67          | 1006         | 32,14     | 27         | 0,86       |
| <b>Total</b>           | <b>41565</b> | <b>69,4</b> | <b>17361</b> | <b>29</b> | <b>980</b> | <b>1,6</b> |

Source: Study data

Table 21: Menstrual hygiene products used by women in this household

|                 | Disposable pads | Reusable pads | Tampons | Toilet papers | Unkonwn | Other | Total |
|-----------------|-----------------|---------------|---------|---------------|---------|-------|-------|
| <b>Province</b> |                 |               |         |               |         |       |       |
| Bubanza         | 56,50           | 34,56         | 7,15    | 0,30          | 1,49    | 0,00  | 100   |
| Bujumbura       | 89,16           | 6,84          | 1,17    | 0,65          | 2,12    | 0,06  | 100   |
| Bururi          | 97,54           | 0,18          | 0,18    | 1,05          | 1,05    | 0,00  | 100   |
| Cankuzo         | 76,32           | 23,68         | 0,00    | 0,00          | 0,00    | 0,00  | 100   |
| Cibitoke        | 81,89           | 13,35         | 0,39    | 0,78          | 2,34    | 1,25  | 100   |
| Gitega          | 82,47           | 16,13         | 0,32    | 0,00          | 0,85    | 0,23  | 100   |
| Karusi          | 87,17           | 0,27          | 8,02    | 4,55          | 0,00    | 0,00  | 100   |
| Kayanza         | 48,24           | 36,82         | 12,71   | 1,69          | 0,27    | 0,27  | 100   |
| Kirundo         | 69,56           | 8,30          | 15,31   | 6,27          | 0,37    | 0,18  | 100   |
| Makamba         | 62,19           | 30,75         | 0,34    | 2,96          | 0,58    | 3,18  | 100   |
| Muramvya        | 48,07           | 49,89         | 0,23    | 0,00          | 0,23    | 1,59  | 100   |
| Muyinga         | 73,23           | 23,27         | 0,25    | 1,64          | 0,55    | 1,05  | 100   |

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|                        |              |              |             |             |             |             |            |
|------------------------|--------------|--------------|-------------|-------------|-------------|-------------|------------|
| Mwaro                  | 47,85        | 8,58         | 43,35       | 0,00        | 0,00        | 0,21        | 100        |
| Ngozi                  | 73,69        | 25,45        | 0,00        | 0,43        | 0,32        | 0,11        | 100        |
| Rutana                 | 77,62        | 22,38        | 0,00        | 0,00        | 0,00        | 0,00        | 100        |
| Ruyigi                 | 70,87        | 28,75        | 0,25        | 0,00        | 0,00        | 0,13        | 100        |
| Bujumbura Municipality | 80,78        | 11,19        | 3,22        | 2,66        | 1,98        | 0,17        | 100        |
| Rumonge                | 55,58        | 30,49        | 2,17        | 4,64        | 1,83        | 5,30        | 100        |
| <b>Total</b>           | <b>76,62</b> | <b>15,65</b> | <b>3,21</b> | <b>2,26</b> | <b>1,60</b> | <b>0,66</b> | <b>100</b> |

Source: Study data

The study also identified ways of disposing of menstrual hygiene waste. Nearly 40% of women use the waste management service, i.e. 86% of households, while 35% use landfill or the rubbish pit, as shown in the table opposite:

Table 22: Disposal methods for menstrual hygiene waste

|                        | Burning | Reusable | Landfill | Rubbish pit | Waste management service | Other | Total |
|------------------------|---------|----------|----------|-------------|--------------------------|-------|-------|
| <b>Province</b>        |         |          |          |             |                          |       |       |
| Bubanza                | 9,47    | 23,13    | 0,70     | 66,60       | 0,10                     | 0,00  | 100   |
| Bujumbura              | 19,74   | 6,86     | 2,89     | 19,16       | 50,83                    | 0,52  | 100   |
| Bururi                 | 29,18   | 4,95     | 0,34     | 65,19       | 0,34                     | 0,00  | 100   |
| Cankuzo                | 57,84   | 0,00     | 0,00     | 40,08       | 0,00                     | 2,08  | 100   |
| Cibitoke               | 5,89    | 0,80     | 4,70     | 82,32       | 5,65                     | 0,64  | 100   |
| Gitega                 | 14,29   | 1,98     | 14,41    | 52,23       | 16,38                    | 0,72  | 100   |
| Karusi                 | 11,61   | 0,00     | 0,00     | 87,82       | 0,57                     | 0,00  | 100   |
| Kayanza                | 10,06   | 1,08     | 3,11     | 84,43       | 1,17                     | 0,14  | 100   |
| Kirundo                | 9,98    | 3,91     | 5,28     | 79,26       | 0,98                     | 0,59  | 100   |
| Makamba                | 46,64   | 3,28     | 3,60     | 42,69       | 3,25                     | 0,54  | 100   |
| Muramvya               | 29,93   | 1,86     | 0,00     | 66,13       | 0,00                     | 2,09  | 100   |
| Muyinga                | 17,45   | 6,86     | 12,40    | 51,52       | 7,34                     | 4,44  | 100   |
| Mwaro                  | 11,27   | 0,63     | 2,92     | 75,78       | 5,85                     | 3,55  | 100   |
| Ngozi                  | 11,71   | 10,85    | 6,22     | 61,95       | 9,02                     | 0,24  | 100   |
| Rutana                 | 61,50   | 12,23    | 0,00     | 24,64       | 0,55                     | 1,09  | 100   |
| Ruyigi                 | 29,13   | 3,52     | 4,61     | 58,27       | 3,39                     | 1,08  | 100   |
| Bujumbura Municipality | 21,12   | 9,19     | 13,66    | 11,05       | 43,84                    | 1,14  | 100   |
| Rumonge                | 32,36   | 34,55    | 4,22     | 27,69       | 1,13                     | 0,06  | 100   |

|              |              |             |              |              |              |             |            |
|--------------|--------------|-------------|--------------|--------------|--------------|-------------|------------|
| <b>Total</b> | <b>22,02</b> | <b>9,10</b> | <b>10,36</b> | <b>25,53</b> | <b>31,95</b> | <b>1,04</b> | <b>100</b> |
|--------------|--------------|-------------|--------------|--------------|--------------|-------------|------------|

Source: Study data

## V. GEOGRAPHIC INFORMATION SYSTEM

The Geographic Information System is a powerful tool in the field of water and sanitation infrastructure mapping in its ability to integrate, organise, analyse and visualise geospatial data. The main expected outcome of this study was the development and implementation of a Geoportal of data for planning and reform purposes. In this chapter, we do not pretend to be able to describe how the Geoportal works or all its functions, but to give an overview in order to arouse the reader's interest in visiting this online database.

### V.1. Functionality of the Geoportal

The Geoportal refers to various online platforms that provide mapping services and geographic information systems (GIS).

- User access and interface: The Geoportal gives users access by hovering over certain windows or search bars to find specific locations. By clicking on **parameter**, for example, the administrator can change the profile, user name and password.
- Information layers: Geoportal also lets you add or remove information layers as required. You can overlay information such as administrative boundaries or create **areas of activity** such as:
  - ✓ Drinking water
  - ✓ Sanitation
  - ✓ Hygiene
  - ✓ Etc...

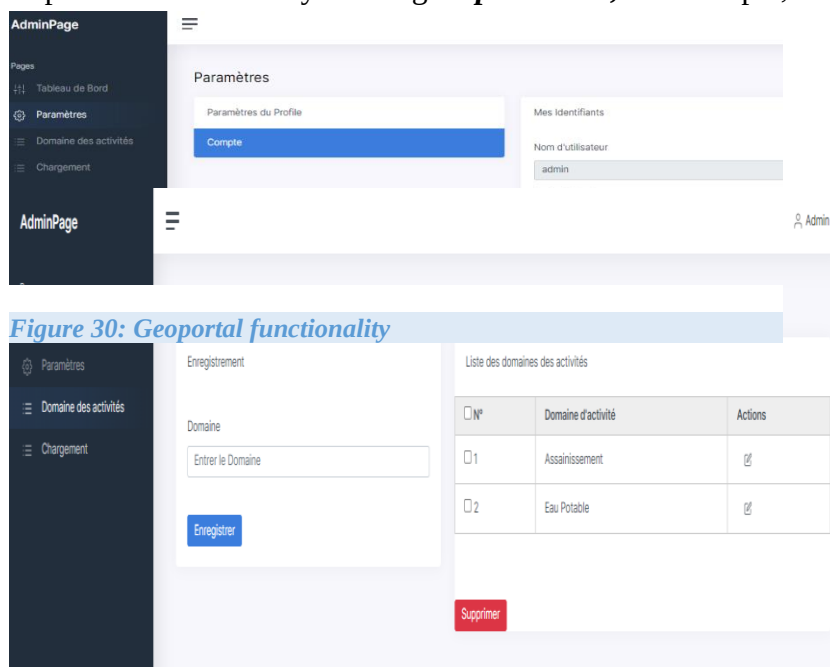


Figure 30: Geoportal functionality

Figure 31: Geoportal activities

## V.2. Public view

The Geoportal also provides additional information by clicking on specific elements of the map.

This allows the public to choose the activity document they wish to visit, for example, wastewater treatment or drinking water.<sup>6</sup>



Figure 32: Choice of activity document

By choosing one of the activities, you receive a map that has already been put online showing the state of this sector of activity in a specific region. The example of the geo-location of structures or indicators can be seen in some of the maps put online during our study.

By way of illustration, the following maps show the location of structures on a dynamic platform, which can be updated whenever the need arises and the resources are available. In this chapter, the location maps included in this report are only an illustration of the data or indicators that each user will be able to find according to their project.

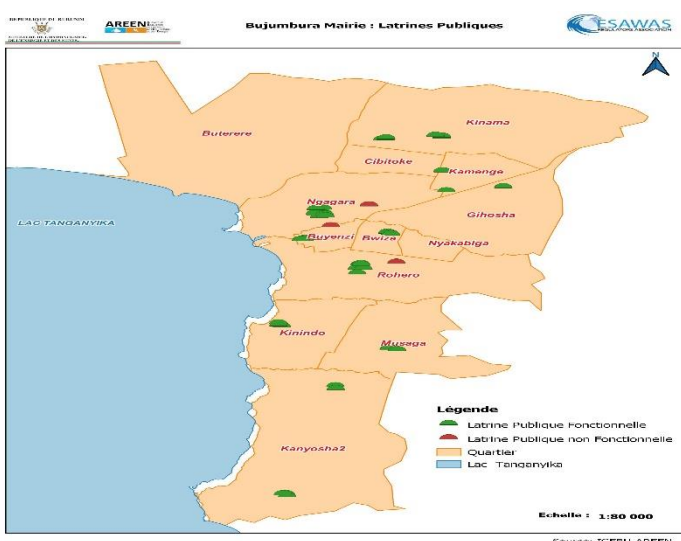


Figure 33: Location of public toilets in Bujumbura Municipality

<sup>6</sup> The link to the Geoportal is as follows: <https://geoportail-areen.bi/>

Figure 34: Location of standpipes in Bujumbura Municipality

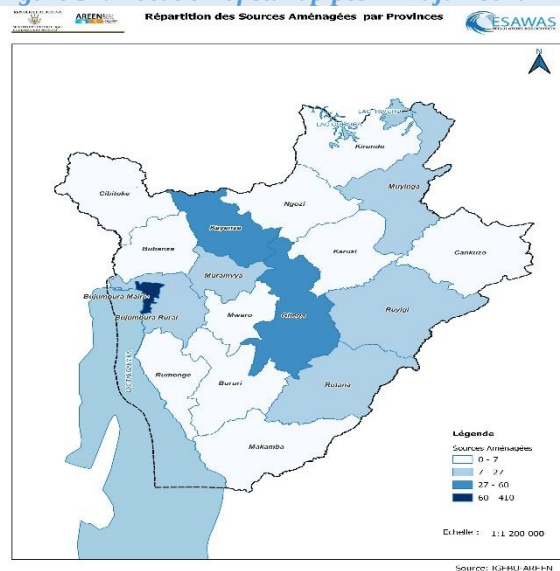


Figure 35: Developed springs by province

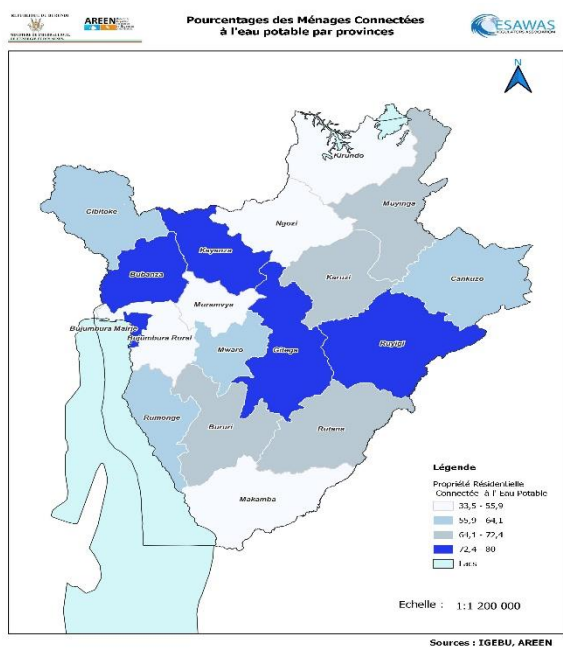


Figure 36: Residential properties connected to drinking water networks

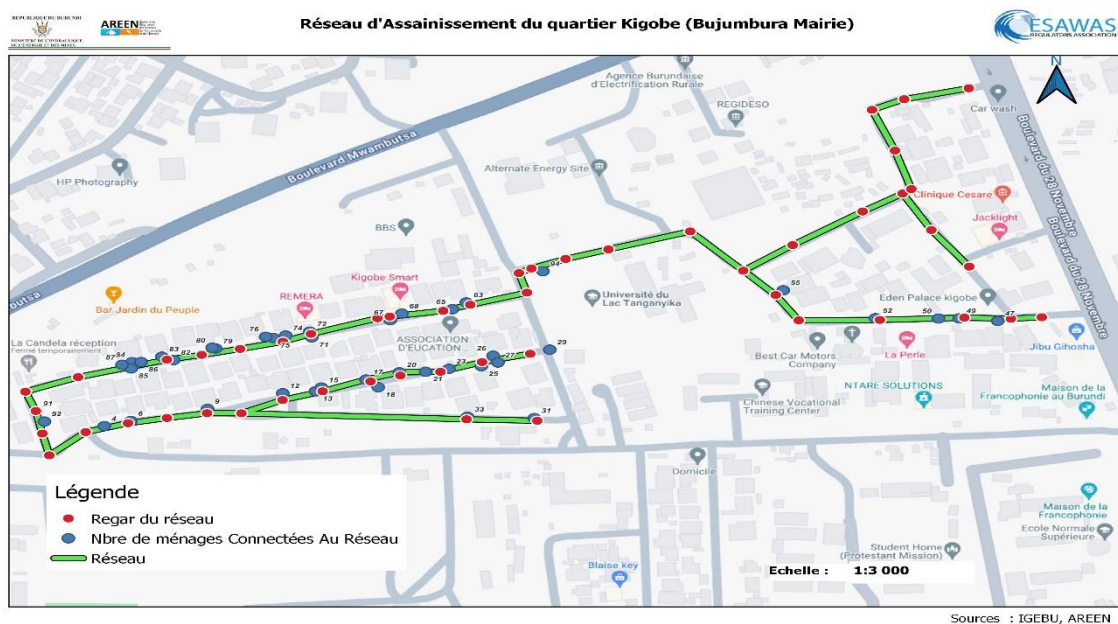


Figure 37: Sewerage system in the Kigobe neighbourhood

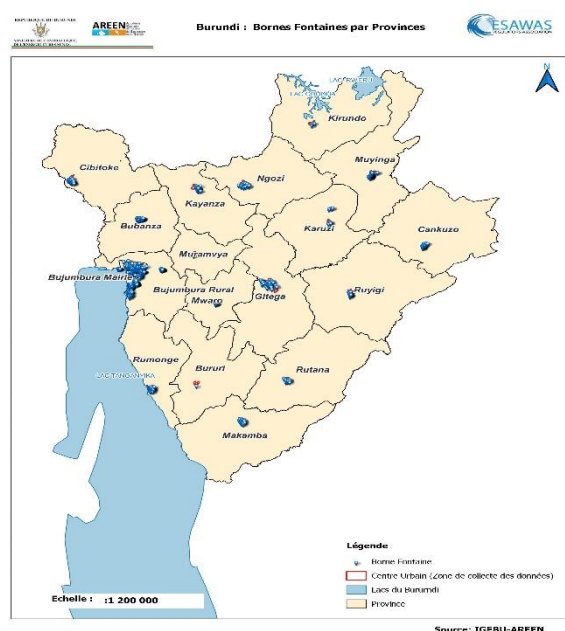


Figure 38: Location of standpipes in the provinces

### V.3. Constitution of the Technical Committee

In accordance with the terms of reference developed by the study's sponsor, training was provided to the GIS mapping database management unit for drinking water and basic sanitation services,

with a view to ensuring effective use of geospatial information. The members of the technical committee are listed in the table opposite:

*Table 23: AREEN Staff (Technical Committee)*

| Full Name                   | Function                                | Email                                                                        | Tel.              |
|-----------------------------|-----------------------------------------|------------------------------------------------------------------------------|-------------------|
| SIBOMANA<br>Dieudonné       | CSRT                                    | <a href="mailto:sibodi2006@yahoo.fr">sibodi2006@yahoo.fr</a>                 | 68962047          |
| NGABIRANO<br>Daphrose       | IT Officer                              | <a href="mailto:daphnyngabirano@gmail.com">daphnyngabirano@gmail.com</a>     | 62522197          |
| BIGIRIMANA<br>Noëlla Ulrike | Monitoring<br>and evaluation<br>Officer | <a href="mailto:ellarikegirimana@gmail.com">ellarikegirimana@gmail.com</a>   | 69475996/72308166 |
| KEZIMANA<br>Mélance         | IT Officer                              | <a href="mailto:mkezimana@areen.bi">mkezimana@areen.bi</a>                   | 61351961          |
| RIRAGENDANWA<br>Jacques     | Technical<br>Officer                    | <a href="mailto:jackfilsrira@gmail.com">jackfilsrira@gmail.com</a>           | 79601319          |
| NIBOGORA<br>Method          | Technical<br>Officer                    | <a href="mailto:nibogora1989metho@gmail.com">nibogora1989metho@gmail.com</a> | 62695129          |
| KUBWAYO Arsène              | Technical<br>Officer                    | <a href="mailto:kubwaarsene@gmail.com">kubwaarsene@gmail.com</a>             | 61441418          |

Source: Report of the Technical Committee

### V.3.1. Training programme

AREEN staff received training for four days on the premises of the aforementioned department. The main objective of the training was to familiarise them with database management tools, in particular:

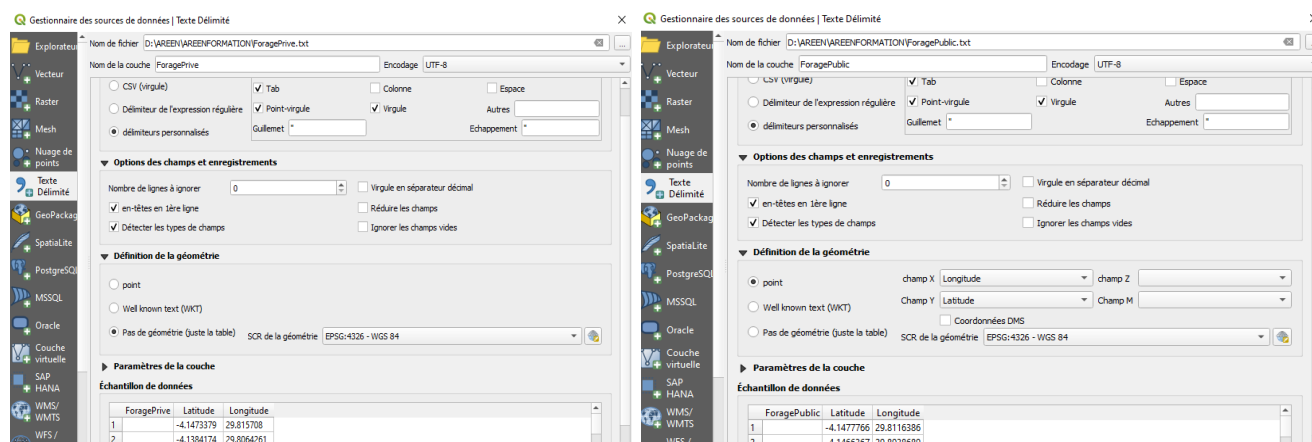
- ✓ Retrieving the data collected in an mWater form in .csv format (separator: semicolon).
- ✓ Processing the data in Excel.
- ✓ Adding data already in the geographic information systems (QGIS) to create a shapefile (.shp).
- ✓ Integrating this data into a PostgreSQL/PostGIS spatial database management system.
- ✓ Creating queries in QGIS and PostgreSQL as required.

### V.3.2. Demonstration of tools

The tools demonstration shows how to manipulate the platform. The first demonstration shows how to add processed data to QGIS.

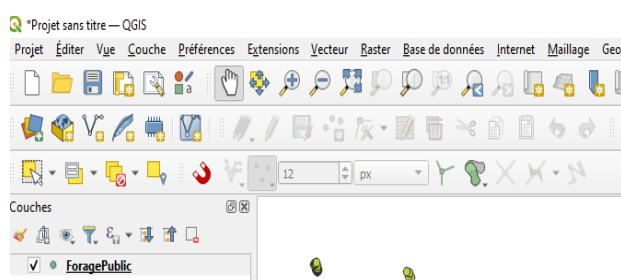
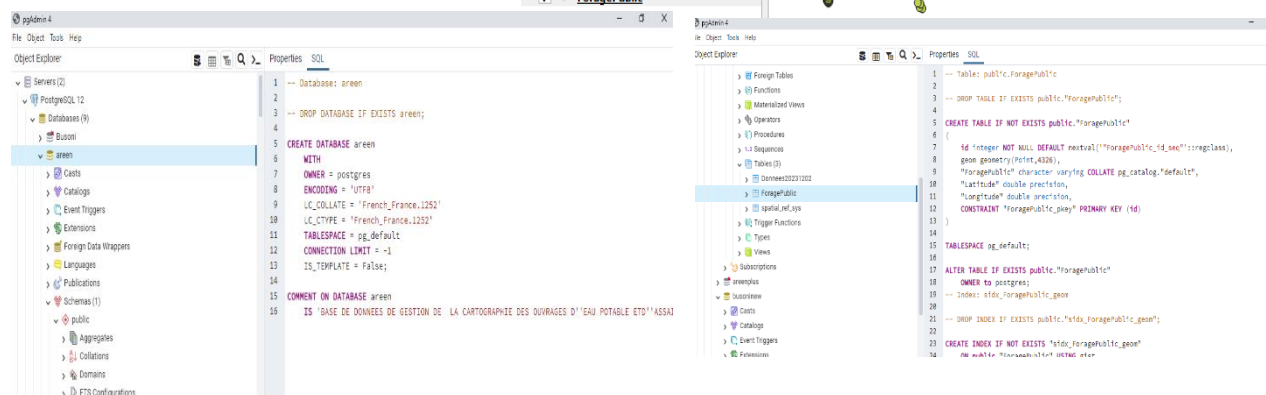
Once you have clicked on "Add a delimited text layer", you will be presented with a window allowing you to add the data in table form (attribute table) or in geometric format (.shp). Another

window to master concerns how to add a table and a point determining the longitude and latitude field for geolocating the point.



After this step, the next window appears with geolocated points as follows:

The other important windows were dealt with during the demonstration of the "postgreSQL" database: AREEN through to the public drilling table in the database.



## VI. CONCLUSION AND RECOMMENDATIONS

Burundi, like other countries, is experiencing increasing urbanisation. According to data from the African Development Bank's 2019 country profile on climate change, the country has the third highest urbanisation rate (around 5.6%).

The development of cities does not result from integrated planning of the urbanization-water supply-sanitation nexus. As a result, the high rate of urbanisation is not accompanied by the development of drinking water and sanitation infrastructures. New neighbourhoods are springing up both in Bujumbura and in other urban areas, all of which have no sanitation infrastructures. Although efforts are being made to support the urbanisation process by developing new infrastructures and drinking water networks, sanitation services seem to be relegated to the background, even though they are a fundamental component of the urbanisation process. The existing sewerage network, which dates back several years, seems to be saturated and unable to cope with the needs generated by the growing urbanisation.

The mapping of water and sanitation infrastructures is a basic and excellent source of information in the process of modernising and improving the management of these resources. Effective management of these resources depends largely on the ability to map water and sanitation infrastructures accurately and completely. This discussion explores the strategic importance of mapping in urban planning, the preservation of water resources, the acquisition of knowledge and the proper management of water and sanitation infrastructures, as well as efforts towards environmental sustainability.

The diagnosis of the water and wastewater sector identified the current situation in these two sectors.

The sanitation sector in Burundi is governed by the Office Burundais de l'Urbanisme, de l'Habitat et de la Construction (OBUHA). In Burundi, there are two types of sanitation: autonomous and collective sanitation in the two urban centers (Bujumbura and Gitega). Autonomous sanitation in Burundi's urban and peri-urban centers has an access rate of 87% for households and 99% for properties and infrastructure. Although the high rate of access to latrines may be a positive indicator, it does not necessarily guarantee that sanitation is adequate. Some latrines are poorly constructed and maintained, and others do not comply with sanitation standards, which compromises their effectiveness in eliminating sludge. Also, despite this rate of access, the study shows that some households still share latrines, a bad habit that contributes to the spread of water-borne and faeco-oral transmissible diseases. This is explained by the economic issues involved in building a latrine, with some households opting to share the cost in order to use a shared latrine. In

some densely populated areas, it may be difficult for each household to have sufficient space to build its own latrine, in such cases households have opted for shared latrines to save space.

There is still room for improvement in the management of faecal sludge, with 63% of households using private sewage disposal. However, a significant number bury the sludge or dig another latrine, which creates a number of dangers for human health, contaminates resources and has an impact on the environment.

Collective sanitation is observed in the country's two provinces, with a low household connection rate. The danger observed in the survey responses is that some households do not even know that the network is available to them, and others connect to open rainwater gutters. The areas where the network is available need a great deal of awareness-raising to mobilise them to connect. This is just as important a task for areas that connect to stormwater networks.

In almost every respect, the situation in the drinking water sector is unacceptable. Production is not keeping pace with urban expansion, and distribution is still rationed. Despite the presence and availability of several water resources, REGIDESO has a large distribution resource from Lake Tanganyika, which depends largely on pumping stations requiring energy sources. The extension and tapping of other gravity-fed resources could strengthen distribution. The Ntakangwa spring requires urgent rehabilitation and protection to support distribution. This could reduce water stress and the long distances travelled to fetch water.

The hygiene sector requires a high level of awareness, given that 24% of households have hand-washing facilities. Households will need to know what type of hand-washing facilities are available, as well as the importance of using soap. Menstrual hygiene also needs to be mobilised, as does personal hygiene. Women and girls need to understand the importance of making available all the tools and materials they need to improve their hygiene.

This mapping of drinking water and basic sanitation services in the 18 urban centers, which is the first of its kind in Burundi, is an invaluable source of information to feed into the planning process in the sanitation sector. The results of the mapping could help to raise the interest of decision-makers in the need to invest in the sanitation sector through integrated urban development planning.

The results of the analysis suggest the following strategic and operational recommendations:

| No. | Recommendations                                                                                                                                                  | Institution responsible |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| 1   | Modernising the regulatory framework in the drinking water and basic sanitation sector to stimulate investment in PPP mode or other forms of service delegation. | AREEN                   |

|    |                                                                                                                                                                             |                                         |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| 2  | Strengthening integrated planning of the urbanisation process (urban development, water and sanitation)                                                                     | Ministry of Infrastructure              |
| 3  | Strengthening regulation of the drinking water and basic sanitation sector                                                                                                  | AREEN                                   |
| 4  | Interfacing the data on structures produced as part of the LATAWAMA project with data from service users to provide a complete picture of the extent of the sanitation gaps | Ministry of Hydraulics                  |
| 5  | Developing a pipeline of investments in the water, hygiene and sanitation sector to be submitted to the PPP mechanism                                                       | Ministry responsible for PPPs           |
| 6  | Setting up a system for updating data at community level to make the National Water and Sanitation Geoportal operational                                                    | AREEN                                   |
| 7  | Designing a national circular economy strategy that includes solid waste management in urban areas                                                                          | Ministry of Infrastructure              |
| 8  | In-depth use of data to design detailed provincial profiles including short, medium and long-term investment priorities                                                     | AREEN                                   |
| 9  | Training for Geoportal users down to decentralised level                                                                                                                    | AREEN                                   |
| 10 | Integrate hygiene and sanitation objectives as a marker in the process of drawing up PCDCs                                                                                  | Ministry in charge of local development |
| 11 | Strengthening the decentralisation of sanitation services                                                                                                                   | OBuha                                   |
| 12 | Developing wastewater services at municipal level                                                                                                                           | Ministry of Infrastructure              |
| 13 | Establishing fair and equitable tariffs that reflect the true cost of services and enable the financing of maintenance, upkeep, expansion and improvements                  | AREEN                                   |
| 14 | Integrating new technologies for infrastructure monitoring, data collection, operations management, maintenance and communication with users                                | Ministry of Infrastructure              |
| 15 | Involving local communities in the planning, design and management of services, to ensure that solutions meet their needs                                                   | Ministry in charge of local development |
| 16 | Designing a digital information system for real-time monitoring of drinking water payments in urban and rural areas                                                         | AREEN                                   |

## APPENDICES

## APPENDIX I: TABLE APPENDICES

Table 24: Type of toilets used by facilities

| Variables              | Flush-to-pit toilet |              | Seated toilet with flush connected to the septic tank |              | Seated toilet with flush connected to the septic tank and cesspit |              | Turkish flush toilet |              |
|------------------------|---------------------|--------------|-------------------------------------------------------|--------------|-------------------------------------------------------------------|--------------|----------------------|--------------|
|                        | Number              | %            | Number                                                | %            | Number                                                            | %            | Number               | %            |
| Bubanza                | 4                   | 2,03         | 24                                                    | 12,18        | 47                                                                | 23,86        | 10                   | 5,08         |
| Bujumbura              | 74                  | 9,14         | 111                                                   | 13,70        | 209                                                               | 25,80        | 185                  | 22,84        |
| Bururi                 | 2                   | 0,84         | 102                                                   | 43,04        | 0                                                                 | 0,00         | 132                  | 55,70        |
| Cankuzo                | 65                  | 30,66        | 77                                                    | 36,32        | 0                                                                 | 0,00         | 49                   | 23,11        |
| Cibitoke               | 10                  | 5,24         | 32                                                    | 16,75        | 45                                                                | 23,56        | 4                    | 2,09         |
| Gitega                 | 76                  | 6,28         | 287                                                   | 23,70        | 252                                                               | 20,81        | 227                  | 18,74        |
| Karusi                 | 19                  | 6,55         | 72                                                    | 24,83        | 39                                                                | 13,45        | 64                   | 22,07        |
| Kayanza                | 4                   | 1,35         | 31                                                    | 10,47        | 67                                                                | 22,64        | 1                    | 0,34         |
| Kirundo                | 92                  | 20,77        | 116                                                   | 26,19        | 13                                                                | 2,93         | 48                   | 10,84        |
| Makamba                | 128                 | 27,35        | 116                                                   | 24,79        | 59                                                                | 12,61        | 73                   | 15,60        |
| Muramvya               | 6                   | 2,90         | 25                                                    | 12,08        | 44                                                                | 21,26        | 12                   | 5,80         |
| Muyinga                | 80                  | 15,15        | 124                                                   | 23,48        | 50                                                                | 9,47         | 117                  | 22,16        |
| Mwaro                  | 3                   | 1,72         | 34                                                    | 19,54        | 29                                                                | 16,67        | 10                   | 5,75         |
| Ngozi                  | 68                  | 7,42         | 227                                                   | 24,78        | 74                                                                | 8,08         | 138                  | 15,07        |
| Rutana                 | 58                  | 23,11        | 2                                                     | 0,80         | 110                                                               | 43,82        | 50                   | 19,92        |
| Ruyigi                 | 21                  | 7,17         | 87                                                    | 29,69        | 56                                                                | 19,11        | 28                   | 9,56         |
| Bujumbura Municipality | 584                 | 9,34         | 1185                                                  | 18,95        | 2078                                                              | 33,24        | 1457                 | 23,30        |
| Rumonge                | 77                  | 16,42        | 124                                                   | 26,44        | 69                                                                | 14,71        | 39                   | 8,32         |
| <b>Total</b>           | <b>1371</b>         | <b>10,20</b> | <b>2776</b>                                           | <b>20,65</b> | <b>3241</b>                                                       | <b>24,11</b> | <b>2644</b>          | <b>19,67</b> |

Table 24: Type of toilets used by facilities (continued)

| Variables              | Open pit latrine |       | Dry pit toilet with dome slab |             | Dry pit toilet with urine separation (AKASUGA) |     | Compost toilet -Double pit with slab |      |
|------------------------|------------------|-------|-------------------------------|-------------|------------------------------------------------|-----|--------------------------------------|------|
|                        | Number           | %     | Number                        | %           | Number                                         | %   | Number                               | %    |
| Bubanza                | 2                | 1,02  | 4                             | 2,030456853 | 0                                              | 0,0 | 11                                   | 5,58 |
| Bujumbura              | 12               | 1,48  | 5                             | 0,62        | 0                                              | 0,0 | 11                                   | 1,36 |
| Bururi                 | 0                | 0,00  | 0                             | 0,00        | 0                                              | 0,0 | 0                                    | 0,00 |
| Cankuzo                | 15               | 7,08  | 0                             | 0,00        | 0                                              | 0,0 | 1                                    | 0,47 |
| Cibitoke               | 0                | 0,00  | 0                             | 0,00        | 0                                              | 0,0 | 1                                    | 0,52 |
| Gitega                 | 8                | 0,66  | 34                            | 2,81        | 17                                             | 1,4 | 6                                    | 0,50 |
| Karusi                 | 25               | 8,62  | 0                             | 0,00        | 0                                              | 0,0 | 6                                    | 2,07 |
| Kayanza                | 0                | 0,00  | 2                             | 0,68        | 0                                              | 0,0 | 6                                    | 2,03 |
| Kirundo                | 1                | 0,23  | 2                             | 0,45        | 1                                              | 0,2 | 7                                    | 1,58 |
| Makamba                | 20               | 4,27  | 1                             | 0,21        | 1                                              | 0,2 | 0                                    | 0,00 |
| Muramvya               | 0                | 0,00  | 0                             | 0,00        | 2                                              | 1,0 | 5                                    | 2,42 |
| Muyinga                | 7                | 1,33  | 3                             | 0,57        | 0                                              | 0,0 | 1                                    | 0,19 |
| Mwaro                  | 1                | 0,57  | 2                             | 1,15        | 2                                              | 1,1 | 6                                    | 3,45 |
| Ngozi                  | 247              | 26,97 | 0                             | 0,00        | 3                                              | 0,3 | 3                                    | 0,33 |
| Rutana                 | 0                | 0,00  | 1                             | 0,40        | 0                                              | 0,0 | 2                                    | 0,80 |
| Ruyigi                 | 1                | 0,34  | 3                             | 1,02        | 1                                              | 0,3 | 1                                    | 0,34 |
| Bujumbura Municipality | 239              | 3,82  | 23                            | 0,37        | 24                                             | 0,4 | 48                                   | 0,77 |
| Rumonge                | 27               | 5,76  | 15                            | 3,20        | 0                                              | 0,0 | 0                                    | 0,00 |
| Total                  | 605              | 4,50  | 95                            | 0,71        | 51                                             | 0,4 | 115                                  | 0,86 |

Table 24: Type of toilets used by facilities (continued)

| Variables              | Dry pit latrine with wooden, plastic or metal slab |       | Dry pit latrines with reinforced concrete slab |       | Compost toilet-Double pit with urine separation (ECOSAN) |      | Mobile toilet |      | Other  |      |
|------------------------|----------------------------------------------------|-------|------------------------------------------------|-------|----------------------------------------------------------|------|---------------|------|--------|------|
|                        | Number                                             | %     | Number                                         | %     | Number                                                   | %    | Number        | %    | Number | %    |
| Bubanza                | 15                                                 | 7,61  | 72                                             | 36,55 | 2                                                        | 1,02 | 0             | 0,00 | 6      | 3,05 |
| Bujumbura              | 60                                                 | 7,41  | 139                                            | 17,16 | 4                                                        | 0,49 | 0             | 0,00 | 0      | 0,00 |
| Bururi                 | 0                                                  | 0,00  | 0                                              | 0,00  | 0                                                        | 0,00 | 1             | 0,42 | 0      | 0,00 |
| Cankuzo                | 0                                                  | 0,00  | 5                                              | 2,36  | 0                                                        | 0,00 | 0             | 0,00 | 0      | 0,00 |
| Cibitoke               | 15                                                 | 7,85  | 84                                             | 43,98 | 0                                                        | 0,00 | 0             | 0,00 | 0      | 0,00 |
| Gitega                 | 55                                                 | 4,54  | 227                                            | 18,74 | 16                                                       | 1,32 | 1             | 0,08 | 5      | 0,41 |
| Karusi                 | 21                                                 | 7,24  | 42                                             | 14,48 | 2                                                        | 0,69 | 0             | 0,00 | 0      | 0,00 |
| Kayanza                | 60                                                 | 20,27 | 125                                            | 42,23 | 0                                                        | 0,00 | 0             | 0,00 | 0      | 0,00 |
| Kirundo                | 17                                                 | 3,84  | 146                                            | 32,96 | 0                                                        | 0,00 | 0             | 0,00 | 0      | 0,00 |
| Makamba                | 11                                                 | 2,35  | 59                                             | 12,61 | 0                                                        | 0,00 | 0             | 0,00 | 0      | 0,00 |
| Muramvya               | 16                                                 | 7,73  | 97                                             | 46,86 | 0                                                        | 0,00 | 0             | 0,00 | 0      | 0,00 |
| Muyinga                | 25                                                 | 4,73  | 119                                            | 22,54 | 2                                                        | 0,38 | 0             | 0,00 | 0      | 0,00 |
| Mwaro                  | 26                                                 | 14,94 | 61                                             | 35,06 | 0                                                        | 0,00 | 0             | 0,00 | 0      | 0,00 |
| Ngozi                  | 70                                                 | 7,64  | 84                                             | 9,17  | 0                                                        | 0,00 | 1             | 0,11 | 1      | 0,11 |
| Rutana                 | 15                                                 | 5,98  | 12                                             | 4,78  | 1                                                        | 0,40 | 0             | 0,00 | 0      | 0,00 |
| Ruyigi                 | 29                                                 | 9,90  | 66                                             | 22,53 | 0                                                        | 0,00 | 0             | 0,00 | 0      | 0,00 |
| Bujumbura Municipality | 124                                                | 1,98  | 435                                            | 6,96  | 26                                                       | 0,42 | 2             | 0,03 | 27     | 0,43 |
| Rumonge                | 44                                                 | 9,38  | 71                                             | 15,14 | 3                                                        | 0,64 | 0             | 0,00 | 0      | 0,00 |
| Total                  | 603                                                | 4,48  | 1844                                           | 13,72 | 56                                                       | 0,42 | 5             | 0,04 | 39     | 0,29 |

Table 25: Proportion of households by main type of latrine used, by province (%).

| Variables              | Latrines with lined septic tanks | Latrines with unlined septic tanks | Latrines without septic tanks | Total      |
|------------------------|----------------------------------|------------------------------------|-------------------------------|------------|
| Province               |                                  |                                    |                               |            |
| Bubanza                | 10,9                             | 1,2                                | 87,9                          | 100        |
| Bujumbura              | 52,8                             | 22,9                               | 24,4                          | 100        |
| Bururi                 | 61,8                             | 38,1                               | 0,1                           | 100        |
| Cankuzo                | 25,6                             | 73,7                               | 0,7                           | 100        |
| Cibitoke               | 11,0                             | 8,6                                | 80,5                          | 100        |
| Gitega                 | 43,7                             | 8,4                                | 47,9                          | 100        |
| Karusi                 | 20,8                             | 34,6                               | 44,7                          | 100        |
| Kayanza                | 15,4                             | 2,4                                | 82,2                          | 100        |
| Kirundo                | 38,9                             | 12,6                               | 48,5                          | 100        |
| Makamba                | 62,7                             | 22,6                               | 14,8                          | 100        |
| Muramvya               | 29,8                             | 0,3                                | 69,8                          | 100        |
| Muyinga                | 31,6                             | 30,7                               | 37,7                          | 100        |
| Mwaro                  | 48,4                             | 6,5                                | 45,0                          | 100        |
| Ngozi                  | 40,0                             | 40,2                               | 19,8                          | 100        |
| Rutana                 | 70,8                             | 9,2                                | 20,1                          | 100        |
| Ruyigi                 | 40,2                             | 5,2                                | 54,6                          | 100        |
| Bujumbura Municipality | 66,0                             | 16,3                               | 17,6                          | 100        |
| Rumonge                | 35,6                             | 20,0                               | 44,4                          | 100        |
| <b>Total</b>           | <b>51,9</b>                      | <b>18,2</b>                        | <b>29,9</b>                   | <b>100</b> |

Table 26: Proportion of facilities by main type of latrine used, by province (%).

| Variables              | Latrines with lined septic tanks | Latrines with unlined septic tanks | Latrines without septic tanks | Total      |
|------------------------|----------------------------------|------------------------------------|-------------------------------|------------|
| Province               |                                  |                                    |                               |            |
| Bubanza                | 49,3                             | 2,7                                | 48,0                          | 100        |
| Bujumbura              | 39,0                             | 15,3                               | 45,7                          | 100        |
| Bururi                 | 50,2                             | 48,3                               | 1,5                           | 100        |
| Cankuzo                | 53,9                             | 31,9                               | 14,3                          | 100        |
| Cibitoke               | 53,3                             | 0,0                                | 46,7                          | 100        |
| Gitega                 | 63,6                             | 10,4                               | 26,0                          | 100        |
| Karusi                 | 49,2                             | 26,2                               | 24,6                          | 100        |
| Kayanza                | 41,0                             | 1,3                                | 57,7                          | 100        |
| Kirundo                | 34,2                             | 6,3                                | 59,5                          | 100        |
| Makamba                | 62,6                             | 12,9                               | 24,5                          | 100        |
| Muramvya               | 27,6                             | 2,7                                | 69,7                          | 100        |
| Muyinga                | 45,7                             | 12,9                               | 41,4                          | 100        |
| Mwaro                  | 49,6                             | 7,1                                | 43,3                          | 100        |
| Ngozi                  | 38,4                             | 21,3                               | 40,3                          | 100        |
| Rutana                 | 71,0                             | 12,0                               | 17,0                          | 100        |
| Ruyigi                 | 68,2                             | 4,1                                | 27,7                          | 100        |
| Bujumbura Municipality | 70,0                             | 14,4                               | 15,6                          | 100        |
| Rumonge                | 57,2                             | 13,4                               | 29,4                          | 100        |
| <b>Total</b>           | <b>59,2</b>                      | <b>14,1</b>                        | <b>26,7</b>                   | <b>100</b> |

Table 27: Types of emptying used by households (%)

| Variables              | Household drainage system |                                    |             |                      |                   |
|------------------------|---------------------------|------------------------------------|-------------|----------------------|-------------------|
|                        | Public operator           | Authorised private tanker operator | Owner       | Community enterprise | Informal draining |
| <b>Province</b>        |                           |                                    |             |                      |                   |
| Bubanza                | 0                         | 0                                  | 0           | 0                    | 100               |
| Bujumbura              | 26,34                     | 58,61                              | 6,52        | 0,84                 | 7,69              |
| Bururi                 | 0                         | 0                                  | 0           | 0                    | 100               |
| Cankuzo                | 2                         | 0                                  | 44          | 0                    | 54                |
| Cibitoke               | 0                         | 0                                  | 31,25       | 0                    | 68,75             |
| Gitega                 | 50,68                     | 3,41                               | 18,86       | 2,73                 | 24,32             |
| Karusi                 | 100                       | 0                                  | 0           | 0                    | 0                 |
| Kayanza                | 0                         | 0                                  | 32          | 0                    | 68                |
| Kirundo                | 0                         | 0                                  | 33,33       | 0                    | 66,67             |
| Makamba                | 0,53                      | 7,45                               | 31,91       | 0                    | 60,11             |
| Muramvya               | 0                         | 0                                  | 0           | 0                    | 100               |
| Muyinga                | 9,24                      | 0                                  | 29,41       | 8,4                  | 52,94             |
| Mwaro                  | 0                         | 0                                  | 50          | 0                    | 50                |
| Ngozi                  | 69,23                     | 15,38                              | 0           | 0                    | 15,38             |
| Rutana                 | 2,78                      | 2,78                               | 8,33        | 11,11                | 75                |
| Ruyigi                 | 0                         | 0                                  | 0           | 0                    | 100               |
| Bujumbura Municipality | 27,91                     | 65,45                              | 1,44        | 0,75                 | 4,45              |
| Rumonge                | 4,47                      | 5,54                               | 12,78       | 7,03                 | 70,18             |
| <b>Total</b>           | <b>26,72</b>              | <b>59,88</b>                       | <b>3,09</b> | <b>1,1</b>           | <b>9,2</b>        |

Table 28: Types of sewage system used in facilities or institutions (%)

| Variables              | Infrastructure drainage system |                                    |             |                      |                   |
|------------------------|--------------------------------|------------------------------------|-------------|----------------------|-------------------|
|                        | Public operator                | Authorised private tanker operator | Owner       | Community enterprise | Informal draining |
| <b>Province</b>        |                                |                                    |             |                      |                   |
| Bubanza                | 8,33                           | 0                                  | 8,33        | 8,33                 | 75                |
| Bujumbura              | 41,3                           | 39,13                              | 6,52        | 0                    | 13,04             |
| Bururi                 | 0                              | 12,5                               | 12,5        | 0                    | 75                |
| Cankuzo                | 28,57                          | 0                                  | 14,29       | 0                    | 57,14             |
| Cibitoke               | 16,67                          | 50                                 | 16,67       | 0                    | 16,67             |
| Gitega                 | 70,13                          | 3,9                                | 9,09        | 6,49                 | 10,39             |
| Karusi                 | 33,33                          | 33,33                              | 0           | 0                    | 33,33             |
| Kayanza                | 0                              | 0                                  | 20          | 0                    | 80                |
| Kirundo                | 0                              | 0                                  | 0           | 0                    | 0                 |
| Makamba                | 13,04                          | 0                                  | 21,74       | 0                    | 65,22             |
| Muramvya               | 33,33                          | 16,67                              | 33,33       | 0                    | 16,67             |
| Muyinga                | 13,33                          | 20                                 | 0           | 0                    | 66,67             |
| Mwaro                  | 0                              | 0                                  | 0           | 0                    | 100               |
| Ngozi                  | 52,94                          | 17,65                              | 17,65       | 0                    | 11,76             |
| Rutana                 | 0                              | 0                                  | 41,67       | 0                    | 58,33             |
| Ruyigi                 | 0                              | 33,33                              | 0           | 0                    | 66,67             |
| Bujumbura Municipality | 29,15                          | 65,02                              | 1,49        | 1,05                 | 3,29              |
| Rumonge                | 21,95                          | 4,88                               | 24,39       | 12,2                 | 36,59             |
| <b>Total</b>           | <b>31,53</b>                   | <b>48,47</b>                       | <b>5,51</b> | <b>1,84</b>          | <b>12,65</b>      |

Table 29: Proportion of households by type of water source used

| Variables              | Private connection | Public fountain | Private borehole | Public drilling | Constructed well |
|------------------------|--------------------|-----------------|------------------|-----------------|------------------|
| <b>Province</b>        |                    |                 |                  |                 |                  |
| Bubanza                | 40,82              | 25,33           | 0,05             | 0               | 6,39             |
| Bujumbura              | 31,36              | 50,08           | 3,63             | 5,7             | 1,47             |
| Bururi                 | 81,02              | 0               | 0                | 0               | 0                |
| Cankuzo                | 54,14              | 47,77           | 0,29             | 1,08            | 0,05             |
| Cibitoke               | 14,32              | 82,96           | 2,05             | 0,03            | 25               |
| Gitega                 | 55,53              | 12,94           | 0,27             | 0,46            | 0,24             |
| Karusi                 | 50,26              | 33,45           | 28,79            | 14,14           | 0,04             |
| Kayanza                | 37,77              | 19,55           | 0,05             | 0,06            | 0,12             |
| Kirundo                | 10,67              | 43,22           | 17,08            | 8,08            | 0,08             |
| Makamba                | 26,1               | 32,91           | 0,07             | 0,95            | 9,2              |
| Muramvya               | 36,44              | 0,19            | 0,76             | 4,19            | 0,1              |
| Muyinga                | 42,4               | 23,29           | 0,04             | 0,22            | 0,05             |
| Mwaro                  | 63,33              | 1,07            | 0,13             | 0,4             | 0                |
| Ngozi                  | 69,74              | 5,38            | 0,16             | 0,43            | 0,12             |
| Rutana                 | 59,63              | 13,86           | 0,05             | 0               | 0                |
| Ruyigi                 | 58,26              | 14,4            | 0,54             | 0,79            | 0                |
| Bujumbura Municipality | 51,07              | 33,01           | 0,95             | 8,57            | 1,22             |
| Rumonge                | 32,25              | 36,69           | 0,81             | 2,4             | 4,68             |
| <b>Total</b>           | <b>47,33</b>       | <b>31,6</b>     | <b>1,45</b>      | <b>5,92</b>     | <b>2,04</b>      |

Table 29: Proportion of households by type of water source used (continued)

| Variables              | Unfinished well | Developed spring | Undeveloped spring | Surface water | Rainwater   | Next door   |
|------------------------|-----------------|------------------|--------------------|---------------|-------------|-------------|
| <b>Province</b>        |                 |                  |                    |               |             |             |
| Bubanza                | 0,87            | 11,97            | 0,36               | 1,77          | 5,9         | 29,77       |
| Bujumbura              | 0,56            | 3,79             | 0,3                | 6,19          | 13,93       | 21,8        |
| Bururi                 | 0,08            | 3,68             | 2,24               | 6,33          | 0           | 8,09        |
| Cankuzo                | 0,05            | 3,19             | 0,29               | 0,69          | 1,03        | 19,96       |
| Cibitoke               | 9,97            | 0,1              | 0,37               | 14,93         | 27,38       | 13,74       |
| Gitega                 | 0,07            | 41,96            | 6,4                | 11,07         | 5,95        | 5,66        |
| Karusi                 | 0,08            | 32,1             | 0,2                | 0,4           | 9,64        | 19,24       |
| Kayanza                | 0,06            | 24,33            | 2,07               | 0,48          | 0,09        | 17,47       |
| Kirundo                | 0,2             | 18,84            | 1,11               | 0             | 1,81        | 1,84        |
| Makamba                | 3,44            | 8,12             | 1,64               | 23,81         | 22,34       | 31,52       |
| Muramvya               | 0               | 60,51            | 2,24               | 0,1           | 1,38        | 9,23        |
| Muyinga                | 0,07            | 16,35            | 1,51               | 0,46          | 11,99       | 39,35       |
| Mwaro                  | 0               | 55,73            | 2,67               | 18,8          | 1,33        | 3,6         |
| Ngozi                  | 0,05            | 5,59             | 0,22               | 1,65          | 5,07        | 24,85       |
| Rutana                 | 0,05            | 43,76            | 1,43               | 0,38          | 0,1         | 9,79        |
| Ruyigi                 | 0               | 19,02            | 1,58               | 4,45          | 0,29        | 8,78        |
| Bujumbura Municipality | 0,13            | 3,64             | 0,35               | 3,71          | 4,32        | 7,83        |
| Rumonge                | 0,22            | 0,96             | 0,02               | 5,12          | 4,1         | 26,93       |
| <b>Total</b>           | <b>0,49</b>     | <b>8,68</b>      | <b>0,87</b>        | <b>4,74</b>   | <b>6,07</b> | <b>12,8</b> |

Table 30: Number of structures by province

|                        | Waterworks     |                  |                 |                 |                   |
|------------------------|----------------|------------------|-----------------|-----------------|-------------------|
|                        | Water fountain | Private borehole | Public drilling | Developed wells | Developed sources |
| <b>Province</b>        |                |                  |                 |                 |                   |
| Bubanza                | 52             | 2                |                 | 1               | 2                 |
| Bujumbura              | 79             | 35               | 18              | 11              | 15                |
| Bujumbura Municipality | 363            | 167              | 150             | 13              | 45                |
| Bururi                 | 1              | 0                | 0               | 1               | 5                 |
| Cankuzo                | 27             | 2                | 1               | 0               | 2                 |
| Cibitoke               | 49             | 4                | 0               | 14              | 0                 |
| Gitega                 | 53             | 1                | 2               | 1               | 46                |
| Karusi                 | 11             | 1                | 0               | 3               | 1                 |
| Kayanza                | 29             | 0                | 0               | 3               | 46                |
| Kirundo                | 5              | 0                | 8               | 0               | 0                 |
| Makamba                | 32             | 1                | 4               | 12              | 3                 |
| Muramvya               | 3              | 0                | 0               | 0               | 18                |
| Muyinga                | 70             | 0                | 0               | 0               | 20                |
| Mwaro                  | 9              | 1                | 0               | 0               | 1                 |
| Ngozi                  | 18             | 0                | 0               | 0               | 3                 |
| Rutana                 | 54             | 2                | 5               | 1               | 0                 |
| Ruyigi                 | 19             | 0                | 0               | 0               | 11                |
| Rumonge                | 19             | 0                | 3               | 0               | 5                 |
| <b>Total</b>           | <b>893</b>     | <b>216</b>       | <b>191</b>      | <b>60</b>       | <b>223</b>        |

Table 31: Time taken to fill a 20-litre can (in %)

| Variables              | Time taken to fill a 20-litre can |                 |                  |                  |                      |
|------------------------|-----------------------------------|-----------------|------------------|------------------|----------------------|
|                        | 0 to 5 min                        | 5 to 10 minutes | 10 to 20 minutes | 20 min to 30 min | More than 30 minutes |
| <b>Province</b>        |                                   |                 |                  |                  |                      |
| Bubanza                | 90,15                             | 8,18            | 1,05             | 0,10             | 0,52                 |
| Bujumbura              | 73,86                             | 18,68           | 5,28             | 1,36             | 0,82                 |
| Bururi                 | 94,88                             | 4,96            | 0,16             | 0,00             | 0                    |
| Cankuzo                | 94,36                             | 5,10            | 0,34             | 0,20             | 0                    |
| Cibitoke               | 83,92                             | 14,25           | 1,39             | 0,13             | 0,3                  |
| Gitega                 | 84,59                             | 12,66           | 2,06             | 0,62             | 0,07                 |
| Karusi                 | 60,18                             | 35,88           | 2,91             | 0,48             | 0,56                 |
| Kayanza                | 86,17                             | 9,53            | 2,94             | 0,71             | 0,65                 |
| Kirundo                | 92,76                             | 3,12            | 1,42             | 2,56             | 0,14                 |
| Makamba                | 69,15                             | 26,50           | 2,86             | 1,03             | 0,46                 |
| Muramvya               | 65,79                             | 30,45           | 2,71             | 1,00             | 0,05                 |
| Muyinga                | 85,21                             | 13,24           | 1,22             | 0,21             | 0,13                 |
| Mwaro                  | 78,40                             | 18,40           | 3,07             | 0,00             | 0,13                 |
| Ngozi                  | 90,52                             | 7,67            | 1,24             | 0,20             | 0,37                 |
| Rutana                 | 97,56                             | 1,19            | 0,24             | 0,48             | 0,53                 |
| Ruyigi                 | 86,85                             | 12,19           | 0,67             | 0,12             | 0,17                 |
| Bujumbura Municipality | 79,35                             | 14,47           | 4,24             | 0,97             | 0,97                 |
| Rumonge                | 88,94                             | 10,33           | 0,54             | 0,11             | 0,07                 |
| <b>Total</b>           | <b>80,76</b>                      | <b>14,24</b>    | <b>3,44</b>      | <b>0,84</b>      | <b>0,71</b>          |

Table 32 : Household water expenditure (%)

| Variables                 | Amount (in BIF)     |                  |                  |                  |                  |                     |
|---------------------------|---------------------|------------------|------------------|------------------|------------------|---------------------|
|                           | Less than<br>10,000 | 10001 -<br>20000 | 20001 -<br>30000 | 30001 -<br>40000 | 40001 -<br>50000 | More than<br>50,000 |
| <b>Province</b>           |                     |                  |                  |                  |                  |                     |
| Bubanza                   | 87,21               | 9,76             | 2,27             | 0,57             | 0,14             | 0,05                |
| Bujumbura                 | 48,55               | 28,46            | 11,77            | 4,34             | 2,57             | 4,31                |
| Bururi                    | 68,45               | 24,90            | 4,40             | 0,40             | 0,56             | 1,28                |
| Cankuzo                   | 86,95               | 7,21             | 2,94             | 1,72             | 0,34             | 0,83                |
| Cibitoke                  | 36,30               | 19,43            | 13,52            | 8,59             | 4,68             | 17,48               |
| Gitega                    | 66,45               | 22,52            | 6,80             | 1,99             | 0,83             | 1,41                |
| Karusi                    | 80,17               | 13,82            | 3,42             | 1,04             | 0,72             | 0,84                |
| Kayanza                   | 89,70               | 7,24             | 1,58             | 0,79             | 0,42             | 0,28                |
| Kirundo                   | 74,20               | 14,29            | 4,85             | 2,87             | 1,95             | 1,84                |
| Makamba                   | 65,84               | 22,29            | 6,22             | 2,08             | 1,28             | 2,29                |
| Muramvya                  | 64,18               | 17,17            | 10,32            | 3,85             | 1,67             | 2,81                |
| Muyinga                   | 59,61               | 27,10            | 8,32             | 2,23             | 1,52             | 1,22                |
| Mwaro                     | 90,00               | 5,87             | 2,27             | 1,20             | 0,40             | 0,27                |
| Ngozi                     | 48,10               | 34,15            | 12,66            | 3,52             | 0,76             | 0,81                |
| Rutana                    | 81,75               | 13,23            | 3,77             | 0,48             | 0,33             | 0,43                |
| Ruyigi                    | 79,28               | 14,11            | 3,54             | 1,50             | 0,37             | 1,21                |
| Bujumbura<br>Municipality | 46,04               | 20,75            | 13,16            | 8,08             | 4,20             | 7,77                |
| Rumonge                   | 83,53               | 13,10            | 2,39             | 0,42             | 0,37             | 0,19                |

Table 33: Availability of water in households

| Variables              | Availability of water |                 |                   |                  |                   |                        |
|------------------------|-----------------------|-----------------|-------------------|------------------|-------------------|------------------------|
|                        | One day a week        | Two days a week | Three days a week | More than 3 days | Less than 6 hours | Between 6 and 12 hours |
| <b>Province</b>        |                       |                 |                   |                  |                   |                        |
| Bubanza                | 1,77                  | 3,01            | 9,40              | 79,72            | 0,64              | 0,00                   |
| Bujumbura              | 12,94                 | 15,78           | 17,08             | 28,68            | 6,11              | 4,07                   |
| Bururi                 | 0,32                  | 2,16            | 5,20              | 76,46            | 0,00              | 0,00                   |
| Cankuzo                | 0,29                  | 0,25            | 0,00              | 0,05             | 1,28              | 13,54                  |
| Cibitoke               | 6,70                  | 4,52            | 14,64             | 48,89            | 0,61              | 1,92                   |
| Gitega                 | 7,40                  | 11,46           | 12,11             | 43,32            | 0,70              | 0,34                   |
| Karusi                 | 3,03                  | 4,58            | 16,21             | 37,36            | 0,12              | 0,08                   |
| Kayanza                | 0,90                  | 0,37            | 0,17              | 62,29            | 0,11              | 0,05                   |
| Kirundo                | 8,97                  | 10,92           | 6,05              | 16,94            | 34,83             | 0,56                   |
| Makamba                | 3,08                  | 3,58            | 4,66              | 16,24            | 7,94              | 11,83                  |
| Muramvya               | 0,33                  | 0,90            | 10,70             | 42,67            | 0,10              | 0,00                   |
| Muyinga                | 11,82                 | 13,76           | 28,75             | 38,24            | 0,52              | 0,35                   |
| Mwaro                  | 46,80                 | 0,40            | 1,87              | 34,93            | 0,00              | 0,00                   |
| Ngozi                  | 11,81                 | 10,58           | 22,79             | 36,17            | 2,39              | 1,36                   |
| Rutana                 | 5,59                  | 11,80           | 9,84              | 28,76            | 0,96              | 15,10                  |
| Ruyigi                 | 1,33                  | 1,12            | 4,45              | 38,33            | 1,00              | 1,66                   |
| Bujumbura Municipality | 11,20                 | 7,12            | 12,29             | 38,11            | 8,14              | 4,26                   |
| Rumonge                | 1,16                  | 1,27            | 7,11              | 77,91            | 9,85              | 0,90                   |
| <b>Total</b>           | <b>9,6</b>            | <b>7,8</b>      | <b>12,7</b>       | <b>39,9</b>      | <b>6,6</b>        | <b>3,5</b>             |

Table 33: Household water availability (continued)

| Variables              |                         |                 |                        |                 |                  |             |
|------------------------|-------------------------|-----------------|------------------------|-----------------|------------------|-------------|
|                        | Between 12 and 18 hours | 18 and 24 hours | Between 1 and 24 hours | One day a month | Two days a month | Other       |
| <b>Province</b>        |                         |                 |                        |                 |                  |             |
| Bubanza                | 0,00                    | 0,10            | 0,00                   | 0,67            | 0,02             | 4,68        |
| Bujumbura              | 1,80                    | 1,60            | 4,00                   | 2,50            | 1,27             | 4,16        |
| Bururi                 | 0,00                    | 0,00            | 1,28                   | 0,00            | 0,40             | 14,17       |
| Cankuzo                | 38,84                   | 10,74           | 11,33                  | 0,10            | 0,00             | 23,59       |
| Cibitoke               | 0,79                    | 1,70            | 4,70                   | 3,51            | 1,72             | 10,31       |
| Gitega                 | 1,19                    | 9,43            | 1,91                   | 1,87            | 1,98             | 8,29        |
| Karusi                 | 0,00                    | 0,00            | 0,00                   | 1,00            | 2,95             | 34,69       |
| Kayanza                | 0,12                    | 0,09            | 2,80                   | 3,05            | 0,51             | 29,54       |
| Kirundo                | 0,25                    | 0,45            | 12,43                  | 0,47            | 0,17             | 7,97        |
| Makamba                | 7,84                    | 9,59            | 17,82                  | 0,11            | 0,11             | 17,18       |
| Muramvya               | 0,00                    | 0,24            | 0,05                   | 0,14            | 0,10             | 44,77       |
| Muyinga                | 0,13                    | 0,12            | 0,82                   | 0,77            | 0,26             | 4,46        |
| Mwaro                  | 0,00                    | 0,00            | 0,00                   | 0,00            | 0,13             | 15,87       |
| Ngozi                  | 1,28                    | 3,47            | 4,52                   | 2,39            | 1,84             | 1,4         |
| Rutana                 | 3,30                    | 4,59            | 2,87                   | 0,62            | 1,00             | 15,58       |
| Ruyigi                 | 1,29                    | 1,79            | 37,16                  | 0,21            | 0,00             | 11,65       |
| Bujumbura Municipality | 3,13                    | 5,90            | 3,82                   | 1,80            | 1,26             | 2,98        |
| Rumonge                | 0,12                    | 0,59            | 0,35                   | 0,23            | 0,21             | 0,3         |
| <b>Total</b>           | <b>2,64</b>             | <b>4,66</b>     | <b>4,15</b>            | <b>1,71</b>     | <b>1,15</b>      | <b>5,61</b> |

Table 34: Condition of latrines in households

|                        | In good condition |              | Poor condition |             | Intermediate |            |
|------------------------|-------------------|--------------|----------------|-------------|--------------|------------|
|                        | Number            | %            | Number         | %           | Number       | %          |
| Bubanza                | 2628              | 62,71        | 462            | 11,02       | 1101         | 26,3       |
| Bujumbura              | 21296             | 84,61        | 1452           | 5,77        | 2423         | 9,6        |
| Bururi                 | 1044              | 83,59        | 28             | 2,24        | 177          | 14,2       |
| Cankuzo                | 1812              | 88,87        | 53             | 2,6         | 174          | 8,5        |
| Cibitoke               | 3528              | 56,57        | 625            | 10,02       | 2084         | 33,4       |
| Gitega                 | 12451             | 82,38        | 839            | 5,55        | 1824         | 12,1       |
| Karusi                 | 2337              | 93,07        | 102            | 4,06        | 72           | 2,9        |
| Kayanza                | 5747              | 88,92        | 179            | 2,77        | 537          | 8,3        |
| Kirundo                | 3023              | 84,23        | 181            | 5,04        | 385          | 10,7       |
| Makamba                | 5551              | 90,85        | 250            | 4,09        | 309          | 5,1        |
| Muramvya               | 1795              | 85,39        | 122            | 5,8         | 185          | 8,8        |
| Muyinga                | 7470              | 90,95        | 383            | 4,66        | 360          | 4,4        |
| Mwaro                  | 513               | 68,4         | 130            | 17,33       | 107          | 14,3       |
| Ngozi                  | 9074              | 82,55        | 1136           | 10,33       | 782          | 7,1        |
| Rutana                 | 1496              | 71,48        | 42             | 2,01        | 555          | 26,5       |
| Ruyigi                 | 1714              | 71,33        | 593            | 24,68       | 96           | 4,0        |
| Bujumbura Municipality | 127082            | 86,41        | 7668           | 5,21        | 12320        | 8,4        |
| Rumonge                | 9991              | 79,49        | 1006           | 8           | 1572         | 12,5       |
| <b>Total</b>           | <b>218552</b>     | <b>84,43</b> | <b>15251</b>   | <b>5,89</b> | <b>25063</b> | <b>9,7</b> |

Table 35 : Condition of latrines in infrastructure

|                        | In good condition |              | Poor condition |             | Intermediate |            |
|------------------------|-------------------|--------------|----------------|-------------|--------------|------------|
|                        | Number            | %            | Number         | %           | Number       | %          |
| Bubanza                | 120               | 80           | 8              | 5,33        | 22           | 14,7       |
| Bujumbura              | 759               | 79,39        | 61             | 6,38        | 136          | 14,2       |
| Bururi                 | 166               | 80,19        | 7              | 3,38        | 34           | 16,4       |
| Cankuzo                | 160               | 87,43        | 8              | 4,37        | 15           | 8,2        |
| Cibitoke               | 125               | 83,33        | 3              | 2           | 22           | 14,7       |
| Gitega                 | 799               | 84,91        | 40             | 4,25        | 102          | 10,8       |
| Karusi                 | 156               | 85,25        | 7              | 3,83        | 20           | 10,9       |
| Kayanza                | 222               | 92,89        | 4              | 1,67        | 13           | 5,4        |
| Kirundo                | 450               | 81,08        | 19             | 3,42        | 86           | 15,5       |
| Makamba                | 385               | 89,74        | 14             | 3,26        | 30           | 7,0        |
| Muramvya               | 206               | 78,63        | 23             | 8,78        | 33           | 12,6       |
| Muyinga                | 476               | 94,63        | 12             | 2,39        | 15           | 3,0        |
| Mwaro                  | 73                | 57,48        | 23             | 18,11       | 31           | 24,4       |
| Ngozi                  | 832               | 89,85        | 34             | 3,67        | 60           | 6,5        |
| Rutana                 | 144               | 72           | 9              | 4,5         | 47           | 23,5       |
| Ruyigi                 | 201               | 91,36        | 18             | 8,18        | 1            | 0,5        |
| Bujumbura Municipality | 6005              | 90,07        | 259            | 3,88        | 403          | 6,0        |
| Rumonge                | 355               | 80,87        | 23             | 5,24        | 61           | 13,9       |
| <b>Total</b>           | <b>11634</b>      | <b>87,23</b> | <b>572</b>     | <b>4,29</b> | <b>1131</b>  | <b>8,5</b> |

## APPENDIX II: QUESTIONNAIRE

REPUBLIQUE DU BURUNDI

MINISTRE DE L'HYDRAULIQUE,  
DE L'ENERGIE ET DES MINES.

## SECTION 0: GENERAL INFORMATION: IMYIDONDORO

|                                                  |                                                 |   |
|--------------------------------------------------|-------------------------------------------------|---|
| Q0.1. Date/Igihe igikorwa kiriko kiberako        | _  _  _  _2_ 3_                                 |   |
| Q0.2. Place of residence/ Aho abaye *            | 1. Urban /mu gisagara<br>2. Suburban /mu misozi | _ |
| Q0.3. Province/Intara nyene urugo abamwo*        |                                                 | _ |
| Q0.4. Commune/Ikomine nyene urugo abamwo*        |                                                 | _ |
| Q0.5. Zone /Izone nyene urugo abamwo*            |                                                 | _ |
| Q0.6. Neighbourhood or Hill/ Umusozi abamwo*     |                                                 | _ |
| Q0.7. Delimited study area in Buja Town Hall     |                                                 |   |
| Q0.8. Name of interviewer / Izina ry'uwusansuma* |                                                 | _ |
| Q0.9. Name of controller / Umucungerezi*         |                                                 | _ |
| Q0.10. Supervisor's name / Uwutwara ibikorwa*    |                                                 | _ |

SECTION 1 - RESPONDENT BASIC INFORMATION : UMWIDONDORO  
NYAMUKURU

|                                                                                            |                                                                                                                                                                                                                                           |   |
|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| Q1.1 Respondent code /Izina ry'uwuriko arishura *                                          | .....                                                                                                                                                                                                                                     |   |
| Q 1. 2 What is your status in this property? /Ujejwe iki aho ubaye?*                       | 1. Owner: Nyeninzu<br>2. Owner's representative: Uwuserukira nyeninzu<br>3. Tenant: Umupangayi<br>4. Manager: Uwuyikwirikirana<br>5. Tenant representative: Uwuserukira uwuyibamwo<br>6. Other (please specify): Ibindi (Bivuge)          | _ |
| Q 1.3 What ownership documents does the owner have? /Ni izihe mpapuro ndangatongo mufise ? | 1. Property title: Impapuro z'itongo<br>2. Purchase contract: Amasezerano y'ubuguzi<br>3. Land certificate: Igipapuro ndangatongo<br>4. Traditional clay: XXX<br>5. Other (please specify): Ibindi (bimenyeshe)<br>6. I don't know: Sinzi | _ |

|                                                             |                                        |  |
|-------------------------------------------------------------|----------------------------------------|--|
| Q1.4. Sex of respondent /Igitsina<br>c'umukuru w'umuryango* | 1. Male/Umugabo<br>2. Feminine/Umugore |  |
| Q1.5. Age of respondent                                     |                                        |  |

## SECTION 2 - CHARACTERISTICS OF THE PROPERTY

|                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                             |  |
|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Q2.A. General information about the property                                             |                                                                                                                                                                                                                                                                                                                                                                                             |  |
| Q2.A. 1 Street name/ Izina<br>ry'ibarabara                                               |                                                                                                                                                                                                                                                                                                                                                                                             |  |
| Q2.A.2 Parcel number/ Inomero<br>y'itongo                                                |                                                                                                                                                                                                                                                                                                                                                                                             |  |
| Q2.A.3 GPS data capture ?                                                                |                                                                                                                                                                                                                                                                                                                                                                                             |  |
| Q2.A. 4 What type of property is it?                                                     | 1. Residential /Inzu yo kubamwo<br>2. Commercial /Inzu y'ubudandaji<br>3. Institutional/Ikigo<br>4. Industrial /Ihinguriro<br>5. Community/ Ikibano<br>6. Public /Rusangi                                                                                                                                                                                                                   |  |
| Q2.4. A If residential, what type of household/ Umuze w'umuryango *                      | 1. Ordinary household/Umuryango usanzwe<br>2. IDP household/Umuryango w'impunzi zo hagati mu gihugu<br>3. Household of returnees from outside the country/Umuryango w'abahungutse bava hanze<br>4. Refugee household/Umuryango w'impunzi<br>5. Multi-tenant household                                                                                                                       |  |
| Q2.A. 4_0 If the property is residential, how many of the households in the property     |                                                                                                                                                                                                                                                                                                                                                                                             |  |
| Q2.A. 4.1 If it is commercial, what is the activity? Ibikorwa vy'ubudandaji mukoreramwo? | 1. Bar :Ubunywero<br>2. Restaurant: Uburiro<br>3. Cafeteria: Ubunywero bw'icayi n'amata<br>4. Hotel: Inzu y'ingenzi<br>5. Car Wash: Aho bogereza imiduga<br>6. Pharmacy: Inzu idandarizawamwo imiti<br>7. Slaughterhouse: Ibagiro<br>8. Bakery: Aho bakorera imikate<br>9. Butchery: Ikibanza bandandazamwo inyama<br>10. Food: Iduka ry'ibifungugwa<br>11. Shop: Iduka<br>12. Bank: Ibanki |  |

|                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                         |                      |
|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
|                                                                                                    | 13. Insurance: <b>Ikigo co gukinga impanuka</b><br>14. Microfinance: <b>Ikigo gito co kubika no kuziganya amafaranga</b><br>15. Transport agency: <b>Ikigo gifasha gutunganya ingendo</b><br>16. Travel agency: <b>Ikigo gitunganya ingendo za kure</b><br>17. Printed by:<br>18. Fuel station: <b>Ku bunywero bw'igitoro</b><br>19. Reception room: <b>Inzu y'imanza</b><br>20. Other (please specify) |                      |
| Q2.A. 4.2 your position or job title in this commercial property?                                  | 1. Representative/Chief Executive/Employer: <b>Uwuyiserukira</b><br>2. Member/staff/employee: <b>Umunywanyi</b><br>3. Other (please specify): <b>Ibindi</b>                                                                                                                                                                                                                                             | <input type="text"/> |
| Q2A.4.3 What is the name of this commercial property? <b>Izina ry'aho hantu</b>                    |                                                                                                                                                                                                                                                                                                                                                                                                         |                      |
| <b>Q2.B Institutional property :</b>                                                               |                                                                                                                                                                                                                                                                                                                                                                                                         |                      |
| Q2.B. 1 Type of institution?/<br><b>Ubwoko bw'ico kigo</b>                                         | 1. School: <b>Ishure</b><br>2. Hospital: <b>Ivuriro</b><br>3. Military camp: <b>Ikambi ya gisirikare</b><br>4. <b>Ikigo c'abihebeyimana</b><br>5. Office: <b>Inzu yo gukoreramwo akazi</b><br>6. Other (please specify): <b>Ibindi</b>                                                                                                                                                                  | <input type="text"/> |
| Q2.B.2 your position or job title in this institution?                                             | 4. Representative/Chief Executive/Employer: <b>Uwuyiserukira</b><br>5. Member/staff/employee: <b>Umunywanyi</b><br>6. Other (please specify): <b>Ibindi</b>                                                                                                                                                                                                                                             |                      |
| Q2.B.3 What is the name of this institution or building?/<br><b>Izina ry'ikigo canke inyubakwa</b> |                                                                                                                                                                                                                                                                                                                                                                                                         | <input type="text"/> |
| <b>Q.2.C Industrial Property : Inzu yubuhinguriro</b>                                              |                                                                                                                                                                                                                                                                                                                                                                                                         |                      |
| Q2. c.1 Type of industry: <b>Ubwoko bw'iryo hinguriro</b>                                          | 1. Agri-food: <b>Ibifungurwa mvaburimy</b><br>2. Chemical:<br>3. Biochemical:<br>4. Metallurgy: <b>Ihunguriro ry'ivuma</b><br>5. Tannery: <b>Ihunguriro ry'inshato</b><br>6. Other (please specify):                                                                                                                                                                                                    |                      |

|                                                                                                   |                                                                                                                                                                                                 |                      |
|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Q2.c.2 Your position or job title in this industry/plant? Ico ujejwe muri iryo hinguriro          | 1. Representative/Chief Executive/Employer: <b>Ndariserukira</b><br>2. Member/staff/employee: <b>Umukozi</b><br>3. Other (please specify) <b>Ibindi.....</b>                                    |                      |
| <b>Q2.D Community property: Ikigo c'imibano</b>                                                   |                                                                                                                                                                                                 |                      |
| Q2.D.1 Type of community institution /Ubwoko bw'ico kigo                                          | 1. Church/Ishengero<br>2. Congregations<br>3. Others /Ikindi kivuge                                                                                                                             | <input type="text"/> |
| Q2.9.2 What is your position or job title in this church? Ico ujejwe muri iryo hinguriro          | 1. Representative/Chief Executive/Employer: <b>Ndariserukira</b><br>2. Member/staff/employee: <b>Umunywanyi/umukozi</b><br>3. Other (please specify): <b>Ibindi</b>                             |                      |
| Q2.9.3 What is the name of this church\ Izina ry'iryo shengero                                    | .....                                                                                                                                                                                           |                      |
| <b>Q2.E Public property: Ikibanza rusangi</b>                                                     |                                                                                                                                                                                                 |                      |
| Q2.E.1 Public property                                                                            | 1. Market: <b>Isoko</b><br>2. Bus station: <b>Igituro c'imdodoka</b><br>3. Stadium: <b>Ikigo c'inkino</b><br>4. Playground: <b>Ikibuga c'inkino</b><br>5. Other (please specify): <b>Ibindi</b> | <input type="text"/> |
| Q2.E.2 Your position or job title in this institution or establishment? Ico mujejwe muri ico kigo | 1. Representative/Responsible/Employer: <b>Umuserukizi</b><br>2. Member/staff/employee: <b>Umunywanyi</b><br>3. Other (please specify): <b>Ibindi</b>                                           |                      |
| Q2.E.3 What is the name of this institution or public space? Izina ry'ico kigo                    | .....                                                                                                                                                                                           |                      |

### SECTION 3 - PROPERTY DETAILS AND SERVICE PROVIDER CUSTOMER CONTACT INFORMATION\ Imyidondoro ijanye n'umunywanyi hamwe n'ikigo gitanga amazi ashorera

|                                                                                                                            |                                                    |                      |
|----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|----------------------|
| Q3.1. Is your property connected to the drinking water network? Amazi mukoresha ava ku miringoti y'ishirahamwe ry'amazi? * | 1. Yes/Ego<br>2. No/Oya                            | <input type="text"/> |
| Q3.2. If yes, who is the service provider? Irihe shirahamwe? *                                                             | 1. REGIDESO<br>2. SOREGEHA<br>3. NCE<br>4. Commune |                      |

|                                                                                                                                            |                                                                                                         |                      |
|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|----------------------|
|                                                                                                                                            | 5. Hydraulics (AHAMR)<br>6. NGO<br>7. Church<br>8. No overseeing authority<br>9. Other (please specify) |                      |
| Q3.3 Is your property connected to the sewerage system?<br>Amazi yakoreshejwe y'aho mubaye atwagwa n'imiringoti y'ishirahamwe ribijejwe? * | 1. Yes/Ego<br>2. No/Oya                                                                                 |                      |
| Q3.3.1. If yes, is the network functional? Iyo miringoti irakora neza? *                                                                   | 1. Yes/ Ego<br>2. No/Oya<br>3. I don't know/ Ntavyo nzi                                                 |                      |
| Q3.4. Who is the service provider? Ni irihe shirahamwe mukorana?                                                                           | 1. OBUHA<br>2. SETAG                                                                                    | <input type="text"/> |
| Q3.5. Do you have a sewerage subscription number? Murafise inomeru mwanditsweko mwahawe n'iryo shirahamwe rijejwe amazi yakoreshejwe? *    | 1. Yes/Ego<br>2. No/ Oya                                                                                | <input type="text"/> |
| Q3.5.1 If yes, specify the subscription number? Nimba myifise mwoyitubwira?                                                                |                                                                                                         |                      |
| Q3.6. Does your property have a drinking water meter? Aho mubaye murafise icuma giharura amazi mukoresha? *                                | 1. Yes/Ego<br>2. No/Oya                                                                                 | <input type="text"/> |
| Q3.6.1 Is the meter accessible? Ico cuma twokibona? *                                                                                      | 1. Yes/Ego<br>2. No/Oya                                                                                 | <input type="text"/> |
| Q3.6.2 Is your meter working? Ico Cuma kirakora? *                                                                                         | 1. Yes/Ego<br>2. No/Oya                                                                                 | <input type="text"/> |

## SECTION 4 – SANITATION/ IBIJANYE N'ISUKU

### SECTION 4A: TYPE OF SANITATION FACILITY, COMMUNAL SANITATION FACILITIES AND ACCESSIBILITY OF SANITATION FACILITIES ACCORDING TO GENRE/ IBIJANYE N'INYUBAKO Z'ISUKU, UKWO ZIFASHE N'UKO ZIKORESHA KURI BURI GITSINA

|                                                              |                          |  |
|--------------------------------------------------------------|--------------------------|--|
| Q4A.1. Do you have a latrine? Murafise akazu ka surwumwe ? * | 1. Yes/Ego<br>2. No/ Oya |  |
|--------------------------------------------------------------|--------------------------|--|

|                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
|                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |
| Q4A.1_0 If you do not have latrines, what means do you use?                       | <ol style="list-style-type: none"> <li>1. The neighbours' place</li> <li>2. Public latrine</li> <li>3. In the bush</li> <li>4. I don't know</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |
| Q4A.2. If yes, what type of toilet do the members of your household usually use?* | <ol style="list-style-type: none"> <li>1. Flush toilet to pit: Ubwisherero bufise ibinogo bibika imyanda</li> <li>2. Seated toilet with flush connected to the septic tank: Ubwisherero bufise imiringoti ijana imyanda mu binogo bibika imyanda</li> <li>3. Flush toilet connected to septic tank and pit: Ubwisherero bufise imiringoti ijana imyanda mu binogo bibika imyanda</li> <li>4. Pour-flush toilet connected to the sewer system: Ubwisherero bufise imiringoti ijana imyanda ku miringoti mikuru y'ishirahamwe ribijejwe</li> <li>5. Turkish flush latrine: Umusarani mu kwituma bicara ku kinogo</li> <li>6. Open dry pit latrine : Umusarani ufise intoboro iguma yuguruye</li> <li>7. Compost toilets -Double pit with slab : Umusarani ufise ibinogo bibiri vyubakiye</li> <li>8. Dry pit latrine with wooden, plastic or metal slab: Umusarani w'ikinogo gifise intoboro, ukozwe n'imbaho harya bicara, parasitike canke ivyuma</li> <li>9. Dry pit latrines with reinforced concrete slab: Umusarani ufise intoboro ukozwe mwisima</li> <li>10. Compost toilet-Double pit with urine separation (ECOSAN): Umusarani umukoyo n'amazirantoke bitandukana</li> </ol> | [ ] |

|                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                               |                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
|                                                                                                                                                                   | <p>umuntu ariko arituma kndi uvamwo intabire</p> <p>11. Urine-diverting dry pit toilet (AKASUGA): Umusarani umukoyo n'amazirantoke bitandukana umuntu ariko arituma kndi uvamwo intabire</p> <p>12. Mobile toilet: Ubwiherero ngendanwa</p> <p>13. Dry pit toilet with dome slab: Umusarani igisenge kimeze nk'urutaro rwubitse</p> <p>14. Other (please specify): Izindi</p> |                      |
| Q4.3.A Are there any public latrines in the locality?                                                                                                             | <p>1. Yess/Ego</p> <p>2. No/Oya</p>                                                                                                                                                                                                                                                                                                                                           |                      |
| Q4.3.A.0 If latrines exist, what is the condition of these toilets?                                                                                               | <p>1. In good condition /Neza</p> <p>2. Poor condition/Nabi</p> <p>3. Intermediate/Bigereranye</p>                                                                                                                                                                                                                                                                            |                      |
| Q4A.3 Do you share sanitary facilities with other people who are not members of your household? Murasangiye inyubakwa z'ubwiherero n'abandi mutabana?*            | <p>1. Yes/Ego</p> <p>2. No/Oya</p>                                                                                                                                                                                                                                                                                                                                            | <input type="text"/> |
| Q4A.3 If you share these facilities, how many households in total use these toilets, including your own household? Hari imiryango ingahe ikoresha ubwo bwiherero* |                                                                                                                                                                                                                                                                                                                                                                               | <input type="text"/> |
| Q4A.4 What is the total number of men/boys who use the toilet in your household? Nabagabo bangahe bakoresha ubwo bwihero?*                                        |                                                                                                                                                                                                                                                                                                                                                                               | <input type="text"/> |
| Q4A.5 What is the total number of women/girls who use the toilet in your household? Ni abakobwa/abakenyezi bangahe bakoresha umusarani mu rugo iwanyu?*           |                                                                                                                                                                                                                                                                                                                                                                               | <input type="text"/> |
| Q4A.6 Where are the toilets located? Ubwiherero buherereye amaja he?*                                                                                             | <p>1. Inside the house: Imbere mu nzu</p> <p>2. In the yard: Mu kigo</p> <p>3. Other (please specify): Ahandi</p>                                                                                                                                                                                                                                                             |                      |
| Q4A.7 What is the total number of toilets on this property belonging to this household? Mufise ubwiherero bangahe mu rugo buri mu nzu? *                          |                                                                                                                                                                                                                                                                                                                                                                               | <input type="text"/> |
| Q4A.8 What is the total number of toilets on this property shared with other households? Mufise                                                                   |                                                                                                                                                                                                                                                                                                                                                                               | <input type="text"/> |

|                                                |  |  |
|------------------------------------------------|--|--|
| ubwiherero bungahe mu rugo musangiye n'abandi? |  |  |
|------------------------------------------------|--|--|

#### SECTION 4 B : DRAINING OF SANITATION FACILITIES AND DISPOSAL: GUTUNGANYA IBINOGO VY'UBWIHERERO

|                                                                                                                  |                                                                                                                                                                                                                                                                            |                      |
|------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Q4B.1. Has your pit latrine/ septic tank ever been full? Ibinogo bibikwamwo imyanda yanyu vyoba bimaze kwuzura * | 1. Yes/ Ego<br>2. No/ Oya                                                                                                                                                                                                                                                  |                      |
| Q4B. What is the solution if your latrine/septic tank is full? Ukora iki iyo umusarani wuzuye?*                  | 1. drainage: Ndayipakurura<br>2. landfill: Ndabihamba<br>3. a new Latrine: Ntegura nshasha<br>3. Withdrawal: Ndayiheba<br>4. No action: Nta na kimwe<br>5. I don't know: Ntavyo nzi                                                                                        | <input type="text"/> |
| Q4B.3 System used most recently: Uburyo uherutse gukoresha vuba cane                                             | 1. Public operator: Ababijejwe bo muri reta<br>2. Authorised private tanker operator: Ababijejwe bigenga<br>3. Owner: Nyeninzu<br>4. Community enterprise: Amashirahamwe agarukira ku bantu<br>5. Informal draining: Tubikora uko tubibonye<br>5. I don't know: Ntavyo nzi | <input type="text"/> |
| Q4B.3_0 Type of drainage supplier                                                                                | 1. OBUHA<br>2. SETAG<br>3. Mercus cleaning<br>4. BGS<br>5. MBASHA<br>6. SALAMA<br>7. KARIKURUBU<br>8. Andrew Kurt<br>9. PND<br>10. FDN<br>11. Omar<br>12. Samuel<br>13. Bonus<br>14. SEE<br>15. Eduard<br>16. Great at Vision<br>17. Innocent                              |                      |

|                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                 |                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Q4B.4 Approximate emptying time? Igihe bitwara kugira mutunganye (muvidure) imisarani?                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                 | <input type="text"/> |
| Q4B.5 Accessibility to households/institutions, etc.: Inzira ija ku mihana canke ibigo *                                                           | 1. Accessible road: Ibarabara rihita neza<br>2. Road not passable: Ibarabara ridahita nza<br>3. Other : Ikindi                                                                                                                                                                                                                                                                                                  | <input type="text"/> |
| Q4B.6. Accessibility to toilets that can be emptied: Inzira ija ku misarani irimwo imyanda *                                                       | 1. Yes :Ego<br>2. Name: Oya                                                                                                                                                                                                                                                                                                                                                                                     |                      |
| Q4B.7. Type of vehicle used: Ubwoko bw'i modoka zikoreshwa*                                                                                        | 1. Tanker truck: Imodoka ibijejwe<br>2. Trolley transport: Ivyuma basunika<br>3. Other (please specify): Ibindi                                                                                                                                                                                                                                                                                                 | <input type="text"/> |
| Q4B.8. Average frequency of emptying pit latrine/septic tank: Incuro mutunganya (muvidura) imisarani *                                             | 1. Once every six months: Rimwe mu mezi atandatu<br>2. Once a year: Rimwe mu mwaka<br>3. In less than 5 years: Musi y'amezi atanu<br>4. Once every 3 years: Rimwe mu myaka itatu<br>5. Once every 5 years: Rimwe mu myaka itanu<br>6. Once every 7 years: Rimwe mu myaka indwi<br>7. Once every 10 years: Rimwe mu myaka icumi<br>8. Over 10 years: Inyuma y'imyaka irenga icumi<br>9. I don't know: Ntavyo nzi | <input type="text"/> |
| Q4B. 9. What is the destination of faecal sludge? Iyo myanda bayitwara hehe?*                                                                      | 1. Wastewater treatment plant: mu kigo gihingura amazi yakoreshejwe<br>2. sludge drying beds: Ku kibanza babikamwo inyanda<br>3 In watercourses: Mu nzuzi zitwegereye<br>4 In gutters: Mu miferege<br>5 In the wild: Mw'ishamba<br>6 - I don't know: Ntavyo nzi<br>7 Other (please specify): Ahandi                                                                                                             | <input type="text"/> |
| Q4B.10. On average, how much do you pay for sanitation emptying services? Mukoresha uburyo bungana gute mu gutunganya (kuvidura) imisarani yanyu ? |                                                                                                                                                                                                                                                                                                                                                                                                                 | <input type="text"/> |

## SECTION 4C. ROOF CONDITION AND IMPROVEMENTS: UBURYO IMISARANI ITUNGANIJWE

|                                                                                                                                                                                   |                                                                                                              |                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|--------------------------|
| Q4C.1 What is the state of the toilets? Mbega ubu uyo musarani umeze gute?*                                                                                                       | 4. In good condition : <b>Neza</b><br>5. Poor condition : <b>Nabi</b><br>6. Intermediate: <b>Bigereranye</b> | <input type="checkbox"/> |
| Q4C.2. If it is in poor condition, do you have any plans to repair, rehabilitate or build your sanitation facility? Mbega murafise umugambi wo kuyisanura canke kwubaka nshasha ? | • Yes: <b>Ego</b><br>• No: <b>Oya</b><br>• N/A:<br>• I don't know: <b>Ntavyo nzi</b>                         | <input type="checkbox"/> |
| Q4C.3 Do you have any standards to follow when building a toilet? Murafise inyisungu mu kwubaka iyo misarani?                                                                     | 1. Yes: <b>Ego</b><br>2. No: <b>Oya</b><br>3. N/A<br>4. I don't know: <b>Ntavyo nzi</b>                      | <input type="checkbox"/> |
| Q4C.4 Do you think you can raise enough money to finance such toilet improvements or new building work? Mbega muraziganya uburyo bwo kwubaka imisarani yanyu ?                    | 1. Yes: <b>Ego</b><br>2. No: <b>Oya</b><br>3. I don't know: <b>Ntavyo nzi</b>                                | <input type="checkbox"/> |

## SECTION 5. WATER SECTION: IGISATA C'AMAZI

### SECTION 5A. TYPE OF WATER SUPPLY SOURCE AND LOCATION AND SHARED WATER FACILITIES AND ACCESSIBILITY OF WATER FACILITIES BY GENDER: AMASOKO BAKURAMWO AMAZI, AHO AHEREREYE, UKO ATUNGANIJWE N'UKO BAYARONKA UFAYIYE KU GITSINA

|                                             |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Q5A.1 What is the source of the water used? | 1. Private connection: <b>Mu miringoti y'abigenga</b><br>2. Public fountain: <b>Ku mabombo yubatswe kubw'abanyagihugu</b><br>3. Private drilling: <b>Amazi ava mu kuzimu y'abigenga</b><br>4. Public drilling: <b>Amazi ava mu kuzimu yubatswe na Leta</b><br>5. Developed well: <b>Mu binogo bitunganijwe</b><br>6. Unfinished well: <b>Mu binogo bidatunganijwe</b><br>7. Managed source: <b>Kw'isoko ryubakiye</b> |  |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

|                                                                                                                                                                              |                                                                                                                                                                                                                              |                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
|                                                                                                                                                                              | 8. Undeveloped spring: Kw'isoko ritubakiye<br>9. Surface water: (river, dam, lake, stream, canal): Mu nzuzi zitandukanye<br>10. Rainwater: Amazi y'imvura<br>11. Next door: Ku babanyi<br>12. Other (please specify): Ahandi |                          |
| Q5A.2. Do you share a water facility located in this property with other people who are not members of your household? Mbega inyubako zanyu z'amazi murazisangiye n'abandi?* | 1. Yes: Ego<br>2. No: Oya                                                                                                                                                                                                    | <input type="checkbox"/> |
| Q5A.3 How many households have access to this water facility? Ni imiryango ingahe ikoresha inyubako y'amazi yanyu?*                                                          |                                                                                                                                                                                                                              |                          |
| Q5A. 5 How many people access this water facility? Ni abantu bangahe bakoresha inyubako y'amazi yanyu?*                                                                      |                                                                                                                                                                                                                              |                          |
| Q4A.6 What is the total number of clean water installations at this property? Mufise inyubako z'amazi zingahe ziri mu nzu?<br>*                                              |                                                                                                                                                                                                                              |                          |
| Q4A.7 What is the total number of drinking water installations shared with other properties (households or others)? Mufise inyubako zingahe mu rugo musangiye n'abandi?      |                                                                                                                                                                                                                              |                          |
| Q5A.8 Are there any of the following structures in the locality?                                                                                                             | 1. Water fountain<br>2. Private drilling<br>3. Public drilling<br>4. Developed wells<br>5. Developed sources                                                                                                                 |                          |
| Q5A.8.1 If it's a standpipe, is it functional? Nimba iryo iriba rihari, ryoba rikora neza?                                                                                   | 1. Yes: Ego<br>2. No :Oya                                                                                                                                                                                                    | <input type="checkbox"/> |
| Q5A.8.2 If this is a private well, is it functional? Nimba ari iriba ryisangijwe, ryoba rikora neza?*                                                                        | 1. Yes: Ego<br>2. No: Oya                                                                                                                                                                                                    | <input type="checkbox"/> |
| Q5A.8.3 If it's a public borehole, is it functional? Nimba ari iriba rusangi, ryoba rikora?<br>*                                                                             | 1. Yes: Ego<br>2. No: Oya                                                                                                                                                                                                    | <input type="checkbox"/> |
| Q5A.11.1 If these wells are developed, are they functional? Nimba ayo mariba yubatse neza ahari, yoba akora neza?*                                                           | 1. Yes: Ego<br>2. No: Oya                                                                                                                                                                                                    | <input type="checkbox"/> |
| Q5A.12.1 If these springs are developed, are they functional? Nimba ayo masoko yubakiye ahari, yoba akora neza?*                                                             | 1. Yes: Ego<br>2. No: Oya                                                                                                                                                                                                    | <input type="checkbox"/> |

## SECTION 5B. FUNCTIONALITY, TIME TO FIND WATER AND LEVEL OF SERVICE

### UMWANYA NKORESHA MU KORONKA AMAZI HAMWE N'UKO ATANGWA

|                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                      |
|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Q5B.1 What is the state of the drinking water installation?<br>Mbega inyubako y'amazi yanyu imeze gute?*                      | <ul style="list-style-type: none"> <li>Functional: <b>Irakora neza</b></li> <li>Non-functional: <b>Ntikora</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <input type="text"/> |
| Q5B.2 How do you rate the quality of the water? Ni gute mubona urugero mushimako amazi mufise ?*                              | <ol style="list-style-type: none"> <li>Good quality: <b>Meza cane</b></li> <li>Poor quality: <b>Mabi</b></li> <li>Questionable quality: <b>Amazi afise akanenge</b></li> <li>I don't know: <b>Ntavyo nzi</b></li> </ol>                                                                                                                                                                                                                                                                                                                                                                             | <input type="text"/> |
| Q5B.3 What is the distance travelled to fetch drinking water? Urugendo mugira mu kurondera amazi rungana gute?*               | <ol style="list-style-type: none"> <li>Less than 500 m: <b>Musi ya metero amajana atanu</b></li> <li>Over 500 m: <b>Imetero amajana atanu zirenga</b></li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                    | <input type="text"/> |
| Q5B.3 A How long does it take to get to the water source, fill up and return?                                                 | <ol style="list-style-type: none"> <li>0 to 5 min</li> <li>5 to 10 minutes</li> <li>10 to 20 minutes</li> <li>20 to 30 minutes</li> <li>30 min to 1 hour</li> <li>More than 1 hour</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                       | <input type="text"/> |
| Q5B.4 On average, how long does it take for drinking water to become available? Bitwara umwanya ungana kugira amazi aboneke?* | <ol style="list-style-type: none"> <li>One day a week: <b>Umusi umwe mu ndwi</b></li> <li>Two days a week: <b>Imisi ibiri mu ndwi</b></li> <li>Three days a week: <b>Imisi itatu mu ndwi</b></li> <li>More than 3 days: <b>Imisi irenga itatu</b></li> <li>Less than 6 hours: <b>Musi y'amasaha atandatu</b></li> <li>Between 6 and 12 hours: <b>Hagati y'amasaha atandatu na cumi n'abiri</b></li> <li>Between 12 and 18 hours: <b>Hagati y'amasaha icumi n'abiri na cumi n'umunani</b></li> <li>Between 18 and 24 hours: <b>Hagati y'amasaha icumi n'umunani na mironigibiri n'ane</b></li> </ol> | <input type="text"/> |
| Q5B.5: How long does it take to fill a 20-litre container in your drinking water supply?                                      | <ol style="list-style-type: none"> <li>0 to 5 min</li> <li>5 to 10 minutes</li> <li>10 to 20 minutes</li> <li>20 to 30 minutes</li> <li>More than 30 min</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                 | <input type="text"/> |

|                                                                   |                                                                                                                                            |  |
|-------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|--|
| Q5B.6. What is the average monthly expenditure on drinking water? | 1 Less than 10,000 BIF<br>2. From 10,000 to 20,000 BIF<br>3. 30,000 to 40,000 BIF<br>4 From 40,000 to 50,000 BIF<br>5.more than 50,000 BIF |  |
|-------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|--|

## SECTION 6. HYGIENE: ISUKU

### SECTION 6A. HAND HYGIENE ISUKU RIJANYE N'UGUKARABA INTOKE

|                                                                                                                    |                                                                                                                       |                          |
|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|--------------------------|
| Q6A.1 Is there a hand-washing facility in the yard or on the premises? <b>Hoba hariho ikibanza c'ubukarabiro?*</b> | 1. Yes: <b>Ego</b><br>2. No: <b>Oya</b>                                                                               |                          |
| Q6A.2. What type of hand-washing facility is there? <b>Ni ubuhe bwoko bw'ubukarabiro bw'amaboko buhari? *</b>      | 1. Seal with tap: <b>Indobo ifise umuringoti</b><br>2. Washbasin: <b>XX</b><br>3. Hanging can: <b>Honyora ukarabe</b> |                          |
| Q6A.3. Does the hand-washing facility have water? <b>Ubwo bukarabiro burafise amazi?*</b>                          | 1. Yes: <b>Ego</b><br>2. No: <b>Oya</b>                                                                               | <input type="checkbox"/> |
| Q6A.4 Does the hand-washing facility have soap? <b>Ubwo bukarabiro burafise amazi n'isabuni?*</b>                  | 1. Yes: <b>Ego</b><br>2. No: <b>Oya</b>                                                                               | <input type="checkbox"/> |

### SECTION 6B. MENSTRUAL HYGIENE/ ISUKU RIJANYE N'UBUTINYANKA

|                                                                                                                                                                                                                           |                                                                                                                                                                                                        |                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Q6B.1. Are you comfortable answering questions about menstrual hygiene? <b>Mwumva ata kibazo bibateye kuganira ibijanye n'isuku ry'ubutinyanka ?*</b>                                                                     | 1. Yes: <b>Ego</b><br>2. No: <b>Oya</b>                                                                                                                                                                | <input type="checkbox"/> |
| Q6B.2 If you are comfortable answering questions about menstrual hygiene, is there a sanitary bin for it? <b>Hamwe hoba ata kibazo, mwotubwira ko mufise agasaho mwegeranizamwo ivyo mwakoresheje muri mu butinyanka?</b> | 1. Yes: <b>Ego</b><br>2. No: <b>Oya</b><br>3. Don't know <b>Oya, ntavyo nzi</b>                                                                                                                        | <input type="checkbox"/> |
| Q6B.3 What menstrual hygiene products do women use in this household? <b>Ni igiki mukoresha iyo muri mu butinyanka?</b>                                                                                                   | 1. Disposable pads: <b>XX</b><br>2. Reusable pads: <b>XX</b><br>3. Napkins: <b>XX</b><br>4. Toilet papers: <b>XX</b><br>5. Other (please specify): <b>Ibindi</b><br>7. I don't know: <b>Ntavyo nzi</b> | <input type="checkbox"/> |

|                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                |                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Q6B.4. What means do you have for disposing of menstrual hygiene waste? <b>Ni iki mukoresha mu guta ivyo mwakoresheje?</b>                                             | <ul style="list-style-type: none"> <li>• Burning: <b>Turabiturira</b></li> <li>• Landfill: <b>Turabihamba</b></li> <li>• Rubbish pit: <b>Tubishira mu binogo</b></li> <li>• Toilet pit: <b>Mu binogo vy'imisarani</b></li> <li>• Waste management service: <b>Abatwara imicafu</b></li> <li>• Other (please specify): <b>Ibindi</b></li> </ul> | <input type="text"/> |
| Q6A.5 Is there somewhere to wash and change clothes during menstruation? <b>Hariho ikibanza co gukaraba canke kwihindura gitegekanijwe mu gihe muri mu butinyanka?</b> | <ol style="list-style-type: none"> <li>1. Yes: <b>Ego</b></li> <li>2. No: <b>Oya</b></li> </ol>                                                                                                                                                                                                                                                | <input type="text"/> |

## SECTION 7. TAKING GPS COORDINATES OF IDENTIFIED STRUCTURES

|                                                                  |  |  |
|------------------------------------------------------------------|--|--|
| Q7.1. GPS coordinates of the public fountain in the locality *.  |  |  |
| Q7.2. GPS coordinates of the private borehole in the locality *. |  |  |
| Q7.3. GPS coordinates of the public borehole in the locality *.  |  |  |
| Q7.4. GPS coordinates of wells in the locality *.                |  |  |
| Q7.5. GPS coordinates of springs in the locality *.              |  |  |
| Q7.6. GPS coordinates of public latrines in the locality*.       |  |  |

## ANNEX III: STATISTICAL VISA

REPUBLIQUE DU BURUNDI

Bujumbura, le 06/09/2023



MINISTRE DES FINANCES, DU BUDGET ET  
DE LA PLANIFICATION ECONOMIQUE

CABINET DU MINISTRE

N/Réf : 540/95/...../2023

4232

A Monsieur le Ministre de l'Hydraulique, de  
l'Energie et des Mines  
à  
**BUJUMBURA**

**Objet** : Votre demande de Visa Statistique pour le protocole de  
« l'étude portant sur la cartographie des services d'eau  
potable et d'assainissement de base dans 18 centres urbains »

Monsieur le Ministre,

Faisant suite à votre correspondance N° 760/CAB/2115/2023 du 07 juillet 2023 relative à  
l'objet en marge, j'ai l'honneur de vous informer que le Visa demandé vous est octroyé.

Vous trouverez, en annexe, la décision y relative.

Je voudrais saisir cette occasion pour vous informer que, désormais, la demande de Visa  
statistique se fera conformément aux dispositions de l'article 22 de la loi n°1/18 du 24 juillet  
2023 portant modification de la loi n°1/08 du 20 mai 2021 portant modification de la loi  
n°1/17 du 25 septembre 2007 portant organisation du système statistique au Burundi.

Veuillez agréer, **Monsieur le Ministre**, l'assurance de ma haute considération.

LE MINISTRE DES FINANCES, DU BUDGET ET  
DE LA PLANIFICATION ECONOMIQUE

Audace NIYONZIMA.

B.P. 1830 Bujumbura, Tél : 257 22 223988-257 22 222775, Fax : 257 22 223827  
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## REPUBLIQUE DU BURUNDI

MINISTRE DES FINANCES, DU BUDGET ET  
DE LA PLANIFICATION ECONOMIQUE

## CABINET DU MINISTRE

4232

DECISION MINISTERIELLE N°540/95/...../2023 DU 06/09/2023 PORTANT  
OCTROI DU VISA STATISTIQUE AU PROTOCOLE DE L'ETUDE PORTANT SUR LA  
CARTOGRAPHIE DES SERVICES D'EAU POTABLE ET D'ASSAINISSEMENT DE BASE  
DANS LES 18 CENTRES URBAINS DU PAYS

LE MINISTRE DES FINANCES, DU BUDGET ET DE LA PLANIFICATION ECONOMIQUE,

Vu la Constitution de la République du Burundi ;

Vu la loi n°1/19 du 17 mai 2014 portant ratification par la République du Burundi de la Charte Africaine de la Statistique ;

Vu la loi n°1/27 du 29 décembre 2017 portant révision du code pénal ;

Vu la loi n°1/012 du 30 mai 2019 portant Code de l'Offre des Soins et Services de Santé ;

Vu la loi n°1/18 du 24 juillet 2023 portant modification de la loi n°1/08 du 20 mai 2021 portant modification de la loi n°1/17 du 25 septembre 2007 portant organisation du système statistique au Burundi ;

Vu le décret n°100/261 du 31 octobre 2013 portant institution du visa statistique et de l'avis d'éthique pour les enquêtes statistiques et recherches biomédicales et comportementales au Burundi ;

Vu le décret n°100/227 du 08 octobre 2014 portant cadre national d'assurance qualité des données (CNAQD) au Burundi ;

Vu le décret n°100/085 du 25 juillet 2018 portant cadre national de collecte, de diffusion, d'accès, d'archivage et de sécurisation des données et des micro-données ;

Vu le décret n°100/094 du 25 juin 2019 portant nomination des membres du Comité National d'Ethique pour la protection des êtres humains sujets de la recherche biomédicale et comportementale ;

Vu le décret n°100/007 du 28 juin 2020 portant révision du décret 100/037 du 19 avril 2018 portant structure, fonctionnement et missions du Gouvernement de la République du Burundi ;

Vu le décret n°100/069 du 24 septembre 2020 portant missions, organisation et fonctionnement du Ministère des Finances, du Budget et de la Planification Economique ;

Vu le décret n°100/110 du 30 novembre 2020 portant institution de l'usage systématique des nomenclatures utilisées dans le système statistique national du Burundi ;

Vu le décret n°100/06 du 08 septembre 2022 portant nomination des membres du Gouvernement ;

Vu le Décret N°100/152 du 16 novembre 2022 portant création, attributions, composition et règles de fonctionnement du Comité National de l'Information Statistique (CNIS) ;

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Vu le Décret N°100/153 du 16 novembre 2022 portant création, attributions, composition et règles de fonctionnement de l'Autorité Statistique Nationale (Institut National de la Statistique du Burundi, INSBU en sigle) ;

Vu l'ordonnance ministérielle n° 540/1643 du 25 novembre 2013 portant modalités d'obtention du visa statistique pour les enquêtes statistiques au Burundi ;

Vu l'ordonnance ministérielle n° 214/1225/2016 du 27 juin 2016 portant mise en place des procédures de suivi de la qualité de la production des statistiques officielles au Burundi ;

Vu l'ordonnance ministérielle n° 540/206/2021 du 1<sup>er</sup> mars 2021 portant modification de l'ordonnance n° 540.1/079 du 25 janvier 2021 portant mise en place des procédures de suivi de l'usage systématique des nomenclatures utilisées dans le système statistique national du Burundi ;

Vu la lettre de demande de visa statistique pour réaliser l'étude portant sur la cartographie des services d'eau potable et d'assainissement de base dans 18 centres urbains, introduite, le 07 juillet 2023, par Monsieur Ir Ibrahim UWIZEYE, Ministre de l'Hydraulique, de l'Energie et des Mines, et les amendements apportés au protocole de l'étude après observations du CTIS ;

Vu l'accord du Ministre des Finances, du Budget et de la Planification Economique du 13 juillet 2023 pour faire les analyses techniques d'opportunité et de conformité conduisant à l'obtention du visa statistique ;

Vu la décision n° CNE/20/2023 établie le 05 juillet 2023 par le Comité National d'Ethique de la protection des êtres humains sujets de la recherche biomédicale et comportementale ;

Vu les avis d'opportunité N° 019AO/2023/CTIS et de conformité N° 019AC/2023/CTIS établis, le 23 août 2023, par le Comité Technique de l'Information Statistique (CTIS) ;

#### **DECIDE :**

**Article 1 :** Il est accordé un **Visa Statistique N° VS2023019CNIS** au « Protocole de l'étude portant sur la cartographie des services d'eau potable et d'assainissement de base dans 18 centres urbains ».

**Article 2 :** Ce numéro doit figurer sur tous les questionnaires physiques de l'étude.

**Article 3 :** Tout changement de la méthodologie du protocole de l'étude est soumis à une autre demande de visa statistique.

**Article 4 :** Au terme de l'étude, le commanditaire doit réserver une copie du rapport définitif et de la base de données au secrétariat du CTIS logé à l'Institut Nationale de la Statistique du Burundi (INSBU) pour appréciation de la qualité des données et quitus avant leur diffusion.

**Article 5 :** Le présent Visa Statistique concerne cette étude et est valable jusqu'au 04 juillet 2024, à compter de la date de sa signature.

Fait à Bujumbura, le 06. / 09. / 2023.

**LE MINISTRE DES FINANCES, DU BUDGET ET  
DE LA PLANIFICATION ECONOMIQUE**

Audace NIYONZIMA



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**ANNEX IV: DELIMATION WORK AREA (LINK)**

<https://1drv.ms/f/s!AigwANgncjNWiwlB7YKuG0NqUiz?e=ECPeKe>