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COMMUNITY PARTICIPATION AND SUSTAINABILITY OF PROJECT DELIVERY IN RURAL WATER PROJECTS IN WALUNGU TERRITORY, DEMOCRATIC REPUBLIC OF THE CONGO

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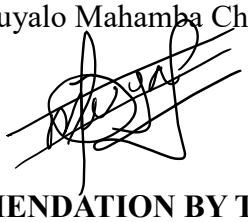
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DECLARATION

This research is my own work and has not been submitted before, in whole or in part, to any other University or Institution for the award of any degree. I acknowledged all the information sources used in this investigation.

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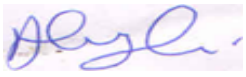
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DEDICATION

This research is dedicated to my father and my mother, whose unaltered support continues for every one of my efforts. My parents' love, encouragement and sacrifices inspire me to be better every day. They believed in me even when I didn't, and they always pushed me to keep on going. With their support and patience, I managed to stay focused and strong. My appreciation for their support and understanding is incredibly great. The accomplishment reflects their ongoing commitment to my future success.

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ABBREVIATIONS AND ACRONYMS

DRC: Democratic Republic of Congo

FASS: Faculty of Arts and Social Sciences

GIZ: Deutsche Gesellschaft für Internationale Zusammenarbeit

IRC: International Water and Sanitation Centre

NGO: Non-Governmental Organization

O&M: Operation and Maintenance

SDG: Sustainable Development Goal

SNHR: Service National d'Hydraulique Rurale

SPSS: Statistical Package for the Social Sciences

SSA: Sub-Saharan Africa

UN: United Nations

UNICEF: United Nations Children's Fund

USAID: United States Agency for International Development

WASH: Water, Sanitation and Hygiene

WHO: World Health Organization

B: Unstandardised regression coefficient

β: Standardised regression coefficient

CUEA: The Catholic University of Eastern Africa

IDI: In-depth interview

JMP: Joint Monitoring Programme

R^2: Coefficient of determination

SD: Standard deviation

SNV: Netherlands Development Organisation

ABSTRACT

Access to clean and sustainable rural water services remains a major challenge in many parts of the Democratic Republic of the Congo despite significant investments in the water sector. However, there is limited empirical evidence on how different dimensions of community participation influence the sustainability of rural water services in Walungu Territory. The study focused on four specific objectives: it examined how community involvement in decision-making influences the sustainability of a rural water project in Walungu Territory; analyzed how capacity building influences the sustainability of a rural water project in Walungu Territory; assessed how participation in operation and maintenance contributes to the sustainability of rural water projects in Walungu Territory; and explored how ownership and sense of responsibility influence the sustainability of a rural water project in Walungu Territory. Guided by Arnstein's Ladder of Citizen Participation Theory and Sustainability Theory, the study adopted a convergent parallel mixed-methods design. A sample of 360 households was selected using simple random sampling, while 35 key informants were selected purposively. Data were collected through structured questionnaires and semi-structured interviews. Quantitative data were analyzed using SPSS version 27, while qualitative data were analyzed thematically. Pearson correlation analysis showed weak but significant positive relationships between sustainability and capacity building ($r = 0.110$, $p = .042$) and operation and maintenance ($r = 0.199$, $p < .001$), whereas decision-making ($r = 0.069$, $p = .199$) and ownership ($r = -0.031$, $p = .561$) were not significantly related to sustainability. Multiple regression analysis showed that operation and maintenance was the only statistically significant predictor of sustainability ($\beta = 0.180$, $p = .001$), while the other dimensions were not significant. The study recommends strengthening community participation in operation and maintenance through regular maintenance, technical capacity building, and collaboration among communities, local authorities, and development partners. Further studies should examine other factors influencing sustainability across different contexts and over time. The study contributes context-specific empirical evidence showing that the dimensions of community participation do not contribute equally to the sustainability of rural water services in Walungu territories.

CHAPTER 1: INTRODUCTION

1.0 Introduction

This chapter presents various sections such as the background information under which the study is based on, problem statement, aims and objectives of the study, the research questions, justification and significance of the study in that order, as well as the limitations, delimitation of the study, the conceptual framework and finally the operational definition of terms for the study.

1.1 Background to the Study

Sustainability of water services remains a major concern in the development sector. These services are considered sustainable when they continue to function over time and provide safe, reliable, and affordable access without prolonged interruptions, with appropriate continuing support (WHO & UNICEF, 2022). Sustainability goes beyond simply constructing infrastructure. It depends on several interconnected elements such as effective operation and maintenance, financial viability, institutional support, and strong community ownership (Foster et al., 2021; Harvey, USAID, 2020). When these elements are weak or missing, systems often deteriorate shortly after implementation (Truslove et al., 2020; Cronk & Bartram, 2020).

At the global level, access to safe and sustainable water services remains uneven. The 2023 WHO–UNICEF estimates show that 2.2 billion people still lack safely managed drinking water, while 3.5 billion people do not have access to safely managed sanitation services (WHO & UNICEF, 2023). Communities exposed to unsafe water face repeated health risks, while school attendance and productivity are also affected. Progress towards Sustainable Development Goal 6 remains slow

(United Nations, 2021; WHO & UNICEF, 2023). Global frameworks increasingly emphasize that sustainability depends not only on infrastructure, but also on people, including how communities participate in decision-making, capacity building, operation and maintenance, and ownership of the systems (United Nations, 2021; USAID, 2020; Foster et al., 2021).

In Sub-Saharan Africa, these challenges are more visible, especially in rural areas. Limited financing, weak governance, population growth, and insufficient investment in maintenance structures affect the sustainability of water services (UNICEF, 2023; World Bank, 2021; Harvey & Reed, 2007). Rural water points are constructed, but many become non-functional within a few years. Limited community participation in planning, implementation, and maintenance has also been identified as a factor that may affect system sustainability (Truslove et al., 2020; Foster et al., 2021; Niyongabo et al., 2022). Studies show that when communities are actively involved throughout the project cycle, systems are more likely to remain functional and sustainable (Niyongabo et al., 2022; USAID, 2020).

These challenges are even more pronounced in the Democratic Republic of the Congo. Despite having abundant water resources, access to safe and sustainable water services in rural areas remains low (UNICEF DRC, 2022; WHO, 2021). Institutional capacity is often weak, insecurity affects service delivery in several regions, and community participation in project management and decision-making remains limited (World Bank, 2021). Evidence from different studies indicates that many rural water systems fail shortly after construction. This has been associated with low levels of community ownership, inadequate capacity building, and weak operation and maintenance arrangements (Foster et al., 2021; Mercy Corps, 2021; UNICEF DRC, 2022; Cronk & Bartram, 2020).

At the provincial and local level, South Kivu Province, and particularly Walungu Territory, reflects these broader challenges. Access to safe water remains limited for many households. As a result, communities rely on unsafe sources such as rivers, unprotected springs, and shallow wells, exposing them to diseases such as cholera, typhoid, and diarrhea (Mercy Corps, 2021; UNICEF DRC, 2022). Over the years, several water projects have been implemented in the area. The continuation of benefits from these installations is therefore an important question for rural water projects in Walungu Territory; a territory-wide failure rate is not established by the evidence presented here.

In Walungu Territory, the study examined whether community involvement in decision-making, capacity building, operation and maintenance, and ownership was associated with sustained project outcomes. These factors may be associated with delays in repairs, poor maintenance practices, and low willingness to contribute financially (Foster et al., 2021; USAID, 2020; Niyongabo et al., 2022; UNICEF DRC, 2022). However, there is limited empirical evidence on how these different dimensions of community participation influence the sustainability of rural water services specifically in Walungu Territory.

Evidence from South Kivu helps locate this concern without providing a failure rate for Walungu. Jeandron et al. (2015) used time-series data from Uvira and found that interruptions in piped water supply were associated with increased suspected cholera incidence. Their urban health outcome differs from the household perceptions examined here, but it shows why continued service reliability matters after infrastructure is installed. More recently, Gallandat et al. (2024) examined implementation of infrastructure improvements in Uvira and highlighted the importance of delivery processes and contextual constraints. These studies justify attention to sustained benefits

while leaving the specific participation–sustainability relationship in Walungu to empirical investigation.

Community participation includes several distinct dimensions. The four key dimensions considered in this study were participation in decision-making, capacity building and training, involvement in operation and maintenance, and ownership with a sense of responsibility. These dimensions were selected because they represent different forms of community involvement: participation in project decisions, development of skills and knowledge, practical involvement in maintaining the systems, and responsibility for their continued management. The dimensions reflect Arnstein's (1969) Ladder of Citizen Participation, which provides for various levels of citizen influence, and Sustainability Theory, which requires technical, financial, institutional, and social conditions that support and sustain service delivery over time. While past research has looked at general water sustainability difficulties in Sub-Saharan Africa, there is little evidence on how these four dimensions of community participation are collectively associated with the sustainability of rural water projects in Walungu Territory (Foster et al., 2021; UNICEF DRC, 2022). The present study therefore sought to address this knowledge gap by examining how the four dimensions of community participation are collectively associated with the sustainability of rural water projects in Walungu Territory.

1.2 Statement of the Problem

Despite significant investments in water infrastructure, the sustainability of rural water services remains a major challenge in many developing countries. Many rural water systems fail to remain functional over time due to weak operation and maintenance systems, limited institutional support, and low levels of community participation (Foster et al., 2021; Truslove et al., 2020; World Bank, 2021).

In the Democratic Republic of the Congo, particularly in South Kivu Province, reports raise concerns about the continuing functionality of rural water systems (UNICEF DRC, 2022; Mercy Corps, 2021). In Walungu Territory, the practical concern is whether completed installations continue to provide reliable benefits to rural communities. This situation may be associated with limited community involvement, inadequate capacity building, weak participation in operation and maintenance, and low levels of ownership (Foster et al., 2021; Le Gouais & Wach, 2021).

While existing studies highlight the importance of community participation, there is limited empirical evidence on how its different dimensions influence sustainability at the local level (Lockwood & Smits, 2019; Smits et al., 2020). Conceptually, limited attention has been given to decision-making, capacity building, operation and maintenance, and ownership as distinct dimensions of community participation. Contextually, little is known about their influence on rural water sustainability specifically in Walungu Territory**.** Therefore, this study examined how these dimensions of community participation were associated with the sustainability of rural water services in Walungu Territory, South Kivu Province, Democratic Republic of Congo.

The practical problem concerns the continuity of benefits from completed rural water infrastructure. The research gap concerns whether, and to what extent, the four participation dimensions are associated with those benefits in Walungu. Evidence from other DRC settings supports the relevance of the question but does not establish a territory-wide failure rate or prove that participation caused local service problems. The study addresses this gap through household-level associations and complementary stakeholder accounts.

1.3 Purpose of the Study

The purpose of this study was to examine the relationship between community participation and the sustainability of project outcomes in selected rural water projects in Walungu Territory, South Kivu Province, Democratic Republic of the Congo.

1.4 Research Objectives

1.4.1 General Objective

To assess the relationship between community participation and the sustainability of project delivery in selected rural water projects in Walungu Territory.

1.4.2 Specific Objectives

1. To examine how community involvement in decision-making influences the sustainability of a rural water projects in Walungu Territory, South Kivu.
2. To analyze how capacity building influences the sustainability of a rural water projects in Walungu Territory, South Kivu.
3. To assess how participation in operation and maintenance contributes to the sustainability of a rural water projects in Walungu Territory, South Kivu.
4. To determine the influence of ownership and sense of responsibility on the sustainability of rural water projects in Walungu Territory, South Kivu.

1.5 Research Questions

1. How does community involvement in decision-making influence the sustainability of rural water services in Walungu Territory?

2. How does capacity building and training affect the sustainability of rural water services in Walungu Territory?
3. How does community participation in operation and maintenance contribute to the sustainability of rural water services in Walungu Territory?
4. How does community ownership and sense of responsibility influence the sustainability of rural water services in Walungu Territory?

1.6 Justification of the study

Sustainability of rural water services remains a continuous challenge in large parts of Sub-Saharan Africa, including the Democratic Republic of Congo (DRC). Repeated investments and interventions have resulted in the construction of water infrastructure in rural areas, but construction alone does not establish that the intended benefits will continue over time.

In Walungu Territory, South Kivu Province, DRC, a variety of rural water projects have been implemented, but their outcomes have varied considerably. This highlighted the need to better understand the factors that supported or prevented the sustainability of these initiatives. Studies on sustainable and viable water services have largely recognized the significance of participation from local communities. Despite this, most research has focused on a single type of participation or sustainability at a national or regional level. Research on how different aspects of community participation affect sustainability outcomes in the same local context has remained limited.

The various dimensions examined in this study were participation in decision-making, capacity building and training, operation and maintenance, and ownership. A notable gap existed in fragile and conflict-affected settings such as eastern DRC, where the social, institutional, and governance context shaped participation processes in distinct ways.

Household data from the selected project communities were analysed together. The study therefore provides an aggregate assessment within the selected setting rather than a comparison of the performance of four individual projects.

The results of this research were useful to academia as they enhanced the understanding of the way in which different forms of community participation together contributed to sustainability in rural water projects. In practical terms, the study was useful to policymakers, development partners, local NGOs, and local government authorities in designing and implementing more participatory and sustainable water interventions in Walungu and other similar rural and fragile contexts.

1.7 Significance of the Study

The study was significant to non-governmental organizations and development partners that invest in rural water projects. The findings provided evidence on how different forms of community participation influenced sustainability, which may help these organizations improve project planning, community involvement, and long-term management of rural water services.

Local councils and water point committees also benefited from the findings by identifying areas of community participation that required improvement. The findings provided information that may help strengthen local management, accountability, operation and maintenance, and community responsibility for rural water services.

For communities, the study provided evidence on the importance of their involvement in decision-making, capacity building, operation and maintenance, and ownership. This may encourage stronger participation and responsibility in the management of their water services.

The findings were also useful to local government authorities by providing insights into how community participation could be better integrated into local governance structures. The findings

may support stronger collaboration between communities, local institutions, and service providers, thereby improving coordination, accountability, and the long-term sustainability of rural water services.

Finally, the study contributed to academic knowledge by providing local empirical evidence on the four dimensions of community participation and their influence on the sustainability of rural water services in Walungu Territory, a rural and fragile context where research remains limited. The study also provided evidence that may guide future research using Arnstein's Ladder of Citizen Participation and Sustainability Theory in similar contexts.

1.8 Scope and Delimitation of the study

The study was conducted in Walungu Territory, South Kivu Province, Democratic Republic of Congo. It focused on four selected rural water interventions implemented in communities within Walungu Territory, including the « Projet d'extension et de consolidation de la gestion des systèmes d'approvisionnement en eau potable et assainissement dans la province du Sud-Kivu (PROGEAU – Sud-Kivu) », implemented from 2017, and the « Réseau d'adduction d'eau de Mumosho », inaugurated in 2016, together with two selected community water supply systems within the study area. The selected interventions had been implemented for several years, which provided an appropriate basis for examining the sustainability of rural water services over time. The study covered beneficiaries of the selected water services, WASH committee members, local leaders, and other stakeholders involved in their management and maintenance.

The household results were pooled across the selected communities; the study did not conduct a project-by-project comparison. The findings describe the surveyed setting in 2026 and do not demonstrate changes in each project over its entire operating period.

The independent variable was community participation, examined through decision-making, capacity building, operation and maintenance, and ownership and sense of responsibility. The dependent variable was sustainability of project outcomes, operationalised through household reports of reliability, maintenance, continued functionality and the usefulness of water services. This was a perception-based assessment of continuing benefits, not a longitudinal technical audit or a comprehensive evaluation of financial, environmental and institutional sustainability.

Geographically, the study was limited to Walungu Territory and did not cover all rural water interventions in South Kivu Province or the DRC. Other factors that may influence sustainability, including technical design, environmental conditions, political factors, and broader economic conditions, were recognized but were not analyzed because the study specifically focused on community participation.

1.9 Limitations of the Study

The study had certain limitations that may have influenced its findings. First, the study was conducted in selected rural water project communities in Walungu Territory. Although these sites provided relevant insights into community participation and sustainability, the findings may not be fully generalizable to all rural water projects, particularly those operating under different social, institutional, or environmental conditions.

Second, data were collected through questionnaires and interviews and therefore relied partly on respondents' perceptions and experiences. As in most social research, responses may have been

subject to recall bias or social desirability bias, particularly when respondents reported on their level of participation or the functionality of water services. Some respondents may therefore have overstated or understated their responses.

Third, the cross-sectional design measured participation and reported outcomes at one point in time. It cannot establish temporal order, distinguish cause from consequence, or demonstrate that reported functionality persisted over the life of a project. Households were analysed in aggregate, so the results do not establish differences between the four projects.

Fourth, the regression explained only 4.8% of variation in the sustainability score. Most observed variation remained unexplained by the measured participation dimensions. This may reflect omitted determinants, measurement error or limitations of the model specification; the analysis cannot establish that a particular omitted factor accounts for the remaining variation.

Finally, logistical, time, and communication constraints may have affected data collection. Accessing some rural communities was challenging because of limited infrastructure. Some respondents also preferred to communicate in their local language, creating potential language and communication barriers. Although research assistants assisted with translation, some nuances may have been lost during interpretation.

Despite these limitations, the researcher used appropriate measures to reduce their impact, including careful design of the research tools, triangulation of data sources, and clear documentation of the data collection procedures.

A further measurement limitation is that some item labels in the results differ in direction from those in the questionnaire. The outcome table also presents six items although the questionnaire contains seven. These discrepancies, together with differences between reported composites and

the averages of displayed item means, limit interpretation of the composite scores and inferential results.

1.10 Conceptual Framework

The conceptual model developed for this research was based upon the concept that sustainability of rural water and sanitation service delivery was reliant not solely on the technical quality of infrastructure, but also upon the degree to which the community was involved throughout all stages of the project development process.

Using Arnstein's Ladder of Citizen Participation and Sustainability Theory, the model showed how much the local people's share in things helped rural Water projects do well, during the whole of their existence.

As Arnstein's theory has it, local people could be involved in projects to differing extents; from little to none, to being totally in charge. The research, working with this idea, named four main parts to participation: the local people being in on decisions; local people getting the ability and training they required; the local people being in on running and keeping up the projects; and the local people truly owning the projects and feeling they had to look after them. These parts showed useful ways in which local people could affect how water projects worked out, as time went on.

Sustainability Theory built on this framework by demonstrating that long-term service delivery was contingent upon many more than the technical design of a system alone. Good financial plans, working town or city organizations, and people being willing to have it, were all needed to get services going for good. So, even though a water or cleaning system might have been put together in a good, correct way, it would not have been able to give services which lasted if the people who

were helped by it did not have the ability, money, ways of organizing themselves, and the wish to look after the systems properly.

By linking the four participation dimensions to the sustainability factors, the framework assisted in illustrating how community participation could support or limit the longevity of rural water services in Walungu Territory.

In general, the conceptual framework provided an organized structure for assessing the relationships between the independent variable, community participation, and the dependent variable, the sustainability of rural water services. The framework further served as a guide for the study by identifying the pathways through which community participation could either enhance or reduce long-term service delivery.

CONCEPTUAL FRAMEWORK

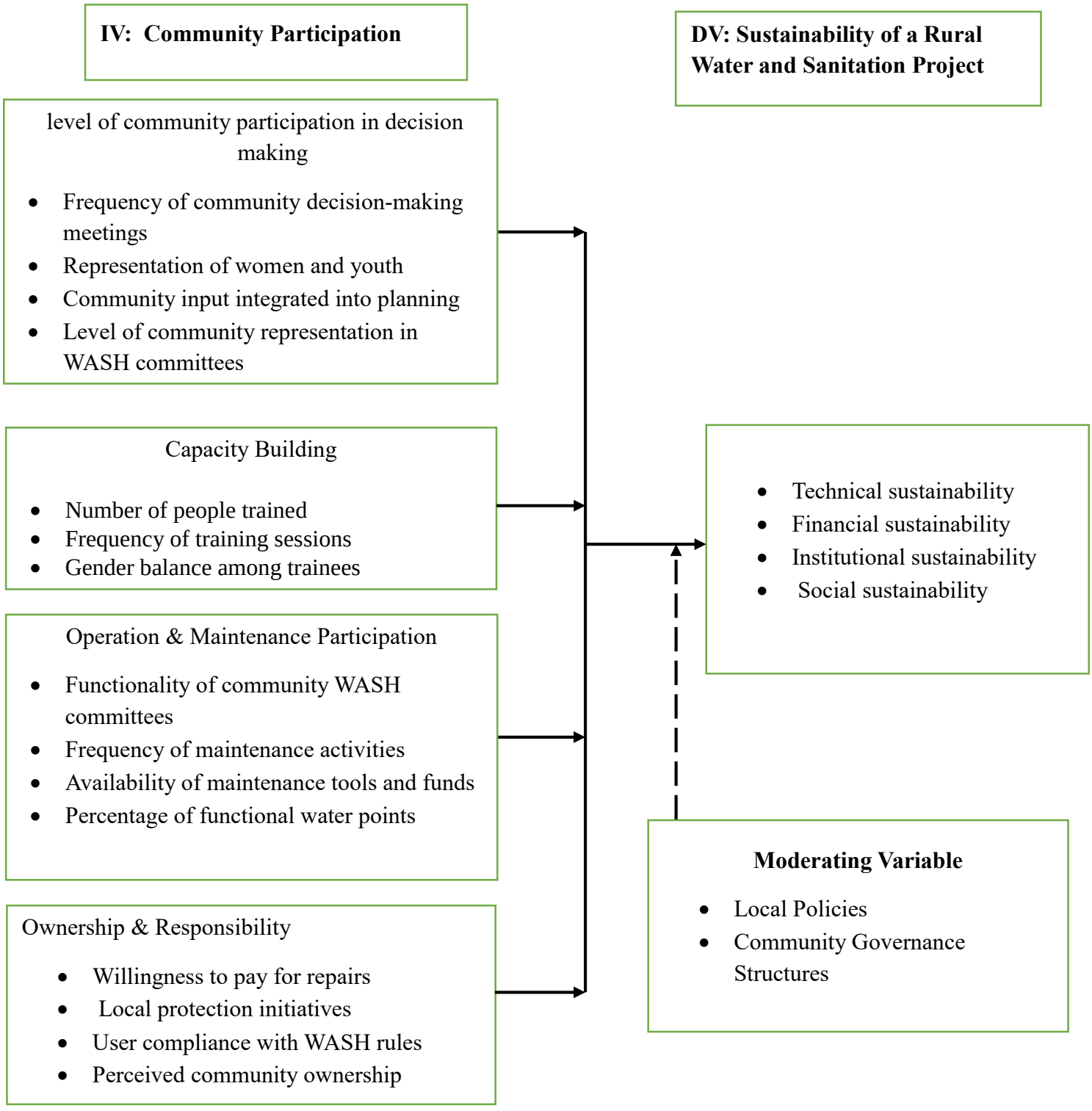


Figure 1: Conceptual framework

1.11 Definition of Key Terms

1. Capacity building

Capacity building refers to organized efforts to improve the knowledge and skills of community members so that they can effectively participate in the management of community services. In this study, capacity building referred to the knowledge and skills provided to community members to enable them to operate, manage, and maintain rural water services effectively over time.

2. Community participation

Community participation refers to the active involvement of community members in activities and decisions that affect their community. It may involve sharing ideas, participating in activities, accepting responsibilities, and influencing decisions. In this study, community participation was operationalized through four dimensions: involvement in decision-making, capacity building and training, participation in operation and maintenance, and ownership and sense of responsibility.

3. Decision making involvement

Decision-making involvement refers to the participation of individuals or groups in decisions concerning issues that affect them. In this study, it referred to the involvement of community members in setting project priorities, choosing water technologies, selecting project locations, and developing rules for managing rural water services.

4. Operation and maintenance

Operation and maintenance refers to the involvement of users in activities required to keep a system functional and in good condition. In this study, it referred to the direct involvement of

community members in activities such as cleaning water facilities, carrying out minor repairs, and monitoring the performance of rural water systems.

5. Ownership and sense of responsibility

Ownership and sense of responsibility refer to the extent to which individuals identify with something and accept responsibility for its protection and continued functioning. In this study, it referred to the extent to which community members considered the rural water facilities as their responsibility, including their willingness to protect the infrastructure, contribute to its maintenance, and take responsibility for its long-term use.

6. Sustainability of project outcomes

Sustainability of project outcomes refers to the continuation of a project's intended benefits beyond implementation. In this study, it referred to household-reported reliability, maintenance, continued functioning and usefulness of rural water services. The questionnaire also includes beliefs about participation and household wellbeing; these should be distinguished from direct measures of sustained performance. The measure does not constitute a technical assessment of water quality or proof of future functionality.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter explores literature on community participation and the sustainability of rural water and sanitation services. It presents the theoretical perspectives that guide the study and reviews literature on sustainability of project outcomes. The chapter further examines empirical studies linking key dimensions of community participation to sustainability outcomes. It concludes by identifying gaps in the literature that the present study seeks to address.

2.1 Theoretical Framework

The study draws on Arnstein's Ladder of Citizen Participation and Sustainability Theory to examine community participation and the continuation of benefits from rural water projects. The two perspectives guide the analysis of participation practices and sustainability outcomes without assuming that participation necessarily guarantees lasting benefits.

2.1.1 Arnstein's Ladder of Citizen Participation

Sherry Arnstein's Ladder of Citizen Participation is a model used to examine differences in community influence over development decisions; this is particularly true in the case of local, community-level provisions like those for rural water and sanitation (Arnstein, 1969; Foster et al., 2021; Le Gouais & Wach, 2021).

The ladder shows participation as a hierarchy, going from no participation, through superficial participation, and up to actual authority for the people. The framework proposes that development

will probably be better if communities really affect and govern choices which concern them (Arnstein, 1969; Foster et al., 2021).

In rural water, sanitation and hygiene (WASH) projects, a number of pieces of research point to more lasting results when communities participate at greater levels. When people are included in the planning, choosing and running of things, WASH services are more prone to working properly for a long time (Truslove et al., 2020; Niyongabo et al., 2022; Foster et al., 2021). Studies also reveal that getting communities actively to take part raises backing for operation and keeping-up work, and this assists in improving the long-run performance of rural WASH provisions (Le Gouais & Wach, 2021).

Arnstein's theory was relevant to the four dimensions of community participation examined in this study. Decision-making involvement reflected the extent to which community members had opportunities to influence project decisions rather than simply being informed or consulted. Capacity building and training supported communities with the knowledge and skills required for more meaningful participation. Operation and maintenance participation reflected practical involvement in managing and maintaining water services, while ownership and sense of responsibility reflected the extent to which communities accepted responsibility for the continued functioning of the services. Together, these dimensions allowed the study to examine community participation beyond simple attendance or consultation.

However, Arnstein's Ladder has limitations when applied to rural WASH projects. Its hierarchical structure may suggest that higher levels of participation are always preferable, although the appropriate level and form of participation may vary according to the local context, institutional arrangements, and the nature of the activity. The model also focuses mainly on the distribution of

power between citizens and institutions and does not directly explain whether services remain technically, financially, or institutionally sustainable over time.

Despite these limitations, the theory was useful in this study because it provided a framework for examining the nature and extent of community participation. It therefore supported the analysis of the independent variable through decision-making, capacity building and training, operation and maintenance, and ownership and sense of responsibility.

Arnstein's ladder concerns the distribution of decision-making power; the four dimensions in this study are not equivalent to four rungs of that ladder. Training may enable participation without transferring authority, and maintenance work may occur even where communities have little control over budgets. Hutchings (2018), examining rural water provision in India, treats service delivery as a relationship between citizens and the state. This provides a useful counterpoint to a purely hierarchical reading of participation: meaningful responsibility may require continued institutional support rather than community control of every task.

2.1.2 Sustainability Theory

Sustainability Theory provides a framework for examining how a development intervention can keep on delivering benefits over time with appropriate arrangements for continuing support (United Nations, 2021). Today, sustainability is understood as more than just having good infrastructure. It also involves technical, financial, institutional, and social factors that help services continue to work reliably over time (Bonsor et al., 2020; United Nations, 2021). In the WASH sector, sustainability is now seen as a systems issue rather than only a technical one. This

means that infrastructure alone cannot guarantee long-term service delivery (WHO & UNICEF, 2022; Foster et al., 2021).

Recent studies show that even well-built water and sanitation facilities may not last if the systems that support them are weak. When local institutions lack capacity, financial arrangements are poor, and communities do not have the skills to manage services, WASH systems often fail earlier than expected (WHO & UNICEF, 2022; Truslove et al., 2020; Foster et al., 2021).

Sustainability Theory was directly related to the dependent variable of this study, sustainability of rural water services. In this study, sustainability was examined through functionality, financing, institutional and management arrangements, and community satisfaction. These considerations reflected the understanding that sustainability goes beyond the physical functionality of water infrastructure and includes the conditions required for services to continue operating and meeting community needs over time (Foster et al., 2021; Marks et al., 2018).

A limitation of applying Sustainability Theory in this study is that the sustainability of rural water services cannot be explained by community participation alone. Rural water sustainability is influenced by several interacting technical, financial, institutional, management, and community factors (Marks et al., 2018). Therefore, although the theory provided a useful framework for understanding sustainability, other factors beyond the community participation dimensions examined in this study may also influence sustainability.

Despite this limitation, Sustainability Theory was applicable because it provided a framework for understanding the dependent variable as a multidimensional outcome, rather than simply considering whether water infrastructure remained physically functional.

The two theories complemented each other in this study. Arnstein's Ladder provided the theoretical basis for understanding community participation, the independent variable, while Sustainability Theory provided the basis for understanding sustainability of rural water services, the dependent variable. Together, the theories provided a framework for examining how decision-making involvement, capacity building and training, operation and maintenance participation, and ownership and sense of responsibility influenced the sustainability of rural water services in Walungu Territory.

The sustainability perspective is used here as an organising framework rather than a single predictive law. Purvis et al. (2019) trace the diverse origins of the social, economic and environmental pillars and show why their application requires explicit definitions. In this study, continued functionality and reliable benefits are the measured outcomes, while financing and institutional arrangements help explain the conditions under which those benefits may persist. Arnstein's ladder addresses the quality of community influence; the sustainability perspective addresses the continuation of benefits. Their combination does not imply that participation automatically produces sustainable outcomes.

2.2. Empirical Literature Review

This section presents a review of empirical studies related to community participation and the sustainability of rural water and sanitation services. It focuses on existing evidence on key variables of the study, including community participation in decision-making, capacity building, participation in operation and maintenance, and community ownership. The review highlights findings from different contexts in order to establish what is already known, identify inconsistencies, and locate gaps that justify the present study.

2.2.1 Sustainability of Project Outcomes in Rural Water Projects

Sustainability of rural water service delivery refers to the ability of water systems to continue providing safe, reliable, and accessible services over time with appropriate continuing management and support. Global frameworks emphasize that sustainability is not limited to infrastructure functionality, but also includes financial viability, institutional effectiveness, and social acceptance within communities (WHO & UNICEF, 2022; United Nations, 2021).

From a technical perspective, many rural water systems fail due to inadequate maintenance and the use of technologies that are not suited to local conditions. Studies show that even well-constructed systems often break down when routine maintenance is not carried out or when users lack the technical capacity to manage minor repairs (Foster et al., 2021; Cronk & Bartram, 2020). This suggests that technical sustainability depends not only on infrastructure quality, but also on the capacity of local users to maintain and manage systems effectively.

Financial sustainability remains a major challenge in rural water service delivery. Evidence indicates that many systems fail because of weak cost-recovery mechanisms and irregular financial contributions from users (Truslove et al., 2020; World Bank, 2021). Without reliable financial arrangements, communities are often unable to carry out timely repairs, leading to system deterioration. However, studies also show that willingness to pay is closely linked to users' sense of ownership and involvement in decision-making processes (Le Gouais & Wach, 2021). This highlights the strong relationship between financial sustainability and community engagement.

Institutional sustainability is associated with the presence of effective local management structures, such as water user committees. Research shows that systems are more likely to remain

functional when responsibilities are clearly defined and when local institutions are active and accountable (Lockwood & Smits, 2019; UNICEF, 2022). In contrast, weak institutional arrangements often result in poor coordination, mismanagement of funds, and lack of monitoring, which negatively affect long-term service delivery. This indicates that strong institutional support is essential for sustaining services beyond the implementation phase.

Social sustainability focuses on how communities perceive and interact with water services. Studies suggest that systems are more sustainable when they respond to local needs, are culturally acceptable, and consider gender roles in water use and management (Niyongabo et al., 2022; Schouten & Moriarty, 2021). When users perceive services as inappropriate or inequitable, their willingness to contribute to maintenance decreases. This shows that social acceptance plays a key role in sustaining services, even when technical and financial conditions are adequate.

Overall, the literature shows that sustainability of rural water services is influenced by the interaction of technical, financial, institutional, and social factors. However, many studies examine these dimensions separately, with limited attention to how they interact in specific local contexts. This creates a need for more context-specific research to better understand how these factors jointly influence sustainability outcomes, particularly in rural areas such as Walungu Territory.

Outcome definitions also affect comparisons among studies. Gaiffe et al. (2023) developed an index of piped-water service quality in Uvira, bringing together dimensions of supply performance. Such an index is more detailed than a single functional/non-functional observation, but its urban piped-system context differs from the rural sources considered here. The implication for the present study is to distinguish reported continuity and functionality from technical water-quality assessment: favourable household perceptions cannot by themselves establish that water is safe or that infrastructure will remain functional.

Marks et al. (2018) used fuzzy-set qualitative comparative analysis of 20 rural water cases and identified different combinations of conditions associated with sustained functionality. User participation and financial management were common features, but the relevant management arrangements differed across service models. This contrasts with an expectation that one participation variable will have the same relationship with sustainability everywhere. Their comparative approach identifies combinations of conditions; the present regression estimates average associations within the sampled Walungu households and cannot reproduce that type of causal comparison.

2.2.2 Community Participation in Rural water Projects

Community participation is now a central principle in the planning and management of rural water projects (WHO & UNICEF, 2022; United Nations, 2021; World Bank, 2021).

Recent literature shows that WASH services are more sustainable when communities are actively involved throughout the project cycle, including planning, implementation, and post-installation stages (WHO & UNICEF, 2022). Communities are therefore not passive beneficiaries but key stakeholders in ensuring long-term sustainability of water and sanitation services (Foster et al., 2021; Niyongabo et al., 2022; Truslove et al., 2020).

Research in rural contexts indicates that community participation may relate to sustainability through several pathways, including being involved in decision-making, access to capacity building and training, participation in operation and maintenance activities and a strong sense of ownership and responsibility (Truslove et al., 2020). The following subsections review recent literature related to each of these dimensions.

A systematic review by Hutchings et al. (2015) examined successful community-managed rural water supplies across 174 cases. Its emphasis on enabling conditions and external support suggests that community management should be assessed together with the resources and institutions that sustain it. However, a review of successful cases cannot estimate how often those conditions produce success across all projects. Le Gouais and Wach (2013), in their analysis of rural water policy documents, likewise show the need to examine how responsibilities and support are framed. Policy prescriptions provide useful context, but they are not equivalent to evidence of implementation or measured household outcomes.

2.2.2.1 Community Involvement in Decision-Making in Sustainability of Project Outcomes in Rural Water Projects

At the global level, community participation in decision-making is widely recognized as an important component of sustainable rural water and sanitation services. International frameworks emphasize the involvement of users in identifying needs, selecting sites and technologies, establishing management rules, and influencing project design (WHO & UNICEF, 2022; United Nations, 2021). However, empirical evidence shows that participation does not always produce the same outcomes. Foster et al. (2021) found that community participation can support rural water functionality, but its effectiveness depends on the management and support systems surrounding communities. Similarly, Truslove et al. (2020) showed that community management alone may not ensure sustainable services when financial, technical, and institutional support is inadequate. These studies therefore agree on the potential value of participation but also show that participation alone cannot guarantee sustainability.

At the African level, particularly in Sub-Saharan Africa, studies also show differences between formal participation and meaningful community influence. Le Gouais and Wach (2021) found that participatory processes do not necessarily provide communities with substantial influence over important project decisions, while Niyongabo et al. (2022) associated stronger community involvement with improved local management of rural water services. These findings suggest that simply consulting communities may not be sufficient. The extent to which communities actually influence decisions concerning technology, financing, management, and maintenance appears to be important. The African literature therefore generally supports participation but differs on whether community involvement alone is sufficient to produce sustainable outcomes.

At the national level, evidence from the Democratic Republic of Congo provides a more complex picture. Guiteras et al. (2021) evaluated a community-driven WASH intervention through a cluster-randomized controlled trial covering 121 village clusters across several DRC provinces, including South Kivu. The intervention improved some water and sanitation outcomes overall, but the researchers found no evidence of effects on the primary outcomes in the South Kivu subgroup. This finding is important because it shows that a community-driven approach that produces results in one setting may not necessarily generate the same outcomes in another.

Other DRC evidence similarly questions the assumption that community management automatically leads to better outcomes. String et al. (2020), using a mixed-methods study of community-managed Water Safety Plans in DRC and three other countries, combined 816 household surveys, 256 key-informant interviews and focus groups, and 1,099 water-quality samples. They found some improvements in communities' capacity to manage water supplies, but no overall improvement in microbiological water quality. The authors concluded that community-managed systems still require adequate technical and financial support. This contrasts with

approaches that treat community participation itself as sufficient and reinforces the importance of examining what communities actually do and the support available to them.

At the South Kivu level, Bengibabuya and Karemere (2022) examined community participation in the Programme Écoles et Villages Assainis in the Bunyakiri Health Zone. Their study focused specifically on participation and community ownership within a South Kivu WASH programme and highlighted the importance of involving communities in project processes for local appropriation. This evidence is particularly relevant because it comes from the same province as Walungu and addresses participation within a fragile rural context rather than assuming that evidence from other African countries applies directly to South Kivu.

Evidence from the wider DRC also shows that community participation has to be considered together with local governance. A recent cluster-randomized evaluation of the Healthy Villages and Schools programme, conducted across 332 rural villages in five DRC provinces including South Kivu, assessed not only water and sanitation outcomes but also local WASH institutions. Governance indicators included water committees, committee meetings, maintenance planning, management of funds, confidence in management, and responses to infrastructure breakdowns. This demonstrates that community participation in rural WASH involves more than consultation; it also concerns how communities participate in the institutions responsible for managing services over time.

At the local level, Walungu Territory reflects many of the rural water management challenges observed elsewhere in South Kivu. Rural WASH interventions have been implemented in the territory, while concerns about the continued functionality and management of water services remain. However, compared with the growing evidence available at the DRC and South Kivu levels, empirical studies specifically examining how community involvement in decision-making

influences the sustainability of rural water services in Walungu remain limited. This makes it difficult to assume that findings from other DRC provinces, or even other parts of South Kivu, apply directly to Walungu (Bengibabuya & Karemere, 2022; Guiteras et al., 2021).

Overall, the literature generally agrees that community involvement can support rural water management, but the empirical findings are not uniform. Some studies associate meaningful participation with stronger management and ownership, while others show that community-driven approaches do not automatically improve service outcomes and may remain dependent on financial, technical, and institutional support (Le Gouais & Wach, 2021; String et al., 2020; Guiteras et al., 2021). Differences in study contexts and methodologies also matter: evidence ranges from qualitative and mixed-methods studies of community management to large cluster-randomized evaluations across DRC provinces. Therefore, the literature supports examining not merely whether communities participate, but how they participate and whether they have meaningful involvement in decision-making (Truslove et al., 2020; Le Gouais & Wach, 2021). The limited evidence specifically from Walungu justified examining this relationship within the local context.

Marks et al. (2014) examined 200 rural Ghanaian communities using household surveys, engineering assessments and interviews. Deeper involvement in planning was associated with handpump sustainability, whereas wider participation alone was not. The distinction between management decisions and technical choices is particularly relevant to Walungu: attendance at a meeting does not necessarily show influence over consequential decisions. Unlike the Ghana study, the present household survey does not include an independent engineering assessment, so the strength and meaning of the outcome measures should be considered when comparing findings.

Quattrochi et al. (2021) evaluated a community-driven WASH programme through a cluster-randomised trial in rural DRC. Its intervention design provides a stronger basis for assessing programme effects than a cross-sectional association, but its programme-level outcomes do not isolate the four participation dimensions measured here. Together with the Ghana evidence, it supports distinguishing the effects of a complete intervention from the associations of individual participation practices. Neither study supplies a substitute estimate for the selected Walungu communities.

2.2.2.2 Capacity Building and Sustainability of Service delivery

At the global level, recent studies show that capacity building is important for the sustainability of rural water services. Capacity building helps communities develop the technical, managerial, financial, and organizational skills needed to operate, manage, and maintain water systems (WHO & UNICEF, 2022; United Nations, 2023). These skills become particularly important when external project support reduces or ends and communities are expected to take greater responsibility for the services. However, training alone does not guarantee sustainability because communities may still need financial resources, appropriate management structures, technical assistance, and institutional support (Foster et al., 2021; WHO & UNICEF, 2023). This suggests that capacity building can prepare communities to manage rural water services, but its effectiveness also depends on the conditions under which these skills are used.

At the African level, recent empirical evidence shows that limited community capacity can create challenges for the sustainability of rural water facilities. Kativhu et al. (2021), in a study of community-managed water facilities in Zimbabwe, found that only 46% of Water Point Committees had received community-based management training. The study also identified

weaknesses in technical, financial, and institutional capacity among community management structures (Kativhu et al., 2021). This shows that providing infrastructure without sufficiently preparing the people responsible for managing it may create difficulties for long-term sustainability. It also shows that community participation becomes more meaningful when people have the knowledge and skills required to perform the responsibilities given to them.

The African evidence also shows that the continuity of training is important. Kativhu et al. (2021) found that training was largely supported by external organizations, creating difficulties for refresher training when donor support was no longer available. This is particularly important because committee membership can change and new technical or managerial problems can appear after project implementation. Evidence from rural water programmes in Tanzania also shows that capacity development has included technical and financial management skills to strengthen local water organizations (World Bank, 2022). Both cases show that training should not end when a project is completed. In my view, communities may have difficulties applying their responsibilities over time if the knowledge provided during project implementation is not updated or reinforced when circumstances change (Kativhu et al., 2021; World Bank, 2022).

Capacity building also needs to go beyond technical repairs. Communities and water committees require skills in financial management, leadership, record keeping, monitoring, organization, and operation and maintenance to manage rural water services effectively (Kativhu et al., 2021; World Bank, 2022). This is important because a technically functional water system may still face sustainability problems when those responsible for it cannot organize maintenance, manage available funds, or coordinate community activities. This means that capacity building should not be understood only as teaching communities how to repair infrastructure. It should prepare them

for the different responsibilities involved in managing a water service over time (Kativhu et al., 2021).

At the DRC level, Guiteras et al. (2021) provide useful empirical evidence from a cluster-randomized controlled trial involving 121 village clusters across several provinces, including South Kivu. The community-driven WASH programme included training for community volunteers in areas such as maintenance of water supply systems, sanitation, conflict management, and petty cash management. The intervention improved some intermediate WASH outcomes, but the results were not uniform across locations. In particular, the study found no evidence of effects on the primary outcomes in the South Kivu subgroup (Guiteras et al., 2021). This finding is important because it shows that the presence of training within a community-based programme does not automatically produce the same results everywhere. Local conditions may therefore influence how communities use the knowledge and skills they receive.

A comparison between the African and DRC evidence provides a more balanced understanding of capacity building. Kativhu et al. (2021) identified inadequate training and weaknesses in community capacity as challenges for the management of rural water facilities, whereas Guiteras et al. (2021) showed that an intervention containing community training did not produce uniform outcomes across different locations. The studies do not necessarily contradict each other. Instead, they show that training is important but cannot be separated from the technical, financial, institutional, and local conditions surrounding rural water management. This means that simply asking whether training was provided may not be enough; it is also necessary to consider whether communities participated in that training and whether the training gave them useful skills for their responsibilities (Kativhu et al., 2021; Guiteras et al., 2021).

At the local level, Walungu Territory has experienced WASH interventions involving community participation, sensitization, and activities intended to improve local WASH practices (UNICEF DRC, 2022). However, available evidence from Walungu focuses more on water access, sanitation, hygiene practices, and community sensitization than on whether participation in capacity building and training contributes to the continued functionality and management of rural water services. Evidence from the wider South Kivu context also shows that the outcomes of community-based WASH interventions can differ from those observed elsewhere in the DRC (Guiteras et al., 2021). This makes Walungu an important context to examine separately. Findings from other African countries, or even other parts of the DRC, cannot simply be assumed to apply in the same way to communities in Walungu (Guiteras et al., 2021; UNICEF DRC, 2022).

Overall, the literature shows that capacity building can strengthen the ability of communities to manage rural water services, but the evidence also shows that training alone does not guarantee sustainability. Studies from Africa highlight the importance of technical, financial, managerial, and organizational skills and the need for continued support after initial training (Kativhu et al., 2021; World Bank, 2022). At the same time, evidence from the DRC shows that community-based interventions that include training can produce different results depending on the local context (Guiteras et al., 2021). Taken together, these findings suggest that what matters is not only whether training is provided, but also its quality, relevance, continuity, and the extent to which communities participate and are able to apply what they have learned. However, there is still limited empirical evidence showing how participation in capacity building and training influences the sustainability of rural water services specifically in Walungu Territory. This made it important for the present study to examine this relationship within the local context (Guiteras et al., 2021; UNICEF DRC, 2022).

String et al. (2020) evaluated community-managed Water Safety Plans in India, DRC, Fiji and Vanuatu using interviews, household surveys and water samples. Improved capacity to identify risks did not translate into an overall improvement in microbiological water quality. This is an important qualification to the assumption that training necessarily produces better services: knowledge must be accompanied by resources and practical implementation. The multicountry design broadens the evidence base, but it does not establish which training components would be effective in Walungu. The present study therefore interprets training as one participation dimension rather than as a sufficient condition for sustainability.

2.2.2.3 Operation and Maintenance Participation in Sustainability of service delivery

At the global level, community participation in operation and maintenance is widely recognized as an important part of sustaining rural water services. Operation and maintenance involves activities such as cleaning facilities, monitoring their condition, protecting water sources, carrying out minor repairs, and contributing resources for maintenance (WHO & UNICEF, 2022; United Nations, 2023). These activities are important because rural water infrastructure requires continuous attention after construction, particularly when external project support is reduced or withdrawn. However, recent literature also shows that operation and maintenance is not only a technical issue. It involves financial management, local organization, technical capacity, and access to support when communities cannot solve problems themselves (Hope et al., 2020; WHO & UNICEF, 2023). This shows that building a water facility is only the beginning. Its sustainability

also depends on what happens after construction and how communities participate in keeping the service functional.

At the African level, empirical evidence shows that weaknesses in operation and maintenance can seriously affect rural water sustainability. Kativhu et al. (2021), in a study of community-managed water facilities in Zimbabwe, found problems related to preventive maintenance, technical skills, availability of spare parts, financial resources, and the functioning of Water Point Committees. The study also showed that some communities continued to depend on external institutions for technical support and materials needed to maintain their facilities (Kativhu et al., 2021). This suggests that giving communities responsibility for operation and maintenance is not enough. Communities also need the skills, resources, and management structures required to carry out that responsibility effectively.

Financial participation is another important part of operation and maintenance. Hope et al. (2020), examining the economics of rural water services in Africa, questioned the heavy dependence on community-based management when communities are expected to finance services with limited and irregular resources. Their analysis showed that sustainable rural water services require more reliable financing arrangements and stronger institutional support rather than depending entirely on community contributions (Hope et al., 2020). This is important because communities may be willing to participate in maintenance but still be unable to finance repairs when the costs are beyond what local users can afford. Therefore, participation should not be understood only as willingness to help, but also in relation to the resources available to make that participation effective.

Recent African evidence also shows that operation and maintenance problems involve several connected factors. Kativhu et al. (2021) found that technical, financial, institutional, and

community-management weaknesses affected the sustainability of rural water facilities in Zimbabwe. Hope et al. (2020), from a broader African perspective, similarly showed that community management needs stronger professional and financial support if rural water services are expected to remain reliable. The two studies therefore reach a similar conclusion from different perspectives. Kativhu et al. (2021) show the problem at the community and water-point level, while Hope et al. (2020) explain the wider financing and service-delivery problem. Together, they show that effective operation and maintenance depends on both community participation and a support system that communities can rely on when their own capacity is not enough (Hope et al., 2020; Kativhu et al., 2021).

At the DRC level, a particularly relevant empirical study was conducted by Jimenez-Redal et al. (2021) on eight gravity-fed rural water schemes on Idjwi Island. Using face-to-face surveys with 1,105 household heads and a log-linear regression model, the researchers examined willingness to pay for improved operation and maintenance services. More than 92% of respondents expressed a preference for improved water sources and an intention to pay for O&M services, with an average willingness to pay of 327 Congolese Francs per month. However, the amount respondents were willing to pay differed considerably between the eight schemes (Jimenez-Redal et al., 2021). This finding is important because it shows strong community interest in maintaining water services, but it also shows that willingness to contribute is not the same across communities. O&M arrangements therefore need to consider the economic situation and characteristics of the communities they are expected to serve.

The Idjwi study provides another important finding concerning participation. Jimenez-Redal et al. (2021) found that participation in management meetings organized by water committees was associated with higher willingness to pay for improved O&M services. Their qualitative evidence

suggested that people who participated in these meetings became more aware of the financial challenges facing their water systems. At the same time, the researchers found that the amount communities were willing to contribute would not be sufficient to cover the full life-cycle costs of the systems, particularly major repairs and replacement (Jimenez-Redal et al., 2021). This shows an important limitation of community-based O&M. Participation can strengthen awareness and willingness to contribute, but communities cannot always finance all maintenance needs themselves. External financial and technical support may therefore remain necessary even when community participation is strong.

The DRC evidence can also be compared with findings from other African contexts. In Zimbabwe, Kativhu et al. (2021) identified weaknesses in local technical and financial capacity as challenges to sustainable community management, while the Idjwi study showed that communities expressed strong demand for improved O&M services but could not necessarily finance all the costs required to sustain them (Jimenez-Redal et al., 2021). Hope et al. (2020) similarly questioned models that place most financial responsibility for rural water services on communities. These findings support each other but from different contexts and methods. They suggest that the main question is not simply whether communities participate in operation and maintenance, but whether their participation is supported by sufficient technical capacity, financing, management structures, and external assistance when necessary (Hope et al., 2020; Kativhu et al., 2021; Jimenez-Redal et al., 2021).

At the South Kivu level, the Idjwi evidence is particularly relevant because it comes from the same province as Walungu and from a rural and fragile context. Jimenez-Redal et al. (2021) found that deficiencies in O&M had contributed to some water points becoming non-functional, forcing users to spend more time reaching functioning improved water sources. The study also showed that

participation in management meetings and local financing arrangements were connected to users' willingness to support improved O&M services. This brings the literature closer to the context of the present study because it shows that operation and maintenance challenges are not only a general African problem but are also present within South Kivu. However, Idjwi and Walungu have different local conditions, and findings from Idjwi cannot automatically be assumed to represent communities in Walungu (Jimenez-Redal et al., 2021).

At the local level, Walungu Territory has experienced rural WASH interventions in which communities have been expected to participate in the management and continued use of water facilities (UNICEF DRC, 2022). However, available evidence from Walungu provides more information on water access, sanitation, hygiene, and community activities than on the specific relationship between participation in routine operation and maintenance and the long-term sustainability of rural water services. This is different from the Idjwi study, which specifically examined O&M financing and community willingness to support maintenance services (Jimenez-Redal et al., 2021). This difference shows an important gap in the available evidence. Although O&M problems have been studied within South Kivu, there is still limited empirical evidence showing how the actual participation of communities in activities such as monitoring, cleaning, minor repairs, and maintenance contributes to the sustainability of rural water services specifically in Walungu Territory (Jimenez-Redal et al., 2021; UNICEF DRC, 2022).

Overall, the literature shows that community participation in operation and maintenance is important for rural water sustainability, but the evidence does not support the idea that participation alone is sufficient. Studies from Africa show that communities face technical, financial, institutional, and management challenges that can limit their ability to maintain rural water facilities (Hope et al., 2020; Kativhu et al., 2021). More specifically, empirical evidence from

South Kivu shows that communities can demonstrate strong interest in improved O&M and willingness to contribute financially while still being unable to meet the full costs required for long-term maintenance (Jimenez-Redal et al., 2021). Taken together, these findings show that effective O&M requires more than assigning maintenance responsibilities to communities. What matters is whether communities actively participate and whether they have the technical skills, maintenance funds, management structures, spare parts, and external support needed to keep services functioning over time. The limited evidence on this relationship specifically in Walungu therefore made it important for the present study to examine how community participation in operation and maintenance influenced the sustainability of rural water services in the territory (Hope et al., 2020; Kativhu et al., 2021; Jimenez-Redal et al., 2021).

Foster (2013) analysed more than 25,000 community-managed handpumps in Liberia, Sierra Leone and Uganda. System age, distance from administrative centres and the absence of user-fee collection were associated with non-functionality across the three countries. The large facility-level dataset strengthens the evidence that maintenance conditions extend beyond community attitudes. Nevertheless, observational functionality data cannot establish the causal effect of each arrangement, and handpump findings may not transfer directly to gravity-fed schemes or springs. These differences help explain why the present analysis treats operation and maintenance as important but not comprehensive.

Jimenez-Redal et al. (2021) examined willingness to pay for improved operation and maintenance on Idjwi Island in South Kivu. This offers a closer geographical comparison than studies from other African regions, while measuring willingness rather than observed long-term payment or system survival. Truslove et al. (2020), studying rural water tariffs in Malawi, distinguish

affordability from the revenue required for operation and maintenance. Read together, the studies suggest that willingness to contribute and the adequacy of financing should be assessed separately. Neither allows willingness or committee membership alone to be treated as proof of sustainable maintenance.

Kativhu, Madzivanyika, et al. (2022) examine the sustainability of community-managed water facilities in Zimbabwe, directing attention to management and the conditions under which communities operate. Kativhu, Mazvimavi, and Tevera (2021) focus on multiple water uses and sustainability in communally managed systems. Their different emphases show that the relationship between community involvement and performance depends partly on the demands placed on a system. For Walungu, this supports examining practical maintenance needs alongside participation, while avoiding direct generalisation from a different institutional and technological setting.

2.2.2.4 Ownership and Sense of Responsibility in Sustainability of Service delivery

At the global level, community ownership and a sense of responsibility are widely recognized as important aspects of sustainable rural water services. Community ownership refers to the extent to which users consider water facilities as systems for which they have responsibility, while a sense of responsibility is reflected in their willingness to protect, manage, and contribute to the continued functioning of these systems (WHO & UNICEF, 2022; United Nations, 2023). However, recent literature shows that ownership should not simply be assumed because a project has been transferred to a community. It develops through the way communities participate in the planning, management, and continued use of rural water services (Whaley & Cleaver, 2017; Marks et al., 2018). This suggests that ownership is more meaningful when it is reflected in what communities actually do to protect and sustain their water services.

At the African level, evidence shows that community responsibility is closely connected to the way rural water systems are managed. Kativhu et al. (2021), in their study of community-managed water facilities in Zimbabwe, found that the sustainability of water facilities was affected by the functioning of Water Point Committees, community involvement, technical capacity, and financial arrangements. Their findings showed that communities had management responsibilities but continued to face difficulties where local structures and resources were weak (Kativhu et al., 2021). This shows that giving a community responsibility for a water facility does not automatically create effective ownership. Communities also need functioning structures that allow them to exercise that responsibility.

Evidence from rural Africa also shows that ownership needs to be considered together with financial responsibility. Hope et al. (2020) examined rural water financing in Africa and showed the limitations of relying heavily on communities to finance and manage rural water services. Community-based management often expects users to contribute financially to operation and maintenance, but local revenue may be insufficient to meet the full costs of reliable service provision (Hope et al., 2020). This creates an important distinction between responsibility and capacity. A community may feel responsible for its water service and be willing to contribute, but this does not necessarily mean that it has enough resources to sustain the system without additional support.

African studies also suggest that ownership is connected to meaningful participation rather than simply the formal existence of community management structures. Marks et al. (2018), in a comparative analysis of 20 rural water programmes, found that user participation in project decisions and good financial management appeared across the identified pathways to sustained functionality, although these factors operated together with management capacity, technical

resources, and post-construction support. This means that participation and responsibility can contribute to sustainability, but they work together with other conditions rather than independently (Marks et al., 2018). In my view, this helps explain why the presence of a water committee or the formal transfer of a facility to a community should not automatically be interpreted as strong ownership. What matters is whether community members actually participate and accept responsibility for the continued management of the service.

At the DRC level, Guiteras et al. (2021) provide empirical evidence from a cluster-randomized controlled trial involving 121 village clusters across several provinces, including South Kivu. The community-driven WASH intervention was designed to involve communities in identifying WASH problems, developing local responses, and taking responsibility for improvements. However, although some intermediate WASH outcomes improved, the results were not uniform across locations, and no evidence of effects on the primary outcomes was found in the South Kivu subgroup (Guiteras et al., 2021). This is important because it shows that encouraging community responsibility within a programme does not automatically produce the same outcomes in every setting. The way ownership develops may depend on the local social, institutional, and economic context.

Evidence from South Kivu provides a more direct view of community responsibility. Jimenez-Redal et al. (2021), using face-to-face surveys with 1,105 household heads across eight gravity-fed rural water schemes on Idjwi Island, found that more than 92% of respondents expressed an intention to pay for improved operation and maintenance services. Participation in meetings organized by water committees was also associated with higher willingness to pay. However, the amount communities were willing to contribute was not sufficient to cover the full life-cycle costs of the water systems (Jimenez-Redal et al., 2021). This finding shows that responsibility can be

expressed through willingness to contribute, but willingness alone does not remove financial limitations. Strong ownership therefore needs to be supported by realistic financial and institutional arrangements.

The South Kivu evidence can be compared with findings from other African contexts. While Kativhu et al. (2021) showed that community responsibility was affected by weaknesses in management structures and resources in Zimbabwe, Jimenez-Redal et al. (2021) found considerable willingness among households in Idjwi to contribute towards improved maintenance services. Hope et al. (2020), however, showed that community financing alone is often insufficient for reliable rural water service delivery in Africa. These studies therefore provide a more balanced picture of ownership. Communities can accept responsibility and be willing to contribute, but their ability to translate this responsibility into sustainable services depends on the resources, management arrangements, and support available to them (Hope et al., 2020; Kativhu et al., 2021; Jimenez-Redal et al., 2021).

At the local level, community participation has formed part of WASH interventions implemented in Walungu Territory, including activities intended to strengthen community involvement in water, sanitation, and hygiene practices (UNICEF DRC, 2022). However, the available evidence provides limited empirical information on whether communities perceive rural water facilities as their responsibility, protect the infrastructure, contribute to maintenance, and remain involved in its long-term management. This differs from the Idjwi evidence, where willingness to contribute financially and participation in water committee meetings were directly examined (Jimenez-Redal et al., 2021). This shows that evidence from South Kivu cannot simply be generalized to Walungu. There is still a need to understand how ownership and responsibility are expressed by communities

in Walungu and whether they are associated with the sustainability of rural water services (Jimenez-Redal et al., 2021; UNICEF DRC, 2022).

Overall, the literature shows that community ownership and responsibility can support rural water sustainability, but the relationship is more complex than simply transferring infrastructure to communities. Comparative evidence shows that meaningful participation, functioning management structures, willingness to contribute, financial capacity, and continued institutional support all influence how community responsibility is translated into practice (Marks et al., 2018; Hope et al., 2020; Kativhu et al., 2021; Jimenez-Redal et al., 2021). Taken together, these findings suggest that ownership should be understood through the actions communities take and the responsibilities they accept, rather than simply through the formal designation of a water facility as community-managed. At the same time, communities may demonstrate responsibility without having all the resources needed to sustain a service independently. The limited empirical evidence specifically examining this relationship in Walungu therefore made it important for the present study to assess how community ownership and sense of responsibility influenced the sustainability of rural water services in the territory (Hope et al., 2020; Jimenez-Redal et al., 2021; UNICEF DRC, 2022).

Marks and Davis (2012) distinguish participation from the sense of ownership it may generate in rural Kenya. Marks, Onda, and Davis (2013) then examine whether that sense of ownership is related to system sustainability. Treating these as separate questions is useful: contributing labour or attending meetings is not identical to psychological ownership, and psychological ownership is not identical to performance. The present ownership items cover identification, protection and willingness to contribute; they should therefore be interpreted as related but potentially distinct

aspects of responsibility. The Kenyan evidence supports examining these distinctions rather than assuming that formal handover creates effective local ownership.

2.3 Research gap

Previous studies have provided important evidence on the relationship between community participation and the sustainability of rural water services. However, their findings are not always consistent. Some studies show that community participation can strengthen local management and sustainability, while others show that participation alone does not guarantee sustainable outcomes when technical, financial, and institutional support is weak (Hope et al., 2020; Kativhu et al., 2021; Guiteras et al., 2021). Evidence from South Kivu also shows that communities may be willing to contribute to the management and maintenance of water services while still lacking sufficient resources to meet their long-term needs (Jimenez-Redal et al., 2021). The empirical gap therefore lies not in the absence of evidence on community participation, but in the limited and sometimes mixed evidence on how specific forms of participation influence the sustainability of rural water services. This made it important for the present study to examine these relationships rather than assume that participation automatically leads to sustainability.

A conceptual gap is also evident in the way community participation has been examined. Previous studies have often discussed community participation or community management broadly, or concentrated on particular aspects such as maintenance, financing, water committees, or participation in project decisions (Marks et al., 2018; Hope et al., 2020; Kativhu et al., 2021). This makes it difficult to understand whether different dimensions of participation contribute to sustainability in the same way. The present study addressed this gap by examining community participation through four specific dimensions: decision-making, capacity building and training,

operation and maintenance, and ownership and sense of responsibility. Examining these dimensions separately provided a clearer way of understanding where community participation may or may not be associated with the sustainability of rural water services.

There is also an important contextual gap. Although empirical studies have been conducted in the DRC and South Kivu, they have not specifically established the relationship between the four dimensions of community participation examined in this study and the sustainability of rural water services in Walungu Territory. For example, Guiteras et al. (2021) included South Kivu in a multi-province evaluation of a community-driven WASH intervention, while Jimenez-Redal et al. (2021) examined operation and maintenance financing on Idjwi Island. These studies provide important evidence from the wider context, but their findings cannot automatically be applied to Walungu. The contextual gap is therefore not simply a lack of research in South Kivu, but the limited evidence specifically explaining community participation and rural water sustainability in Walungu Territory (Guiteras et al., 2021; Jimenez-Redal et al., 2021).

A methodological gap can also be identified from the reviewed empirical studies. Previous research has used different approaches depending on the issue being investigated. Guiteras et al. (2021), for example, used a cluster-randomized controlled trial across 121 village clusters, while Jimenez-Redal et al. (2021) used household surveys and regression analysis to examine willingness to pay for improved operation and maintenance services. Kativhu et al. (2021), on the other hand, examined community-managed water facilities using evidence from households, Water Point Committees, and other stakeholders. These methodological differences have generated useful evidence, but they have generally addressed particular interventions or aspects of rural water management rather than examining the four dimensions of community participation together within the specific context of Walungu. The present study addressed this methodological gap by

using a convergent parallel mixed-methods design, combining quantitative and qualitative evidence to examine community participation and sustainability within the same study.

The study addresses the empirical, conceptual, contextual and methodological gaps above by examining four distinct participation dimensions in Walungu and integrating household and interview evidence. Its cross-sectional, aggregate analysis can identify associations and contextual explanations, but cannot establish causation or compare project trajectories over time.

2.4 Summary of the Literature Review and Research Gap

This chapter reviewed theoretical and empirical evidence about community participation and the sustainability of rural water and sanitation services (WHO & UNICEF, 2022; United Nations, 2023). The review was organised around the study objectives and addressed theories of participation and sustainability, the concept of sustainable water and sanitation service delivery, and the different ways communities can get involved in rural water and sanitation projects (Lockwood & Smits, 2019; Foster et al., 2021).

Discussion using Arnstein's Ladder of Citizen Participation shows that real participation is more important than simply seeming to participate (Arnstein, 1969; Le Gouais & Wach, 2021). Research also shows that development projects have a better chance of success if communities are truly involved in decisions and are able to influence what happens in the project (Truslove et al., 2020; Foster et al., 2021). This is particularly true for rural water and sanitation projects, as the long-term success of services mostly depends on how communities take part in planning, managing, and maintaining systems (WHO & UNICEF, 2022; Lockwood & Smits, 2020).

Looking at Sustainability Theory also makes it clear that infrastructure alone is not enough to make services last (Bonsor et al., 2020; United Nations, 2021). The literature shows that rural water and sanitation systems are more likely to be sustained when technical aspects are supported by strong institutions, reliable financing, and community acceptance (WHO & UNICEF, 2022; Foster et al., 2021). If any of these elements are weak, systems are likely to fail, even if the project was well implemented at the beginning (Truslove et al., 2020; Fisher et al., 2022).

Studies reviewed in this chapter confirm that sustainability is often linked to stronger community participation (Foster et al., 2021; Lockwood & Smits, 2019). Research suggests that when communities are involved in decision-making, water and sanitation projects are more likely to reflect local needs and conditions (Truslove et al., 2020; Niyongabo et al., 2022). In addition, capacity building improve the ability of communities to manage and maintain systems over time (WHO & UNICEF, 2022; UNICEF, 2022). Participation in operation and maintenance is also necessary to keep facilities functioning, while community ownership influences user behaviour, willingness to contribute financially, and long-term commitment to sustainability (Le Gouais & Wach, 2021; Foster et al., 2021). However, the literature also shows that participation is often limited, inconsistent, or poorly implemented, which reduces its effectiveness in supporting sustainability (Smits et al., 2020; Danert et al., 2021).

At the same time, the chapter identified important gaps in existing knowledge. Many studies focus on only one dimension of community participation, such as decision-making or operation and maintenance, without clearly showing how different forms of participation interact within the same project (Lockwood & Smits, 2019; Foster et al., 2021). In addition, studies conducted at national or regional levels often do not reflect the realities of participation at the local level in specific areas (Truslove et al., 2020; Fisher et al., 2022). In Walungu Territory, South Kivu Province, several water and sanitation projects have been implemented by different organizations, yet levels of participation and sustainability vary across projects (UNICEF DRC, 2022; Mercy Corps, 2021). However, existing studies do not fully explain these variations.

Furthermore, research on rural water and sanitation service delivery remains limited in fragile and conflict-affected contexts such as eastern Democratic Republic of the Congo, where insecurity, weak governance, limited institutional capacity, and high dependence on external support may

influence community participation (World Bank, 2021; UNICEF DRC, 2022). As a result, there is still limited empirical evidence explaining how different dimensions of community participation, decision-making, capacity building and training, participation in operation and maintenance, and community ownership interact to influence the sustainability of water and sanitation services in such contexts.

Because of these gaps, this study focuses on analyzing how these different dimensions of community participation influence the sustainability of rural water and sanitation services in Walungu Territory, South Kivu Province, Democratic Republic of the Congo. By examining multiple projects within the same area, the study aims to provide context-specific evidence that can contribute to strengthening participatory approaches and improving long-term sustainability.

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 Introduction

This chapter explains the methods used to study the relationship between community participation and the sustainability of rural water services in Walungu Territory, South Kivu Province, DRC. It presents the research design, describes the study area, and explains how the participants were selected. The chapter also discusses the tools and procedures used to collect and analyze data, and it highlights the ethical issues considered during the research.

3.1 Research Design

This study adopted a **convergent parallel design** which is a **mixed method approach** to examine the relationship between community participation and the sustainability of rural water services delivery in Walungu Territory, South Kivu Province, DRC. The study combined both **quantitative and qualitative approaches**. The quantitative approach focused on measuring levels of community participation and sustainability outcomes across households, while the qualitative approach explored the experiences, perceptions, and practices of key actors involved in service delivery.

The convergent parallel design allowed for the collection of quantitative and qualitative data at the same time, followed by separate analysis and integration of results during interpretation. Both types of data were given equal importance in order to provide a more comprehensive understanding of the research problem.

This design was appropriate for the study because it allowed efficient data collection within the same period, reduced the need for repeated field visits, and enhanced the validity of findings through triangulation. It also provided complementary insights, where quantitative data offered measurable patterns while qualitative data provided deeper understanding of community experiences. Generally, the convergent parallel design was a good fit for this research as it offered an orderly method of bringing together evidence from both numerical and interview-based sources. This helped the researcher to make reliable and context-based conclusions about how community participation contributed to the sustainability of rural water and sanitation services.

Integration was organised around the four objectives by comparing numerical patterns with interview accounts of the same participation dimension. Agreement and differences were considered together, rather than using quotations as proof of a statistical relationship. This approach is consistent with the distinction made by Fetters et al. (2013) between collecting two types of data and integrating them during interpretation and reporting.

3.2 Study Area

This study was conducted in Walungu Territory, located in South Kivu Province in the eastern part of the Democratic Republic of the Congo. Walungu territory is mainly a rural area, and most people depend on agriculture for their daily living. Many communities still rely on natural water sources such as springs and rivers, and access to improved water and sanitation services is still limited.

In this study, four rural WASH projects in Walungu Territory were selected in order to examine how community participation affected the sustainability of rural water service delivery.

3.3 Target Population

The sampling calculation used an estimated 3,600 households, derived from an estimated 18,000 inhabitants divided by an assumed mean household size of five. These figures were attributed in the study records to local administrative information. They are planning estimates for the intended study communities, not verified census totals for Walungu Territory.

The intended target population comprised households in the selected water project communities. The accessible population comprised households included in the local lists used for fieldwork. A household was the unit of analysis, and the household member completing the questionnaire was the unit of observation. Key informants formed a separate purposive qualitative sample. The estimation of 3,600 households and the actual coverage of the sampling frame should be distinguished when considering representativeness.

Another principal target population category was members of community water and sanitation committees. In Walungu Territory, a typical rural water and sanitation facility is managed by a committee with 5 to 7 members. According to information from partners and local authorities, Walungu Territory has 25 rural water facilities. This has resulted in an estimated 150 WASH committee members (on average, six members per committee) in Walungu. The responsibilities of these people included operation and maintenance, management of contributions from users, enforcement of laws, and repairs coordination. The respondents included local leaders like village elders and community development workers who mobilized communities and helped with WASH activities. Walungu Territory has about 12 villages, which means on average, each has 3 or 4 local

leaders carrying out development activities. This made for an approximate total of 40 local leaders who were targeted.

The target population also included local administrative authorities that supervise or inspect water, sanitation, and hygiene projects. Officials at the sector level, health zone representatives and water and sanitation focal persons. The said group, based on administrative structures in Walungu Territory, was estimated at 15 officials. Ultimately, representatives from various NGOs and local development actors that engage in, or support implementation of, rural water in Walungu Territory were included. At the time of the study, around 5 NGOs were working in the WASH sector in the area with an estimated 10 staff involved directly at the community level in WASH-related activities. The defined target population encompassed service users, management structures, leadership and institutional actors, facilitating an assessment of community participation and sustainability of rural water and sanitation services.

Table 3.1: Target population

Target Population Category	**Description**	**Estimated number**	**Relevance to the study/ basis of estimation**
Households (WASH users)	Community members using rural water and sanitation facilities	**3,600 households**	Based on an estimated population of 18000 inhabitants (average household size of 5). Provide user level information on service reliability, accessibility, maintenance practices and participation.
Water and saniation Committee Members	Individuals responsible for operation, maintenance, management of user contributions, and enforcement of rules	**≈150 people**	Estimated from approximately 25 rural water and sanitation facilities with an average of 6 committee members per facility. Provide insights into governance and sustainability challenges.

Local leaders	Village elders and community development representatives involved in mobilization and oversight	**≈40 persons**	Based on about 12 villages with 3–4 leaders per village. Offer perspectives on leadership, participation facilitation, and conflict resolution.
Local Authorities	Administrative and sector-level officials supervising or inspecting WASH projects	**≈15 persons**	Includes health zone representatives, water and sanitation focal points, and sector authorities. Provide institutional and policy-level perspectives.
NGOs / Development Actors	Staff of NGOs and local organizations supporting or implementing WASH projects	**≈10 persons**	Based on approximately 5 NGOs active in the area with 1–2 relevant staff each. Help contextualize participation within implementation frameworks.

3.4 Sample Size and Sampling procedures

This section describes how the sample for the study was determined and how respondents were selected from the target population.

3.4.1 Sample Size Determination

The household sample calculation used N = 3,600 as the planning population described in Section 3.3.

Households constituted the main unit of analysis because they were the primary users of rural water and sanitation services. The sample size was therefore determined using the total number of households.

Using the Yamane (1967) expression with e = .05, the sample target was calculated as follows:

$n = N / (1 + Ne^2) = 3,600 / [1 + 3,600(0.05^2)] = 3,600 / 10 = 360$ households.

Where:

- n = sample size
- N = total number of households
- e = margin of error (0.05)

The target was therefore 360 households. This calculation assumes a suitable sampling frame and does not itself correct for household clustering, non-response or inaccuracies in the population estimate.

The qualitative target was 35 key informants: 15 water committee members, 10 local leaders, five local authorities and five NGO staff. These role-based targets gave greater representation to actors directly involved in local management while including supervisory and implementation perspectives. They were not proportional allocations derived from the household formula, and no documented saturation assessment is used to justify the final number.

Table 3.2: Sample size

Category	**Target Population (Estimated)**	**Selected Sample**
Households (WASH users)	3,600 households	**360**
WASH Committee Members	≈150 persons	**15**
Local Leaders	≈40 persons	**10**
Local Authorities	≈15 persons	**5**
NGOs / Development Actors	≈10 persons	**5**

3.4.2 Sampling Procedures

In accordance with the mixed methods research approach and the study's objectives, two sampling techniques were used in this study. The sample of 360 household respondents was selected using simple random sampling. A sampling frame was developed from updated local community records of households served by rural water facilities in the selected study areas. These records were obtained from village registers and WASH committee lists. Each household in the sampling frame was assigned a unique identification number. A random selection of households was then carried out using a random number generator, ensuring that every household had an equal and independent chance of being selected for the study.

This method was selected to minimize selection bias and to ensure that the sample was representative of the wider population of water service users in the study area. Based on local administrative estimates and project records, it was approximated that about 65–75% of households in the selected communities had access to improved water and sanitation services, although the level of functionality and reliability varies across locations.

Purposive sampling was used to select key informants, including water committee members, local leaders, local authorities, and non-governmental organization staff. Key informants were selected based on their direct involvement in the planning, management, operation, and supervision of rural water projects.

Because of the roles they play, they were able to provide detailed, experience-based information on participation processes, governance arrangements, and management challenges, which cannot easily be obtained through household surveys.

The use of simple random sampling for households and purposive sampling for key informants allowed the study to capture both community-level perspectives and institutional insights. This combined sampling approach was therefore appropriate for addressing the research objectives and analyzing how different forms of community participation influence the sustainability of rural water service delivery.

3.5 Data Collection Instruments

In this study, data were collected using two instruments: a questionnaire and an interview guide. The following sections describe each instrument in detail.

3.5.1 Questionnaire

The questionnaire was carefully designed to collect quantitative data from household respondents. The instrument was structured to capture information on the key dimensions of community participation and their influence on the sustainability of rural water services. In total, the questionnaire contained structured close-ended and Likert scale questions.

The questionnaire was divided into several sections. Part I consisted of demographic information, including questions on gender, age, education level, household size, and length of stay in the community. This section helped to contextualize the responses and allowed for comparison across different categories of respondents.

Part II focused on access to water services. This section included questions related to the type of water source used, functionality of the system and frequency of system breakdowns. These questions provided a general understanding of the current situation of WASH services in the study area.

Part III was organized into five main sections aligned with the study variables. Each section contained a set of Likert-scale statements where respondents indicated their level of agreement.

Section A focused on community participation in decision-making, examining the extent to which community members were involved in planning, decision-making processes, and feedback mechanisms.

Section B addressed training and capacity building, with questions related to access to training, adequacy of skills, and the role of training in improving system management.

Section C explored participation in operation and maintenance, including community involvement in routine maintenance, repairs, and financial contributions.

Section D examined community ownership and sense of responsibility, focusing on perceptions of ownership, willingness to contribute, and protection of WASH facilities.

Section E focused on the sustainability of rural water services, including system reliability, maintenance practices, and long-term functionality.

The questionnaire was adapted from existing literature on community participation and WASH sustainability, and it was contextualized to reflect the socio-economic and institutional realities of Walungu Territory. It was administered through face-to-face interviews to ensure clarity and to accommodate respondents with different literacy levels.

3.5.2 Interview Guide

The researcher designed interview guides to collect qualitative data from key informants, including water committee members, local leaders, local authorities, and representatives of NGOs involved in WASH service delivery.

The interview guide was structured around key thematic areas derived from the study objectives and variables. These themes included community participation in decision-making, capacity building, participation in operation and maintenance, and community ownership and sense of responsibility.

In addition, the guide explored broader issues related to the sustainability of rural water services, including system functionality, governance challenges, financial management, and institutional support. Participants were also asked to share their experiences, challenges, and perceptions regarding community participation and service sustainability.

The semi-structured nature of the interview guide allowed flexibility for probing and follow-up questions, enabling the researcher to capture detailed and context-specific insights. Respondents were also given the opportunity to provide recommendations on how community participation could be strengthened to improve sustainability outcomes.

The purpose of the interview guide was to generate in-depth information that complements the quantitative data and provides a deeper understanding of the processes influencing sustainability in rural WASH projects.

3.5.3 Validity of the Instruments

To establish the validity of the research instruments, several strategies were employed.

First, content validity was ensured through expert review. The questionnaire and interview guide were examined by the research supervisors and experts in the field of WASH and project management to assess whether the instruments adequately captured the study variables and objectives. Their feedback was used to refine the instruments.

A pretest in a community with characteristics similar to the study area was used to assess the clarity and relevance of questions. Feedback informed minor wording changes before main fieldwork. The pretest is distinct from the 35-person key informant sample.

Construct validity was also ensured by aligning all questionnaire items and interview questions with the conceptual framework and key variables of the study. Clear operational definitions of concepts such as community participation and sustainability were maintained to ensure consistency in interpretation.

The use of both quantitative and qualitative instruments further strengthened validity through triangulation, as data collected from different sources could be compared and verified.

3.5.4 Reliability of the Instruments

Reliability concerns consistency of measurement. Cronbach's alpha was used as an indicator of internal consistency among items intended to form a scale, rather than as evidence of stability over time or of validity.

The reported alpha coefficients ranged from .762 to .847, with an overall value of .831 (Table 3.3). These exceed the conventional .70 reference value used in the study. Their interpretation depends on the item set, scoring direction and sample used for estimation. A high alpha does not establish that items measure a single construct, and an overall alpha across different constructs should not be treated as proof of one coherent scale.

In addition, standardized procedures were followed during data collection. The researcher and research assistants were trained on how to administer the questionnaire consistently to minimize variations and reduce interviewer bias.

No test–retest coefficient is reported; consequently, the study does not claim demonstrated temporal stability.

For qualitative data, reliability was enhanced through the use of a structured interview guide, consistent questioning, and careful documentation of responses. This ensured that similar information was collected across different participants.

The reliability evidence is therefore limited to the reported internal consistency estimates and procedural efforts to administer the instruments consistently.

Table 3.3: Reliability of the instruments

Variable	Number of Items	Cronbach's Alpha
Decision Making	7	0.762
Capacity Building	7	0.804
Operation and Maintenance	6	0.847
Community Ownership	8	0.798
Sustainability of Rural Water Services	7	0.812
Overall Cronbach's Alpha	**35**	**0.831**

Source: Pilot survey data 2026

3.6 Data Collection Procedures

Data collection began once the researcher had secured all required research approvals and permissions from relevant local authorities. Only then fielded activities start. Before entering the field, the researcher oriented and trained the research assistant. This training focused on the study objectives, ethical considerations, and the proper administration of data collection tools. Clear guidance at this stage helped ensure consistency and data quality.

Household questionnaires were used to collect quantitative data from selected respondents in the study communities. Data was gathered through face-to-face interviews conducted at respondents' homes. The researcher and trained enumerators administered the questionnaires directly. This

approach helped respondents better understand the questions and improved the accuracy of recoded responses, particularly among participants with limited literacy.

After each interview, the field staff reviewed the completed questionnaire on site. Completeness and internal consistency were checked before leaving the household. At the same time, qualitative data were collected through interviews with key informants. These included members of water and sanitation committees, community leaders, local authorities, and representatives of organizations involved in rural water service delivery. Interviews were conducted at locations convenient to the respondents, using a semi-structured interview guide. With participants' consent, the researcher took notes and made audio recordings.

In addition, relevant project documents were reviewed using a document review checklist. This review provided supplementary information on project implementation processes, community participation mechanisms, and sustainability outcomes.

All data collected were stored systematically and securely in preparation for analysis.

3.7 Data Analysis Techniques

Data for this study were analyzed using both quantitative and qualitative data analysis

techniques, in line with the convergent parallel mixed methods design. At first, numbers and words were looked at on their own. Then, the results from each were putted together when we worked out what everything means, so that we got a really good, full idea of what the results showed.

3.7.1 Quantitative Data Analysis

Quantitative data were coded and entered into Statistical Package for the Social Sciences (SPSS) SPSS version 27 to be analyzed. Coding sticked to the study's variables and indicators the ones in the conceptual framework.

Descriptive statistics was used to summarize the data: that is, frequencies and percentages for things put into categories, and averages and standard deviations for answers on the Likert scales. This analysis showed what community participation was like, and what the sustainability of rural water services was.

Inferential statistics were additionally employed to look at what community participation and sustainability had to do with each other. The correlation analysis showed how strong and in what direction the relationship between variables was. Multiple regression analysis was then performed to determine the influence of the different dimensions of community participation on the sustainability of rural water services. The results were presented using tables to facilitate interpretation and discussion.

3.7.2 Qualitative Data Analysis

Interview recordings were transcribed and prepared as text files. The study reports using Orange, version 3.40.0, to assist the organisation and exploration of text. The substantive analysis was thematic and was undertaken by the researcher.

Recurring terms and lexical patterns were used as aids to locating relevant material. They were not treated as themes in themselves. Themes were interpreted in relation to the objectives and the context of participants' accounts. Orange's role was therefore exploratory support rather than an autonomous qualitative coding procedure.

Thematic interpretation requires attention to patterns of meaning within participants' accounts, not only to the frequency of words. Braun and Clarke (2006) provide a methodological basis for this distinction. Orange supported exploration of text; responsibility for interpreting themes and linking quotations to the research objectives remained with the researcher.

Key themes included participation in decision-making, capacity building and training, involvement in operation and maintenance, community ownership and sense of responsibility, and the sustainability of rural water and sanitation service delivery.

The software outputs supported the organization and classification of themes, while interpretation was conducted by the researcher. Findings were presented in narrative form and supported by selected quotations to illustrate how community participation influences the sustainability of rural water services.

3.8 Ethical Considerations

During the research process, ethical principles were strictly followed to safeguard the rights, safety and dignity of participants. Before carrying out the data collection, the researcher obtained the official permission from community authorities and university as well to do the study on the selected communities. All participants were sufficiently informed about the study that, its goal, the procedures and what it entails with regards to their participation. Participants were informed that

participation in the study was entirely voluntary. They were free to refuse to participate in the study and withdraw at any stage without penalty or negative consequences.

Before administering questionnaires or conducting interviews, the respondents were given informed consent. The study-maintained confidentiality and anonymity. Only the information relevant to each behavior was recorded on the data collection tool. In lieu of personal identifiers, codes were used to protect the respondents. Anyone who provided information had it kept confidential and treated solely for the academic research purpose. The information gathered during the research was safeguarded in password-protected electronic files and stored securely in hard copy. The data access was only be limited to the researcher's team only.

The data collected in this study was kept confidential and was not shared with anyone who was not authorized. All results were reported in a general way so that no individual participant or community could be identified. Participants were protected from any physical, psychological, or social harm during the entire study. The research questions were asked in a respectful manner and in a way that was acceptable for the local culture. Interviews were conducted at a time chosen by the participants and in a place where they felt comfortable. Respect, neutrality and sensitivity to local norms and values was maintained throughout the research process.

CHAPTER FOUR: DATA ANALYSIS, PRESENTATIONS AND INTERPRETATIONS

4.0 Introduction

This chapter presents the results from the questionnaires and interviews. The findings are structured according to the four thematic areas identified in the research objectives and aligned with the conceptual framework: decision making involvement, capacity building, operation & maintenance and ownership & participation. Descriptive and inferential analyses are used to provide both a statistical and narrative understanding of the data.

4.1 Participation Response Rate

Of 360 questionnaires administered, 344 were returned complete, giving a response rate of 95.6%. The remaining 16 questionnaires were not returned or were incomplete. The high response rate reduces the scale of missing participation but does not rule out non-response bias: non-respondents may have had different participation experiences or service conditions. No comparison of respondents and non-respondents is available.

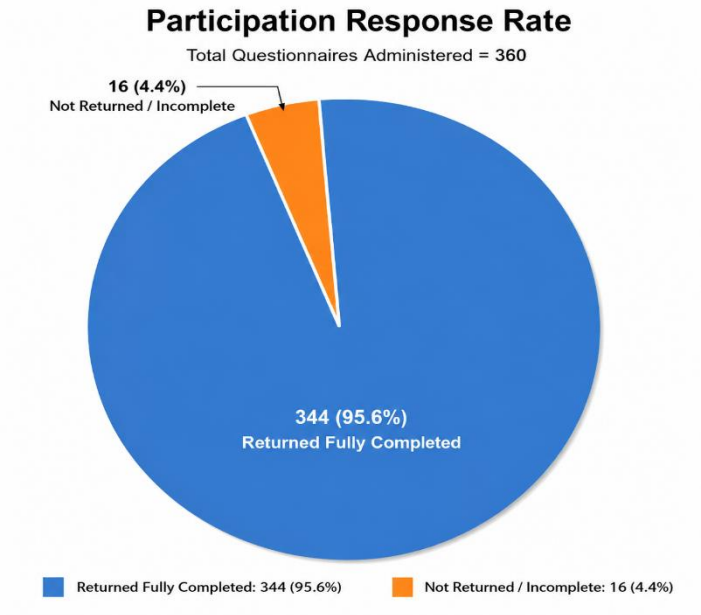


Figure 1: Participation rate

4.2 Background Information

This section presents the demographic characteristics of the respondents including gender and age.

4.2.1 Gender Distribution

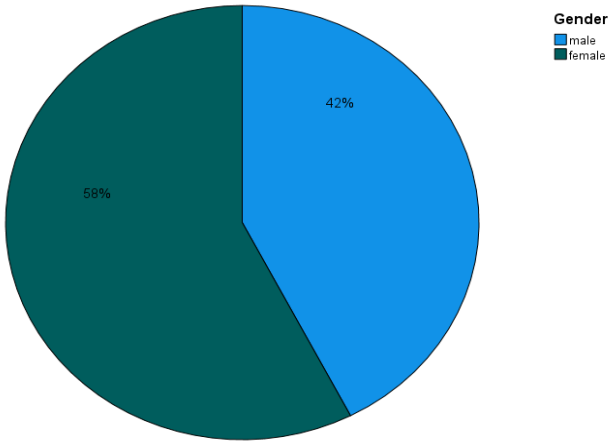


Figure 2: Gender distribution

Figure 3 shows that female respondents constituted the majority of the study participants. This may reflect the important role women play in household water management and hygiene practices in rural communities. The inclusion of both female and male respondents ensured that the study captured diverse perspectives on community participation and the sustainability of rural water and sanitation services.

4.2.2 Age

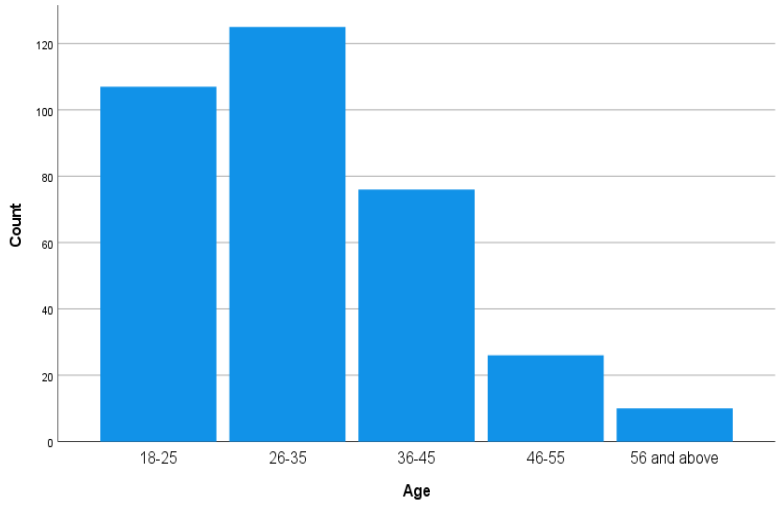


Figure 3: Age

Figure 4. shows the age distribution of the respondents. Most participants were between 26 and 35 years old, followed by those aged 18–25 years. Respondents in the 36–45 years age group also made up a noticeable proportion of the sample, while those aged 46–55 years and 56 years and above were fewer in number.

This distribution indicates that the study mainly captured the views of young and middle-aged adults, who formed the largest part of the sample. At the same time, the inclusion of respondents from older age groups provided additional perspectives, allowing the study to reflect opinions from people of different ages regarding community participation and the sustainability of rural water and sanitation services.

4.2.3 Household size

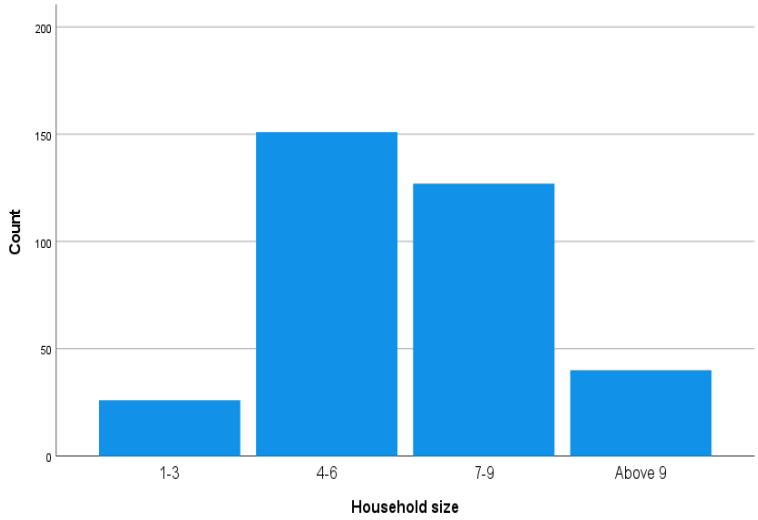


Figure 4: Household size

Figure 5 shows that the majority of respondents lived in households comprising 4–6 members, followed by those with 7–9 members. Households with more than nine members and those with 1–3 members represented much smaller proportions of the sample. Overall, the findings indicate that medium-sized households were the most common among the respondents, reflecting a diversity of household sizes and providing perspectives from different family settings on community participation and the sustainability of rural water and sanitation services.

4.2.4 Length of stay in this community

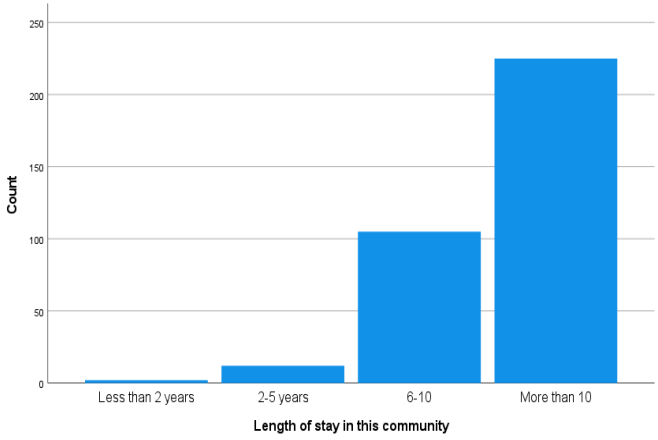


Figure 5: Length of stay in the community

Figure 6 shows that most respondents had lived in their community for more than 10 years, followed by those who had resided there for 6–10 years. Only a few participants had lived in the community for less than six years. This suggests that the majority of respondents had long-term experience within their communities, enabling them to provide informed perspectives on community participation and the sustainability of rural water services.

4.2.5 Main source of drinking water

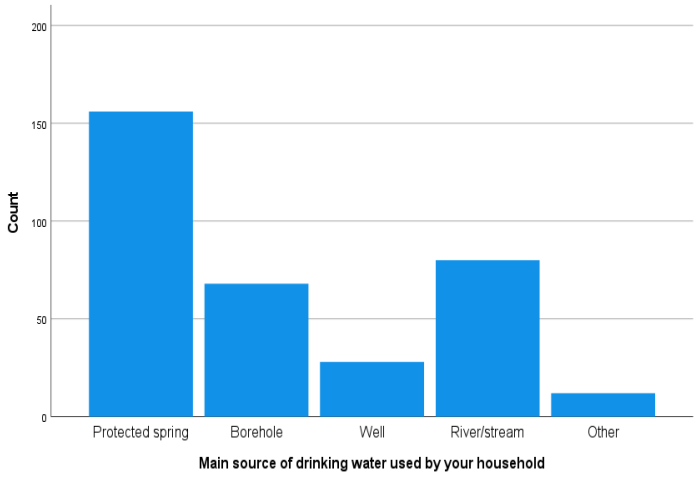


Figure 6: Main source of drinking water

Figure 7 shows that protected springs were the main source of drinking water for most households, followed by rivers/streams and boreholes. Comparatively, only a small proportion of respondents relied on wells or other water sources. This distribution indicates that protected springs remain the primary source of drinking water in the study area, while households also depend on a variety of alternative water sources to meet their daily water needs.

4.2.6 Functionality of Household Drinking Water Sources by Water Source Type

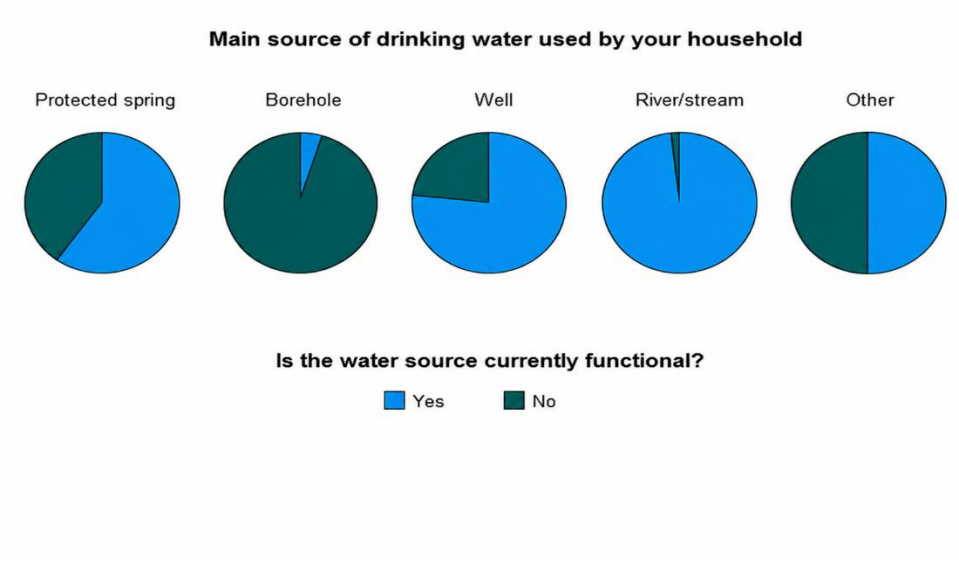


Figure 7: Functionality of Household Drinking Water Sources by Water Source Type

Reported functionality differed by source type. River or stream users reported their sources as functional, whereas boreholes were more frequently reported as non-functional. Availability of water in a river is not equivalent to the operational performance of installed infrastructure or to safe drinking-water quality. These categories should therefore not be treated as directly comparable indicators of project sustainability.

4.2.7 Frequency of Water System Breakdowns

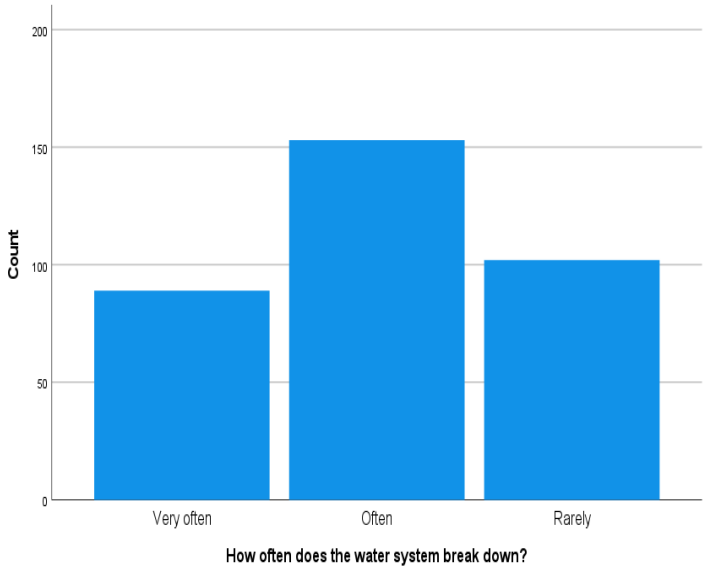


Figure 8: Frequency of Water System Breakdowns

Figure 9 shows that most respondents reported that their water system often breaks down. A considerable proportion indicated that breakdowns occur rarely, while fewer respondents stated that the system breaks down very often. Overall, the findings suggest that water system failures are a common occurrence in the study area, although the frequency of breakdowns varies across communities.

4.3: Community involvement in decision making and the sustainability of service delivery

The first study objective sought to examine how community involvement in decision-making influences the sustainability of rural water services in Walungu Territory. Respondents were requested to indicate their level of agreement with statements relating to community involvement in decision-making using a five-point Likert scale where 1 represented *Strongly Disagree*, 2 *Disagree*, 3 *Neutral*, 4 *Agree*, and 5 *Strongly Agree*. The responses are presented in Table 4.3

Table 4.3: Community involvement in decision-making and sustainability of service delivery

Statements	**SD** **f (%)**	**D** **f (%)**	**N** **f (%)**	**A** **f (%)**	**SA** **f (%)**	**Mean**	**SD**
Local community participation in Water projects has contributed to sustainable water and sanitation services.	11 3.2%	55 16%	104 30.2%	112 32.6%	62 18%	**3.46**	**1.06**
Decisions about water and sanitation facilities consider the opinions of community members.	55 16%	110 32%	122 35.5%	51 14.8%	6 1.7%	**2.54**	**0.99**
Community concerns about water and sanitation services are considered during decision-making.	48 14%	88 25.6%	122 35.5%	62 18%	24 7.0%	**2.78**	**1.11**
Suggestions and concerns raised by community members are not adequately addressed by Water service managers.	12 3.5%	59 17.2%	103 29.9%	117 34%	53 15.4%	**3.41**	**1.05**
Community members are involved in important decisions concerning water facilities.	50 14.5%	101 29.4%	118 34.3%	56 16.3%	19 5.5%	**2.69**	**1.08**

Community participation in decision-making has helped improve the sustainability of water services.	26 7.6%	46 13.4%	109 31.7%	124 36.0%	39 11.3%	**3.30**	**1.08**
Communities are consulted during the planning of water and sanitation projects.	13 3.8%	48 14%	110 32%	118 34.3%	55 16%	**3.45**	**1.04**
Composite Mean and Standard deviation						**3.09**	**0.35**

The findings revealed a composite mean of **3.09** (SD = **0.35**), indicating a moderate level of community involvement in decision-making.

The first statement sought to establish whether local community participation in water projects had contributed to sustainable water and sanitation services. The findings indicate that 50.6% of the respondents either agreed (32.6%) or strongly agreed (18.0%) with the statement, while 19.2% either disagreed (16.0%) or strongly disagreed (3.2%). In addition, 30.2% remained neutral. The mean score of 3.46 (SD = 1.06) indicates a moderate level of agreement among respondents. This finding was further supported by the qualitative findings. M3 stated:

"When community members participate in planning and implementation, they feel responsible for protecting the water facilities and are more willing to contribute to their maintenance. However, the final technical decisions are usually made by the implementing organization."

These findings agree with WHO and UNICEF (2022) and Foster et al. (2021), who reported that meaningful community participation contributes to the sustainability of rural water services.

The second statement sought to establish whether decisions about water and sanitation facilities considered the opinions of community members.

The findings indicate that 48.0% of the respondents either disagreed (32.0%) or strongly disagreed (16.0%), whereas only 16.5% either agreed (14.8%) or strongly agreed (1.7%). A further 35.5% remained neutral. The mean score of 2.54 (SD = 0.99) indicates a relatively low level of agreement. The interview findings were consistent with these results. M7 stated:

"We are invited to meetings and we share our opinions, but the engineers and NGOs make the final decisions."

These findings agree with Foster et al. (2021) and UNICEF DRC (2022), who reported that communities are often consulted but have limited influence over major technical and governance decisions.

The third statement sought to establish whether community concerns about water and sanitation services were considered during decision-making. The findings indicate that 39.6% of the respondents either disagreed (25.6%) or strongly disagreed (14.0%), while 25.0% either agreed (18.0%) or strongly agreed (7.0%). In addition, 35.5% remained neutral. The mean score of 2.78 (SD = 1.11) indicates a relatively low level of agreement. The qualitative findings further supported these results. M12 stated:

"Community members raise their concerns during meetings, but not all of them are considered because of budget limitations and donor requirements."

These findings agree with Truslove et al. (2020) and Le Gouais and Wach (2021), who found that limited consideration of community concerns reduces community commitment and affects the sustainability of rural water services.

The fourth statement sought to establish whether suggestions and concerns raised by community members were not adequately addressed by water service managers. The findings indicate that 49.4% of the respondents either agreed (34.0%) or strongly agreed (15.4%) with the statement, while 20.7% either disagreed (17.2%) or strongly disagreed (3.5%). The remaining 29.9% were neutral. The mean score of 3.41 (SD = 1.05) indicates a moderate level of agreement. Supporting this finding, W5 stated:

"Some of our recommendations are accepted, but many are left out because the project had already been planned and the available budget was limited."

These findings agree with Foster et al. (2021), who reported that community recommendations often have limited influence on final project decisions.

The fifth statement sought to establish whether community members were involved in important decisions concerning water facilities. The findings indicate that 43.9% of the respondents either disagreed (29.4%) or strongly disagreed (14.5%), whereas 21.8% either agreed (16.3%) or strongly agreed (5.5%). A further 34.3% remained neutral. The mean score of 2.69 (SD = 1.08) indicates a relatively low level of agreement. Similarly, M9 stated:

"Our role was mainly to identify community needs and suggest locations, but decisions on budgets and technical designs were made by the project team."

These findings agree with World Bank (2021) and UNICEF DRC (2022), who reported that decision-making authority in many rural WASH projects remains largely outside the communities.

The sixth statement sought to establish whether community participation in decision-making had helped improve the sustainability of water services. The findings indicate that 47.3% of the respondents either agreed (36.0%) or strongly agreed (11.3%), while 21.0% either disagreed

(13.4%) or strongly disagreed (7.6%). In addition, 31.7% remained neutral. The mean score of 3.30 (SD = 1.08) indicates a moderate level of agreement. The qualitative findings also supported this result. M2 stated:

"Communities that are involved in planning are usually more committed to protecting the facilities and supporting maintenance activities after the project is completed."

These findings agree with Niyongabo et al. (2022) and WHO and UNICEF (2022), who reported that community participation contributes to the sustainability of rural water services.

The seventh statement sought to establish whether communities were consulted during the planning of water and sanitation projects. The findings indicate that 50.3% of the respondents either agreed (34.3%) or strongly agreed (16.0%), while 17.8% either disagreed (14.0%) or strongly disagreed (3.8%). The remaining 32.0% were neutral. The mean score of 3.45 (SD = 1.04) indicates a moderate level of agreement. The interview findings further confirmed this result. M15 stated:

"Community meetings were organized before the project started, but the final decisions were taken by the implementing partners after the consultations."

These findings agree with Foster et al. (2021) and Truslove et al. (2020), who argued that consultation alone does not guarantee meaningful participation unless communities influence final project decisions.

Taken together, the quantitative and qualitative findings indicate that community participation in decision-making was generally moderate, with communities being consulted during planning and implementation of water projects. However, responses also revealed that many participants felt their views were not always reflected in final decisions concerning water facilities. This suggests

that participation in the study area remains more consultative than collaborative. Although communities are invited to participate, they may not have sufficient influence over technical, financial and managerial decisions that determine the long-term sustainability of water services. Consequently, participation should not be measured simply by attendance at meetings, but also by the extent to which community opinions influence project outcomes. These findings reinforce the view that meaningful participation requires communities to become active partners in decision-making rather than passive recipients of development interventions.

4.4 Capacity building and the sustainability of service delivery

The second study objective sought to examine how capacity building influences the sustainability of rural water services in Walungu Territory. Respondents were requested to indicate their level of agreement with statements relating to capacity building using a five-point Likert scale where 1 represented *Strongly Disagree*, 2 *Disagree*, 3 *Neutral*, 4 *Agree*, and 5 *Strongly Agree*. The responses are presented in Table 4.4

Table 4.4: Capacity building and the sustainability of service delivery

Statements	**SD** **f (%)**	**D** **f (%)**	**N** **f (%)**	**A** **f (%)**	**SA** **f (%)**	**Mean**	**SD**
Training provided to community members has improved their ability to manage WASH facilities.	17 4.9%	54 15.7%	128 37.25	100 29.1%	45 13.1%	**3.30**	**1.04**
Community members have received enough training on how to use WASH facilities properly.	39 11.3%	77 22.4%	113 32.8%	84 24.4%	31 9%	**2.97**	**1.13**

Training has helped community members respond better when WASH facilities break down.	27 7.8%	62 18%	112 32.6%	100 29.1%	43 12.5%	**3.20**	**1.12**
Community members receive adequate training on the maintenance of water and sanitation facilities.	32 9.3%	71 20.6%	105 30.5%	89 25.9%	47 13.7%	**3.14**	**1.17**
Training and capacity building have contributed to the sustainability of WASH services.	14 4.1%	57 16.6%	131 38.1%	100 29.1%	42 12.2%	**3.29**	**1.01**
Community members know who to contact when technical problems occur.	23 6.7%	80 23.3%	109 31.7%	83 24.1%	49 14.2%	**3.16**	**1.14**
Regular training has improved the maintenance of WASH facilities.	28 8.1%	75 21.8%	104 30.2%	91 26.5%	46 13.4%	**3.15**	**1.15**
Composite Mean and Standard deviation						**3.17**	**0.45**

The findings revealed a composite mean of 3.17 (SD = 0.45), indicating a moderate level of capacity building and training among community members.

The first statement sought to establish whether training provided to community members had improved their ability to manage water facilities. The findings indicate that 42.2% of the respondents either agreed (29.1%) or strongly agreed (13.1%) with the statement, while 20.6% either disagreed (15.7%) or strongly disagreed (4.9%). In addition, 37.2% remained neutral. The mean score was 3.30 (SD = 1.04). This finding was further supported by the qualitative findings. M3 stated:

"Training sessions focused on hygiene promotion, committee management, financial accountability and routine maintenance procedures. These trainings improved local capacities, but resources were insufficient to provide continuous support. Refresher training would be beneficial because knowledge can be lost over time, especially when committee membership changes."

These findings agree with WHO and UNICEF (2022), Foster et al. (2021), and IRC (2021), who reported that capacity building improves communities' ability to manage rural water facilities.

The second statement sought to establish whether community members had received enough training on how to use water facilities properly. The findings indicate that 33.7% of the respondents either disagreed (22.4%) or strongly disagreed (11.3%), whereas 33.4% either agreed (24.4%) or strongly agreed (9.0%). The remaining 32.8% were neutral. The mean score was 2.97 (SD = 1.13). The interview findings were consistent with these results. M6 stated:

"Several trainings were conducted for water committee members and local leaders. These trainings improved management skills and increased understanding of hygiene and sanitation issues. However, the level of training provided was not sufficient to address all challenges that emerged after project completion. Many committee members would benefit from additional technical support."

These findings agree with Le Gouais and Wach (2021), WHO and UNICEF (2022), and UNICEF (2023), who reported that one-off training is often insufficient to ensure the long-term sustainability of rural water services.

The third statement sought to establish whether training had helped community members respond better when water facilities broke down. The findings indicate that 41.6% of the respondents either

agreed (29.1%) or strongly agreed (12.5%), while 25.8% either disagreed (18.0%) or strongly disagreed (7.8%). In addition, 32.6% remained neutral. The mean score was 3.20 (SD = 1.12). The qualitative findings further supported this result. M1 stated:

"The training improved our understanding of how to manage the water system, but it was not sufficient to address all technical problems that may occur."

These findings agree with Truslove et al. (2020), who reported that training enables communities to handle routine maintenance, although complex technical problems often require external support.

The fourth statement sought to establish whether community members received adequate training on the maintenance of water and sanitation facilities. The findings indicate that 39.6% of the respondents either agreed (25.9%) or strongly agreed (13.7%), while 29.9% either disagreed (20.6%) or strongly disagreed (9.3%). The remaining 30.5% were neutral. The mean score was 3.14 (SD = 1.17). Supporting this finding, M10 stated:

"The training improved our ability to support local activities, but additional training would be helpful. Some committee members require more technical knowledge, particularly regarding maintenance and problem-solving. Since project completion, opportunities for further training have been limited."

These findings agree with Foster et al. (2021) and World Bank (2022), who reported that continuous technical training is necessary to strengthen community capacity for maintaining rural water facilities.

The fifth statement sought to establish whether training and capacity building had contributed to the sustainability of water services. The findings indicate that 41.3% of the respondents either

agreed (29.1%) or strongly agreed (12.2%), while 20.7% either disagreed (16.6%) or strongly disagreed (4.1%). In addition, 38.1% remained neutral. The mean score was 3.29 (SD = 1.01). The interview findings further confirmed this result. M2 stated:

"The training was useful because it increased awareness and improved management skills. However, not everyone had the opportunity to participate, and many community members would benefit from additional training."

These findings agree with WHO and UNICEF (2022), United Nations (2023), and Lockwood and Smits (2020), who reported that effective capacity building contributes to the sustainability of rural water services.

The sixth statement sought to establish whether community members knew who to contact when technical problems occurred. The findings indicate that 38.3% of the respondents either agreed (24.1%) or strongly agreed (14.2%), while 30.0% either disagreed (23.3%) or strongly disagreed (6.7%). The remaining 31.7% were neutral. The mean score was 3.16 (SD = 1.14). Similarly, M14 stated:

"Committees organise maintenance activities and contact technicians when needed."

These findings agree with Foster et al. (2021) and IRC (2021), who emphasized the importance of community structures and technical support mechanisms in sustaining rural water services.

The seventh statement sought to establish whether regular training had improved the maintenance of water facilities. The findings indicate that 39.9% of the respondents either agreed (26.5%) or strongly agreed (13.4%), while 29.9% either disagreed (21.8%) or strongly disagreed (8.1%). The remaining 30.2% were neutral. The mean score was 3.15 (SD = 1.15). The qualitative findings also supported this result. M15 stated:

"Training improved community capacity, but additional follow-up would have strengthened results. Refresher training was not always possible because of funding limitations."

These findings agree with Le Gouais and Wach (2021), WHO and UNICEF (2022), and UNICEF (2023), who reported that regular follow-up training is essential for improving the long-term maintenance of rural water facilities.

Overall, the findings indicate that capacity building activities were moderately implemented within the study area. Most respondents acknowledged that training had improved their knowledge and ability to manage water facilities, although many also expressed concerns regarding the adequacy and continuity of such training. This suggests that while capacity building contributes to strengthening community participation, its effectiveness depends on whether knowledge is continuously reinforced after project implementation.

In the context of Walungu Territory, where technical support is often limited after project completion, regular refresher training and continuous mentoring appear essential for sustaining community capacity. Therefore, capacity building should be viewed as a continuous investment in local skills rather than as a one-off activity conducted during project implementation.

4.5 Operation and Maintenance in sustainability of service delivery

The third study objective sought to examine how community participation in operation and maintenance influences the sustainability of rural water and sanitation services in Walungu Territory. Respondents were requested to indicate their level of agreement with statements relating to operation and maintenance using a five-point Likert scale where 1 represented *Strongly*

Disagree, 2 *Disagree*, 3 *Neutral*, 4 *Agree*, and 5 *Strongly Agree*. The responses are presented in Table 4.5

Table 4.5: Operation and maintenance in sustainability of service delivery

Statements	**SD** **f (%)**	**D** **f (%)**	**N** **f (%)**	**A** **f (%)**	**SA** **f (%)**	**Mean**	**SD**
Community members participate in cleaning and maintaining water facilities.	18 5.2%	64 18.6%	133 38.7%	89 25.9%	40 11.6%	**3.20**	**1.04**
There is a community committee responsible for the operation and maintenance of water facilities.	9 2.6%	58 16.9%	83 24.1%	124 36%	70 20.3%	**3.55**	**1.07**
Breakdowns of water facilities are repaired within a reasonable time.	82 23.8%	117 34%	104 30.2%	38 11%	3 0.9%	**2.31**	**0.98**
Community members contribute labour or money for maintenance and repairs.	29 8.4%	83 24.1%	129 37.5%	98 28.5%	5 1.5%	**2.90**	**0.96**
Poor maintenance contributes to frequent breakdowns of water facilities.	1 0.3%	53 15.4%	111 32.3%	81 (23.5%	98 28.5%	**3.65**	**1.06**
When water facilities break down, community members take initiative before external help arrives.	54 15.7%	75 21.8%	107 31.1%	102 29.7%	6 1.7%	**2.80**	**1.08**
Composite Mean and Standard deviation						**3.16**	**0.57**

The findings revealed a composite mean of 3.16 (SD = 0.57), indicating a moderate level of community participation in the operation and maintenance of rural water and sanitation facilities.

The first statement sought to establish whether community members participated in cleaning and maintaining water facilities. The findings indicate that 37.5% of the respondents either agreed (25.9%) or strongly agreed (11.6%) with the statement, while 23.8% either disagreed (18.6%) or strongly disagreed (5.2%). In addition, 38.7% remained neutral. The mean score was 3.20 (SD = 1.04). This finding was further supported by the qualitative findings. M1 stated:

"Community members participate in cleaning activities around the water point and contribute labour when minor repairs are needed. Households are expected to contribute small maintenance fees, although not everyone pays regularly."

These findings agree with WHO and UNICEF (2022), Hutchings et al. (2020), and Schouten and Moriarty (2021), who reported that community participation in routine cleaning and maintenance is essential for sustaining rural WASH services.

The second statement sought to establish whether there was a community committee responsible for the operation and maintenance of water facilities. The findings indicate that 56.3% of the respondents either agreed (36.0%) or strongly agreed (20.3%) with the statement, while 19.5% either disagreed (16.9%) or strongly disagreed (2.6%). The remaining 24.1% were neutral. The mean score was 3.55 (SD = 1.07). The interview findings were consistent with these results. M4 stated:

"The committee is responsible for collecting maintenance contributions from users. These funds are used to cover routine expenses and minor repairs."

These findings agree with IRC (2021), Lockwood and Smits (2020), and Foster et al. (2021), who reported that functional community management committees are fundamental for effective operation and maintenance of rural water systems.

The third statement sought to establish whether breakdowns of water facilities were repaired within a reasonable time. The findings indicate that 57.8% of the respondents either disagreed (34.0%) or strongly disagreed (23.8%) with the statement, whereas only 11.9% either agreed (11.0%) or strongly agreed (0.9%). In addition, 30.2% remained neutral. The mean score was 2.31 (SD = 0.98). Supporting this finding, M8 stated:

"Major breakdowns usually require assistance from external technicians. In some cases, insufficient funds delay repairs and increase the risk of service interruptions." These findings disagree with Truslove et al. (2020) and Danert et al. (2021), who reported that communities actively involved in operation and maintenance generally experience faster repair times and fewer service interruptions.

The fourth statement sought to establish whether community members contributed labour or money for maintenance and repairs. The findings indicate that 30.0% of the respondents either agreed (28.5%) or strongly agreed (1.5%) with the statement, while 32.5% either disagreed (24.1%) or strongly disagreed (8.4%). The remaining 37.5% were neutral. The mean score was 2.90 (SD = 0.96). The qualitative findings further supported these results. M2 stated:

"Contributions are collected from users to support maintenance costs, but payment is sometimes irregular. This creates financial challenges when repairs are needed."

These findings agree with UNICEF DRC (2022), World Bank (2021), and GIZ (2021), who

reported that irregular community financial contributions remain a major challenge for sustaining rural water facilities.

The fifth statement sought to establish whether poor maintenance contributed to frequent breakdowns of water facilities. The findings indicate that 52.0% of the respondents either agreed (23.5%) or strongly agreed (28.5%) with the statement, while only 15.7% either disagreed (15.4%) or strongly disagreed (0.3%). The remaining 32.3% were neutral. The mean score was 3.65 (SD = 1.06). Similarly, M10 stated:

"Financial contributions are collected to support maintenance costs, although not all households contribute consistently. This remains a significant challenge because repairs often require resources that are not always available."

These findings agree with Fisher et al. (2022), Smits et al. (2020), and WaterAid (2021), who reported that poor operation and maintenance practices contribute significantly to the breakdown of rural water facilities.

The sixth statement sought to establish whether community members took the initiative before external assistance arrived when water facilities broke down. The findings indicate that 31.4% of the respondents either agreed (29.7%) or strongly agreed (1.7%), while 37.5% either disagreed (21.8%) or strongly disagreed (15.7%). The remaining 31.1% were neutral. The mean score was 2.80 (SD = 1.08). The interview findings were consistent with these results. M1 stated:

"When a breakdown occurs, the committee first attempts to solve the problem. If the damage is serious, we usually seek assistance from external technicians or development organizations." These findings agree with UNICEF DRC (2022), World Bank (2021), and USAID (2021), who

reported that although communities often undertake routine maintenance, they continue to depend on external technical support for major repairs.

The results demonstrate that community participation in operation and maintenance remains one of the strongest aspects of community involvement in the study area. Communities participate in routine maintenance activities and recognise the importance of maintaining water facilities, although delays in repairs and inadequate financial contributions continue to present important challenges. These findings suggest that the long-term functionality of rural water facilities depends largely on what happens after infrastructure has been constructed. Routine maintenance, timely repairs and effective mobilisation of community resources appear to have a direct influence on service continuity.

However, the study also revealed some inconsistencies. While communities generally recognised the importance of participating in operation and maintenance, many respondents indicated that repairs were not always carried out within a reasonable time and that financial or labour contributions towards maintenance were often inadequate. This may explain why some of the findings contrasted with previous studies, which reported that active community participation in operation and maintenance is usually associated with faster repairs and more reliable service delivery. The present findings suggest that participation alone may not be sufficient unless it is supported by adequate resources, effective coordination and a functional maintenance system.

4.6: Ownership and sense of responsibility in sustainability of service delivery

The fourth study objective sought to examine how community ownership and sense of responsibility influence the sustainability of rural water services in Walungu Territory. Respondents were requested to indicate their level of agreement with statements relating to ownership and sense of responsibility using a five-point Likert scale where 1 represented *Strongly Disagree*, 2 *Disagree*, 3 *Neutral*, 4 *Agree*, and 5 *Strongly Agree*. The responses are presented in Table 4.6

Table 4.6: Ownership and sense of responsibility in sustainability of service delivery

Statements	**SD** **f (%)**	**D** **f (%)**	**N** **f (%)**	**A** **f (%)**	**SA** **f (%)**	**Mean**	**SD**
Community members consider WASH facilities as belonging to the community.	73 21.2%	82 23.8%	140 40.7%	45 13.1%	4 1.2%	**2.49**	**1.00**
Community members feel responsible for protecting WASH facilities.	11 3.2%	147 42.7%	79 23.0%	106 30.8%	1 0.3%	**2.82**	**0.92**
Community ownership helps to prevent misuse of WASH facilities.	92 26.7%	110 32.0%	94 27.3%	41 11.9%	7 2%	**2.31**	**1.05**
Community members are willing to contribute to maintaining WASH facilities.	78 22.7%	75 21.8%	131 38.1%	59 17.2%	1 0.3%	**2.51**	**1.03**
Community ownership has contributed to the sustainability of WASH services.	42 12.2%	79 23%	152 44.2%	67 19.5%	4 1.1%	**2.70**	**0.93**

Community members protect WASH facilities from misuse or vandalism.	14 4.1%	42 12.2%	163 47.4%	125 36.3%	0 (0.0%)	**3.16**	**0.79**
Community members report misuse or damage of WASH facilities when it occurs.	7 2%	43 12.5%	117 34%	145 42.2%	32 9.3%	**3.44**	**0.90**
Community responsibility helps reduce breakdowns of WASH facilities.	107 31.1%	111 32.3%	90 26.2%	35 10.2%	1 0.3%	**2.16**	**0.99**
Composite Mean and Standard deviation						**2.78**	**0.38**

The findings revealed a composite mean of 2.78 (SD = 0.38), indicating a relatively low level of community ownership and sense of responsibility.

The first statement sought to establish whether community members considered WASH facilities as belonging to the community. The findings indicate that 45.0% of the respondents either disagreed (23.8%) or strongly disagreed (21.2%) with the statement, whereas only 14.3% either agreed (13.1%) or strongly agreed (1.2%). The remaining 40.7% were neutral. The mean score was 2.49 (SD = 1.00). This finding was further supported by the qualitative findings. M6 stated:

"Some community members still consider the water facilities as projects belonging to NGOs rather than to the community, which affects their willingness to contribute towards maintenance."

These findings agree with Mercy Corps (2021), UNICEF DRC (2022), and GIZ (2021), who reported that many rural WASH facilities are still perceived as donor projects rather than community-owned systems.

The second statement sought to establish whether community members felt responsible for protecting water facilities. The findings indicate that 45.9% of the respondents either disagreed (42.7%) or strongly disagreed (3.2%) with the statement, while 31.1% either agreed (30.8%) or strongly agreed (0.3%). In addition, 23.0% remained neutral. The mean score was 2.82 (SD = 0.92). The interview findings were consistent with these results. M9 stated:

"Some members actively protect the facilities, while others believe maintenance is the responsibility of the implementing organization."

These findings partially agree with Foster et al. (2021) and Le Gouais and Wach (2021), who reported that a stronger sense of ownership encourages communities to take greater responsibility for protecting water facilities.

The third statement sought to establish whether community ownership helped prevent misuse of water facilities. The findings indicate that 58.7% of the respondents either disagreed (32.0%) or strongly disagreed (26.7%) with the statement, whereas only 13.9% either agreed (11.9%) or strongly agreed (2.0%). The remaining 27.3% were neutral. The mean score was 2.31 (SD = 1.05). Supporting this finding, M11 stated:

"Misuse of water facilities still occurs in some communities despite awareness campaigns, especially where community members do not feel responsible for the facilities."

These findings disagree with Schouten and Moriarty (2021), Hutchings et al. (2020), and Koehler et al. (2021), who reported that strong community ownership contributes to protecting water facilities from misuse and vandalism.

The fourth statement sought to establish whether community members were willing to contribute to maintaining water facilities. The findings indicate that 44.5% of the respondents either disagreed

(21.8%) or strongly disagreed (22.7%), whereas only 17.5% either agreed (17.2%) or strongly agreed (0.3%). The remaining 38.1% were neutral. The mean score was 2.51 (SD = 1.03). The qualitative findings further supported these results. M2 stated:

"Although contributions are encouraged, many households fail to contribute regularly, making it difficult to finance maintenance activities."

These findings agree with Truslove et al. (2020), Foster et al. (2021), and SNV (2021), who reported that weak community ownership is associated with a low willingness to contribute labour and financial resources for maintenance.

The fifth statement sought to establish whether community ownership had contributed to the sustainability of water services. The findings indicate that 35.2% of the respondents either disagreed (23.0%) or strongly disagreed (12.2%), while 20.6% either agreed (19.5%) or strongly agreed (1.1%). The remaining 44.2% were neutral. The mean score was 2.70 (SD = 0.93). The interview findings were consistent with these findings. M14 stated:

"Communities that feel responsible for the facilities usually maintain them better than those that depend entirely on external support."

These findings agree with WHO and UNICEF (2023), Lockwood and Smits (2020), and Fisher et al. (2022), who reported that community ownership contributes to the long-term sustainability of rural water services.

The sixth statement sought to establish whether community members protected water facilities from misuse or vandalism. The findings indicate that 36.3% of the respondents agreed with the statement, while 16.3% either disagreed (12.2%) or strongly disagreed (4.1%). Nearly half of the respondents (47.4%) remained neutral. The mean score was 3.16 (SD = 0.79). Similarly, M5 stated:

"Community leaders encourage users to protect the facilities and report cases of vandalism whenever they occur."

These findings agree with WaterAid (2021), Hutchings et al. (2020), and Koehler et al. (2021), who reported that communities with a strong sense of ownership are more likely to protect water facilities from misuse.

The seventh statement sought to establish whether community members reported misuse or damage of WASH facilities when it occurred. The findings indicate that 51.5% of the respondents either agreed (42.2%) or strongly agreed (9.3%) with the statement, while only 14.5% either disagreed (12.5%) or strongly disagreed (2.0%). The remaining 34.0% were neutral. The mean score was 3.44 (SD = 0.90). The qualitative findings further supported this result. M8 stated:

"Whenever damage is noticed, it is reported to the committee so that appropriate action can be taken as quickly as possible."

These findings agree with Schouten and Moriarty (2021), Foster et al. (2021), and UNICEF (2022), who reported that communities with a sense of responsibility are more likely to report damage and support timely interventions.

The eighth statement sought to establish whether community responsibility helped reduce breakdowns of water facilities. The findings indicate that 63.4% of the respondents either disagreed (32.3%) or strongly disagreed (31.1%) with the statement, whereas only 10.5% either agreed (10.2%) or strongly agreed (0.3%). The remaining 26.2% were neutral. The mean score was 2.16 (SD = 0.99). Supporting this finding, M13 stated:

"Breakdowns still occur frequently because some community members do not consistently take responsibility for protecting and maintaining the facilities."

These findings disagree with Danert et al. (2021), Truslove et al. (2020), and WHO and UNICEF (2022), who reported that strong community responsibility contributes to reducing breakdowns and improving the sustainability of rural water services.

Overall, the quantitative findings, qualitative findings and the literature reviewed both agree and disagree on the influence of ownership and sense of responsibility on the sustainability of rural water services. The findings reveal that community ownership and sense of responsibility remain relatively weak compared to the other dimensions of community participation. Although respondents acknowledged the importance of protecting water facilities, many did not perceive the facilities as fully belonging to the community, and willingness to contribute towards maintenance remained limited. This suggests that ownership cannot simply be created through the construction of infrastructure but develops gradually through meaningful participation, transparency and continuous engagement throughout the project cycle. In the context of Walungu Territory, strengthening community ownership requires creating an environment in which community members feel genuinely responsible for the management and long-term success of water facilities rather than viewing them as projects belonging to external organizations.

4.7: Sustainability of service delivery

Respondents were requested to indicate their level of agreement with statements measuring the sustainability of rural water services using a five-point Likert scale where 1 represented *Strongly Disagree*, 2 *Disagree*, 3 *Neutral*, 4 *Agree*, and 5 *Strongly Agree*. The responses are presented in Table 4.7

Table 4.7: Sustainability of service delivery

Statements	SD f (%)	D f (%)	N f (%)	A f (%)	SA	Mean	SD
Water and sanitation services in this community are reliable throughout the year.	35 10.2%	54 15.7%	110 32.0%	83 24.1%	62 18.0%	**3.24**	**1.21**
Water facilities are generally well maintained.	79 23.0%	89 25.9%	83 24.1%	89 25.9%	4 1.2%	**2.56**	**1.14**
Many water facilities stop functioning shortly after installation.	56 16.3%	82 23.8%	98 28.5%	67 19.5%	41 11.9%	**2.87**	**1.24**
Water services are likely to continue functioning in the future.	55 16.0%	92 26.7%	97 28.2%	85 24.7%	15 4.4%	**2.75**	**1.13**
Community participation is essential for sustaining Water services.	0 0.0%	0 0.0%	14 4.1%	131 38.1%	199 57.8%	**4.54**	**0.58**
Water services meet the daily needs of most households in this community.	50 14.5%	84 24.4%	111 32.3%	88 25.6%	11 3.2%	**2.78**	**1.08**
Composite Mean and Standard Deviation						**3.09**	**0.42**

The findings revealed a composite mean of 3.09 (SD = 0.42), indicating a moderate level of sustainability of rural water and sanitation services.

The first statement sought to establish whether water services in the community were reliable throughout the year. The findings indicate that 42.1% of the respondents either agreed (24.1%) or strongly agreed (18.0%) with the statement, while 25.9% either disagreed (15.7%) or strongly

disagreed (10.2%). The remaining 32.0% were neutral. The mean score was 3.24 (SD = 1.21). This finding was further supported by the qualitative findings. M3 stated:

"Most of the water facilities remain functional throughout the year, although occasional interruptions occur due to mechanical failures or insufficient maintenance funds."

These findings agree with WHO and UNICEF (2022) and United Nations (2021), who identified reliability and continuity of service delivery as key indicators of sustainable rural water and sanitation services.

The second statement sought to establish whether water facilities were generally well maintained. The findings indicate that 48.9% of the respondents either disagreed (25.9%) or strongly disagreed (23.0%), whereas 27.1% either agreed (25.9%) or strongly agreed (1.2%). The remaining 24.1% were neutral. The mean score was 2.56 (SD = 1.14). The interview findings were consistent with these results. M8 stated:

"Routine maintenance is carried out, but limited financial resources often delay major repairs, affecting the condition of some facilities."

These findings agree with Foster et al. (2021) and Cronk and Bartram (2020), who reported that inadequate maintenance remains one of the major threats to the sustainability of rural water systems.

The third statement sought to establish whether many water facilities stopped functioning shortly after installation. The findings indicate that 40.1% of the respondents either disagreed (23.8%) or strongly disagreed (16.3%), while 31.4% either agreed (19.5%) or strongly agreed (11.9%). The remaining 28.5% were neutral. The mean score was 2.87 (SD = 1.24). Supporting this finding, M11 stated:

"Some facilities continue operating for many years, while others become non-functional because maintenance activities are not carried out consistently."

These findings agree with Foster et al. (2021) and Cronk and Bartram (2020), who reported that poor maintenance contributes to the premature failure of rural water systems.

The fourth statement sought to establish whether water services were likely to continue functioning in the future. The findings indicate that 42.7% of the respondents either disagreed (26.7%) or strongly disagreed (16.0%), whereas 29.1% either agreed (24.7%) or strongly agreed (4.4%). The remaining 28.2% were neutral. The mean score was 2.75 (SD = 1.13). The qualitative findings further supported these results. M5 stated:

"The future of the water facilities depends on continued community commitment, regular maintenance and the availability of financial resources."

These findings agree with Lockwood and Smits (2019) and UNICEF (2022), who reported that long-term sustainability depends on effective management structures and continued community support.

The fifth statement sought to establish whether community participation was essential for sustaining water services. The findings indicate that 95.9% of the respondents either agreed (38.1%) or strongly agreed (57.8%) with the statement, while 4.1% remained neutral. None of the respondents disagreed. The mean score was 4.54 (SD = 0.58). The interview findings further confirmed this result. M2 stated:

"Without community participation, it is difficult to sustain water services because the community is responsible for protecting, managing and maintaining the facilities after project completion."

These findings agree with WHO and UNICEF (2022), United Nations (2021), and Niyongabo et al. (2022), who emphasized that meaningful community participation is fundamental to the sustainability of rural water services.

The sixth statement sought to establish whether water services met the daily needs of most households in the community. The findings indicate that 38.9% of the respondents either disagreed (24.4%) or strongly disagreed (14.5%), while 28.8% either agreed (25.6%) or strongly agreed (3.2%). The remaining 32.3% were neutral. The mean score was 2.78 (SD = 1.08). Similarly, M14 stated:

"Although the water facilities provide important services, some households still experience challenges, especially during periods of increased demand or when breakdowns occur."

These findings agree with Schouten and Moriarty (2021) and Niyongabo et al. (2022), who reported that sustainable rural water services should consistently meet the needs of users and remain accessible over time.

Overall, the findings indicate that the sustainability of rural water services in Walungu Territory remains moderate. While many water facilities continue to provide essential services, important challenges related to maintenance, functionality and long-term continuity remain evident. The findings demonstrate that sustainability cannot be achieved through infrastructure development alone but depends on the interaction of several dimensions of community participation. Decision-making, capacity building, operation and maintenance, and ownership should therefore be viewed as complementary rather than independent processes. Strengthening only one dimension is unlikely to produce sustainable outcomes unless the other aspects of community participation are equally supported. This study therefore highlights the importance of adopting a holistic approach

that promotes active community engagement throughout the entire life cycle of rural water projects.

4.8: Relationship Between Community Participation and Sustainability of project outcomes

Pearson correlation analysis was conducted to examine the relationship between the different dimensions of community participation and the sustainability of rural water services in Walungu Territory. The results are presented in Table 4.8

Table 4.8: Correlation analysis

Correlations						
		Decision making	Capacity building	Operation and maintenance	Ownership	sustainability
Decision making	Pearson Correlation	1	.047	.202**	.001	.069
	Sig. (2-tailed)		.385	.000	.989	.199
Capacity building	Pearson Correlation	.047	1	.157**	.080	.110*
	Sig. (2-tailed)	.385		.004	.137	.042
Operation and maintenance	Pearson Correlation	.202**	.157**	1	.000	.199**
	Sig. (2-tailed)	.000	.004		.998	.000
Ownership	Pearson Correlation	.001	.080	.000	1	-.031
	Sig. (2-tailed)	.989	.137	.998		.561
sustainability	Pearson Correlation	.069	.110*	.199**	-.031	1
	Sig. (2-tailed)	.199	.042	.000	.561	

N	344	344	344	344	344
**. Correlation is significant at the 0.01 level (2-tailed).					
*. Correlation is significant at the 0.05 level (2-tailed).					

Decision-making had a very weak positive correlation with sustainability ($r = .069$, $p = .199$). The study did not detect a statistically significant linear association at the .05 level. This does not establish that decision-making is unimportant or that no relationship exists. Interview accounts of consultation without final authority provide one possible interpretation, not a tested explanation.

Capacity building had a weak positive bivariate association with sustainability ($r = .110$, $p = .042$). Statistical significance does not make this a strong relationship. Moreover, the association was not statistically significant after adjustment for the other participation dimensions in the regression. The bivariate and adjusted findings answer different questions and should not be conflated.

Operation and maintenance had the largest positive correlation among the four dimensions ($r = .199$, $p < .001$), but the association was still weak. The result indicates covariation in the reported scores, not proof that increasing participation would improve outcomes by a particular amount.

Ownership had a very weak negative correlation with sustainability ($r = -.031$, $p = .561$). The result provides no statistically significant evidence of a linear association. It should not be interpreted as showing that ownership reduces sustainability. Sampling variation and measurement limitations remain plausible explanations.

The bivariate analysis detected weak positive associations for capacity building and operation and maintenance. Decision-making and ownership were not statistically significant. These results are

interpreted alongside the limitations of the reported composite scores and the cross-sectional design.

4.9 Multiple Regression Analysis

The reported four-predictor model was statistically significant, $F(4, 339) = 4.297$, $p = .002$. It explained 4.8% of variance in the sustainability score ($R^2 = .048$). Thus, 95.2% of observed variation remained unexplained by this model. Statistical significance indicates evidence against all slopes being zero under the model assumptions; it does not imply strong prediction or substantial practical explanation.

The unstandardised coefficient B expresses the difference in the outcome score associated with a one-unit difference in a predictor, holding the other predictors constant. The standardised coefficient β expresses the association in standard-deviation units. The values below follow the original regression table (Table 4.9).

Decision-making: $B = 0.035$, $\beta = .029$, $p = .591$. The adjusted association was positive but not statistically significant.

Capacity building: $B = 0.079$, $\beta = .083$, $p = .122$. Its weak significant bivariate correlation did not remain statistically significant after adjustment.

Operation and maintenance: $B = 0.134$, $\beta = .180$, $p = .001$. It was the only statistically significant adjusted association. A one-unit difference in the reported O&M score corresponded to a 0.134-unit difference in the reported outcome score, conditional on the other three predictors.

Ownership: $B = -0.043$, $\beta = -.038$, $p = .474$. The negative coefficient was not statistically significant. It does not show that ownership harms sustainability. Because the bivariate association

was also slightly negative, the signs alone do not establish a suppression effect; coding and measurement should be examined before substantive explanations are advanced.

The model supports a limited conclusion about an association with O&M in the reported data. It does not establish the relative causal importance of the four dimensions, predict the effects of an intervention, or show which omitted factors explain the remaining variance. Financing, technology, governance and insecurity are candidates for further study rather than demonstrated determinants in this model.

Table 4.9: Multiple regression

Regression	2.952	4	0.738	0.002
Residual	58.223	339	0.172	
Total	61.175	343		
Variable	B	Std. Error	Beta	Sig.
(Constant)	2.426	0.301		0.000
Decision Making	0.035	0.066	0.029	0.591
Capacity Building	0.079	0.051	0.083	0.122
Operation and Maintenance	0.134	0.041	0.180	0.001
Ownership	-0.043	0.060	-0.038	0.474

4.10 Discussion of the findings

The findings of this study indicate differing associations between community participation and the sustainability of rural water service delivery in different ways. However, the reported association varies across the four dimensions examined, namely decision-making, capacity building, operation and maintenance, and community ownership.

The findings revealed a moderate level of community participation in decision-making, suggesting that although many respondents acknowledged being consulted during the planning and implementation of rural water projects, their involvement was not extensive. Correlation analysis further showed a weak positive but statistically insignificant relationship between decision-making and sustainability ($r = 0.069$, $p = .199$), while regression analysis confirmed that decision-making was not a significant predictor of sustainability ($\beta = 0.029$, $p = .591$). These findings differ from those of Foster et al. (2021), Koehler et al. (2021), WHO and UNICEF (2022), and Niyongabo et al. (2022), who found that meaningful community involvement in decision-making strengthens ownership, improves accountability, and enhances the long-term sustainability of rural water services. However, the findings are consistent with Truslove et al. (2020) and Fisher et al. (2022), who argued that participation contributes to sustainability only when communities have genuine influence over project decisions rather than being merely consulted. The findings therefore suggest that community participation in Walungu Territory may have been largely consultative, which offers a possible interpretation of the weak association rather than a demonstrated explanation.

The study also found a moderate level of participation in capacity-building activities. Respondents generally agreed that training enhanced their knowledge and skills for managing rural water facilities. Although capacity building showed a weak but statistically significant positive

correlation with sustainability ($r = 0.110$, $p = .042$), regression analysis indicated that it was not a significant predictor ($\beta = 0.083$, $p = .122$). These findings agree with WHO and UNICEF (2022), Foster et al. (2021), Truslove et al. (2020), and Le Gouais and Wach (2021), who reported that capacity-building programmes improve communities' technical and managerial skills required for operating rural water systems. The findings also support Le Gouais and Wach (2021) and WHO and UNICEF (2022), who emphasized that training contributes to sustainability only when it is continuous, practical, and supported by follow-up activities. However, the present findings differ from studies that reported capacity building as an independent determinant of sustainable service delivery. These accounts suggest examining training quality, follow-up support and the resources needed to apply skills. The regression does not establish whether these factors explain the non-significant adjusted association.

Among the four dimensions, community participation in operation and maintenance had the largest positive association among the four measured dimensions, although the correlation remained weak. Respondents generally agreed that communities actively participated in protecting water sources, carrying out minor repairs, and maintaining water facilities. The statistical analysis further demonstrated a significant positive relationship between operation and maintenance and sustainability ($r = 0.199$, $p < .001$). Multiple regression analysis also identified operation and maintenance as the only significant predictor of sustainability ($\beta = 0.180$, $p = .001$). These findings are consistent with those of Lockwood and Smits (2019), Smits et al. (2020), Danert et al. (2021), Foster et al. (2021), Fisher et al. (2022), and WHO and UNICEF (2022), who concluded that regular maintenance, timely repairs, and active community participation are essential for sustaining rural water services. Likewise, Hutchings et al. (2019) and Koehler et al. (2021) reported that communities actively involved in operation and maintenance experience fewer

breakdowns and more reliable water services. The findings therefore reinforce existing empirical evidence that practical participation in the daily management of water infrastructure merits attention alongside other participation practices; the estimates do not establish their relative causal importance.

The findings further revealed that community ownership and sense of responsibility had a very weak negative, non-significant association with sustainability. Although respondents generally expressed positive perceptions regarding ownership, statistical analysis showed a weak negative and statistically insignificant relationship with sustainability ($r = –0.031$, $p = .561$), while regression analysis equally confirmed that ownership was not a significant predictor ($\beta = –0.038$, $p = .474$). These findings contrast with those of Lockwood and Smits (2020), Schouten and Moriarty (2021), Foster et al. (2021), WHO and UNICEF (2022), Danert et al. (2021), and Le Gouais and Wach (2021), who found that a strong sense of ownership encourages communities to protect infrastructure, contribute financially, and sustain rural water services. Nevertheless, the findings support Niyongabo et al. (2022), Truslove et al. (2020), and Smits et al. (2020), who argued that ownership develops through meaningful participation in decision-making, capacity building, and operation and maintenance rather than existing on its own. This suggests that, in Walungu Territory, feelings of ownership may not automatically translate into sustainable management unless they are supported by effective participation and functioning community management structures.

Overall, the findings of this study suggest that community participation alone does not automatically guarantee the sustainability of rural water service delivery. Rather, the effectiveness of participation depends on the form it takes. While communities in Walungu Territory participated in different aspects of rural water projects, only participation in operation and maintenance

demonstrated a significant association on sustainability. The result supports attention to practical maintenance arrangements, but does not establish that they are causally more important than decision-making, training or ownership. The model explained only 4.8% of observed outcome variation.Therefore, strengthening community participation should not focus solely on increasing participation levels, but also on ensuring that communities are empowered to play active and sustained roles in the day-to-day management of rural water services. These findings contribute to the existing body of knowledge by demonstrating that the different dimensions of community participation do not contribute equally to sustainability within the context of Walungu Territory.

CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter presents a summary of the major findings of the study, conclusions drawn from the findings, recommendations, suggestions for further research, and the contribution of the study to knowledge. The summary of findings is presented according to the research questions that guided the study on community participation and the sustainability of rural water and sanitation projects in Walungu Territory, South Kivu Province, Democratic Republic of Congo.

5.1 Summary of Findings

5.1.1 Influence of community involvement in decision-Making on Sustainability of Rural Water Services

The first objective of the study was to examine the influence of community involvement in decision-making on the sustainability of rural water services in Walungu Territory, South Kivu Province. The descriptive findings showed a moderate level of community participation in decision-making, with a composite mean of 3.09 and a standard deviation of 0.35. Although respondents generally agreed that communities were consulted during project planning and that participation contributed to sustainability, they also indicated that community opinions were not always considered in important decisions.

The correlation analysis revealed a weak positive but statistically non-significant relationship between community involvement in decision-making and the sustainability of rural water services

(r = .069, p = .199). Similarly, the regression analysis showed that decision-making had a positive but statistically non-significant influence on sustainability (B = 0.035, p = .591).

The study therefore concludes that community involvement in decision-making was moderate but did not significantly influence the sustainability of rural water services in Walungu Territory.

5.1.2 Influence of capacity Building on the Sustainability of Rural water Services

The second objective of the study was to examine the influence of capacity building on the sustainability of rural water services in Walungu Territory. The descriptive findings indicated a moderate level of capacity-building activities, with a composite mean of 3.17 and a standard deviation of 0.45. Respondents generally agreed that training improved their knowledge and ability to manage rural water facilities, although they also reported that refresher training and technical support were limited.

The correlation analysis showed a weak positive and statistically significant relationship between capacity building and sustainability (r = .110, p = .042). However, the regression analysis revealed that capacity building had a positive but statistically non-significant influence on sustainability (B = 0.079, p = .122).

The study therefore concludes that although capacity building was positively associated with sustainability, it did not significantly predict the sustainability of rural water services when analysed together with the other dimensions of community participation.

5.1.3 Influence of community Participation in Operation and Maintenance on the Sustainability of Rural water Services

The third objective of the study was to assess the influence of community participation in operation and maintenance on the sustainability of rural water services in Walungu Territory. The descriptive findings showed a moderate level of community participation in operation and maintenance, with a composite mean of 3.16 and a standard deviation of 0.57. Respondents reported that community committees were actively involved in managing water facilities, although delays in repairs and inadequate financial contributions remained important challenges.

The correlation analysis revealed a weak but statistically significant positive relationship between operation and maintenance and sustainability ($r = .199$, $p < .001$). The regression analysis further showed that operation and maintenance had a positive and statistically significant influence on sustainability ($B = 0.134$, $p = .001$).

The study therefore concludes that operation and maintenance was the only dimension of community participation that significantly influenced the sustainability of rural water services in Walungu Territory.

5.1.4 Influence of community Ownership on Sustainability of Rural water Services

The fourth objective of the study was to examine the influence of community ownership on the sustainability of rural water services in Walungu Territory. The descriptive findings showed the lowest level of participation among all the study dimensions, with a composite mean of 2.78 and a standard deviation of 0.38. Although respondents acknowledged their responsibility to protect

water facilities, many were less convinced that the facilities belonged to the community or were willing to contribute to their maintenance.

The correlation analysis showed a very weak negative and statistically non-significant relationship between community ownership and sustainability ($r = –.031$, $p = .561$). Similarly, the regression analysis indicated that ownership had a negative but statistically non-significant influence on sustainability ($B = –0.043$, $p = .474$).

The study therefore concludes that community ownership, as perceived by respondents, did not significantly influence the sustainability of rural water services in Walungu Territory.

5.2 Theoretical Implications of the Study

This study examined how different dimensions of community participation influence the sustainability of rural water projects in Walungu Territory, DRC. The findings showed that although communities were involved in decision-making, capacity-building activities, operation and maintenance, and ownership-related activities, only operation and maintenance had a significant influence on sustainability.

With regard to **Arnstein's Ladder of Citizen Participation**, the findings provide only partial support for the theory. Arnstein argues that community participation contributes to better development outcomes. However, the results of this study showed that participation in decision-making, capacity building, and ownership did not significantly influence sustainability. This suggests that involving communities in project activities does not automatically lead to sustainable outcomes. Rather, the type of participation appears to matter.

The findings also provide partial support for **Sustainability Theory.** The theory emphasizes that sustainability depends on continuous support and effective management of services over time. In this study, operation and maintenance was the only factor that significantly influenced sustainability, highlighting the importance of community involvement in activities that directly keep water facilities functional. At the same time, the non-significant effects of decision-making, capacity building, and ownership suggest that these factors alone are not enough to ensure sustainable services.

Overall, the study indicates that community participation contributes to sustainability when it goes beyond consultation and is translated into practical actions that support the day-to-day functioning of water facilities. This finding adds to existing knowledge by showing that, in the context of Walungu Territory, operation and maintenance play a more important role in sustaining rural WASH services than other forms of participation.

5.3 Implications of the Study Findings to the Programme Pursued by the Researcher

The findings of this study have important implications for the field of Project Planning and Management. The study demonstrated that not all dimensions of community participation contribute equally to the sustainability of rural water services. While decision-making, capacity building, and ownership showed no significant influence on sustainability, operation and maintenance was found to be a significant predictor.

These findings highlight the importance of integrating sustainability considerations into project planning and implementation processes. Project managers and development practitioners should not only focus on community consultation and training activities but should also ensure that

communities are actively involved in the operation and maintenance of project facilities after project completion.

The study further emphasizes the need for project planners to develop mechanisms that promote long-term community engagement and strengthen local management structures. This can improve project sustainability and reduce the likelihood of infrastructure failure after external support has ended.

In addition, the findings contribute to the understanding of community participation as an important component of project management. They provide evidence that participation is most effective when it is linked to practical responsibilities and continuous management activities rather than being limited to consultation during project implementation.

Overall, the study provides useful insights for project planning and management by demonstrating the importance of designing community participation strategies that support the long-term sustainability of development projects.

5.4 Conclusions

This study examined the influence of community participation on the sustainability of rural water and sanitation services in Walungu Territory, South Kivu Province, Democratic Republic of Congo. The findings revealed that community participation was evident across the four dimensions examined: decision-making, capacity building, operation and maintenance, and ownership. However, these dimensions did not contribute equally to the sustainability of rural water services.

The results showed that operation and maintenance was the only dimension with a statistically significant positive influence on sustainability. This finding suggests that the active involvement of community members in maintaining and managing water facilities is critical for ensuring the continued functionality of rural water and sanitation services.

In contrast, decision-making, capacity building, and ownership did not have a statistically significant influence on sustainability. Although respondents reported moderate levels of participation in these areas, the findings suggest that these forms of participation alone may not be sufficient to guarantee sustainable water services. This highlights the need to strengthen not only community involvement but also the effectiveness of participation mechanisms.

Overall, the study concludes that sustainable rural water services depend on meaningful and continuous community participation, particularly in the operation and maintenance of water facilities. Strengthening community capacity, promoting greater ownership, and improving participation in decision-making remain important, but these efforts should be accompanied by practical mechanisms that enable communities to effectively manage and maintain rural water infrastructure over time.

5.5 Recommendations

For Local Government Authorities

1. Local government authorities should provide regular technical support and supervision to community water committees, ensuring that water systems are properly maintained after project implementation.

2. They should also establish a routine monitoring system to identify non-functional water facilities early and coordinate timely maintenance interventions.

For NGOs and Development Partners

3. NGOs and development partners should place greater emphasis on supporting communities after project completion by strengthening operation and maintenance systems rather than focusing mainly on infrastructure development.

4. They should continue providing practical training and mentorship to community water committees so that they can confidently manage and maintain water facilities over the long term.

For Community Water Committees

5. Community water committees should strengthen transparency in the management of maintenance funds and encourage regular communication with community members to build trust and accountability.

6. They should also promote routine inspection and preventive maintenance to reduce frequent water system breakdowns.

For Community Members

7. Community members should actively participate in protecting and maintaining water facilities by reporting faults promptly and supporting community maintenance initiatives whenever possible.

For Policy Makers

8. Policy makers should promote policies that support long-term community participation, with particular attention to strengthening operation and maintenance as a key pillar of sustainable rural water service delivery.

5.6 Suggestions for Further Studies

While this study provides valuable insights into the influence of community participation on the sustainability of rural water services in Walungu Territory, it also highlights several areas that warrant further investigation. The following suggestions are proposed for future research:

1. Longitudinal Studies on the Sustainability of Rural Water Services

Future research could adopt a longitudinal design to examine how community participation and the sustainability of rural water services evolve over time. This would provide a better understanding of the long-term effects of community participation beyond the period covered by this study.

2. Comparative Studies Across Different Contexts

Similar studies could be conducted in other territories of South Kivu or other provinces of the Democratic Republic of Congo to compare the influence of community participation on the sustainability of rural water services under different geographical and socio-economic conditions.

3. Investigation of Additional Factors Affecting Sustainability

Future research could explore other factors that may influence the sustainability of rural water services, such as governance, financial management, institutional capacity, environmental conditions, and the availability of technical support, which were beyond the scope of this study.

4. Assessment of Post-Construction Support

Given the importance of operation and maintenance identified in this study, future research could examine how post-construction support, including technical supervision, maintenance financing, and institutional assistance, contributes to the long-term sustainability of rural water services.

5. Perspectives of Other Stakeholders

Future studies could also explore the perspectives of local government authorities, development partners, water service providers, and community leaders to provide a broader understanding of the factors influencing the sustainability of rural water services.

These suggested areas of research would contribute to a deeper understanding of the factors influencing the sustainability of rural water services and provide evidence to support the design of more effective community-based water management programmes.

5.7 Contribution to the Body of Knowledge

This study makes several important contributions to the understanding of community participation and the sustainability of rural water services, particularly within the context of rural communities in the Democratic Republic of Congo.

1. Context-Specific Empirical Evidence

This study provides empirical evidence from Walungu Territory, South Kivu Province, where limited research has examined the relationship between community participation and the sustainability of rural water services. By generating data from this context, the study helps address a gap in the existing literature and contributes to a better understanding of rural water management in eastern Democratic Republic of Congo.

2. Application of a Mixed-Methods Approach

By adopting a convergent mixed-methods design, the study demonstrates the value of combining quantitative and qualitative approaches to investigate community participation. While the quantitative findings identified the level and influence of each dimension of participation, the qualitative findings provided deeper insights into community experiences and perceptions, resulting in a more comprehensive understanding of rural water service sustainability.

3. Multidimensional Assessment of Community Participation

Rather than treating community participation as a single concept, this study examined four key dimensions: decision-making, capacity building, operation and maintenance, and ownership. This multidimensional approach provides a more detailed understanding of how different forms of

participation relate to the sustainability of rural water services and highlights that not all dimensions contribute equally.

4. Evidence to Inform Rural Water Management

The findings provide practical evidence for local governments, development partners, and community-based organizations involved in rural water service delivery. In particular, the study highlights the importance of strengthening operation and maintenance, which emerged as the only dimension with a statistically significant influence on sustainability, while also reinforcing the need to improve other aspects of community participation.

5. Contribution to Sustainable Rural Water Service Delivery

The study contributes to the growing body of knowledge on sustainable rural water service delivery by demonstrating that meaningful community participation extends beyond involvement in meetings or project implementation. It emphasizes the importance of sustained community engagement throughout the management and maintenance of rural water systems to enhance long-term service sustainability.

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APPENDICES

APPENDIX I: QUESTIONNAIRE

Topic: Community participation and sustainability of service delivery in rural water projects in Walungu Territory, Democratic Republic of the Congo

Introduction

I am Christine Muyalo Mahamba, a student at The Catholic University of Eastern Africa, Nairobi, Kenya doing Masters in Project Planning and Management. I am conducting research as part of my degree thesis, titled: " community participation and sustainability of service delivery in rural water projects in Walungu territory, DRC."

The main aim of this study is to examine how community participation influences the sustainability of rural water services in Walungu Territory. The study focuses on community participation in decision-making, capacity building, participation in operation and maintenance, and community ownership and sense of responsibility.

The study aspires to generate evidence on community participation approaches for the sustainability of water services in rural areas. It is sought that the findings are expected to contribute to a better understanding of why numerous rural water systems are unable to remain functional even after repeated investments and how the community can improve sustainability.

This research is being conducted for academic purposes only. Furthermore, the findings will be communicated to policy makers, development partners, local authorities, and community stakeholders involved in rural water planning and implementation. It is anticipated that this study will enhance the effectiveness of community engagement practices and bolster the sustainability of rural water and sanitation services in Walungu Territory and other similar rural settings.

Thank you for your cooperation.

Researcher: Christine Muyalo Mahamba

Reg. No: 1064462

The Catholic University of Eastern Africa, Nairobi, Kenya

PART I: Demographic Information

1. **Gender:**

☐ Male

☐ Female

2. **Age:**

☐ 18–25

☐ 26–35

☐ 36–45

☐ 46–55

☐ 56 and above

3. **Education Level:**

☐ No formal education

☐ Primary

☐ Secondary

☐ Tertiary (University, College)

☐ Other (Specify): _____

4. **Household size**

☐ 1-3

☐ 4-6

☐ 7-9

☐ Above 9

5. Length of stay in this community

☐ Less than 2 years

☐ 2–5 years

☐ 6–10 years

☐ More than 10 years

PART II: Access to water services

6. **Main source of drinking water used by your household**

   ☐ Protected spring

   ☐ Borehole

   ☐ Well

   ☐ River/stream

   ☐ Other (specify): _____

7. Is the water source currently functional?

   ☐ Yes

   ☐ No

8. How often does the water system break down?

   ☐ Very often

   ☐ Often

   ☐ Rarely

   ☐ Never

PART III: Community Participation in Decision-Making

Please rate your agreement to the following statements on a 5 point Likert scale (Strongly Agree = 5; Agree = 4; Neutral = 3; Disagree = 2; Strongly Disagree = 1). Please provide only one response per question of Section A-.

SECTION A: Community Participation and Sustainability of Rural water Services

	Statement	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
1	Local community participation in water projects has contributed to sustainable water services.					
2	Decisions about water facilities consider the opinions of community members.					
3	Community concerns about water services are often ignored					
4	Feedback provided by the community is addressed by those managing water services.					
5	Community members are often excluded from important decisions concerning water facilities.					
6	Community participation in decision-making has had little impact on sustaining water services					
7	Communities are consulted during the planning of water and sanitation projects					

Please rate your agreement to the following statements on a 5 point Likert scale (Strongly Agree = 5; Agree = 4; Neutral = 3; Disagree = 2; Strongly Disagree = 1). Please provide only one response per question of Section B-.

SECTION B: Training and Capacity Building and Sustainability of Rural water Services

	Statement	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
1	Training provided to community members has improved their ability to manage water facilities.					
2	Community members have received enough training on how to use water facilities properly.					
3	Training has helped community members respond better when water facilities break down.					
4	There is insufficient training related to maintenance of water and sanitation facilities.					
5	Training and capacity building have contributed to the sustainability of water services.					
6	Community members know who to contact when technical problems occur.					
7	Lack of regular training has made it difficult to maintain water facilities					

Please rate your agreement to the following statements on a 5 point Likert scale (Strongly Agree = 5; Agree = 4; Neutral = 3; Disagree = 2; Strongly Disagree = 1). Please provide only one response per question of Section C-.

SECTION C: Participation in Operation and Maintenance and Sustainability of Rural water Services

	Statement	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
1	Community members participate in cleaning and maintaining water facilities.					
2	There is a community committee responsible for operation and maintenance of water facilities.					
3	Breakdowns of water facilities are repaired within a reasonable time.					
4	Community members contribute labour or money for maintenance and repairs.					
5	Poor maintenance contributes to frequent breakdowns of water facilities					
6	When water facilities break down, community members take initiative before external help arrives.					

Please rate your agreement to the following statements on a 5 point Likert scale (Strongly Agree = 5; Agree = 4; Neutral = 3; Disagree = 2; Strongly Disagree = 1). Please provide only one response per question of Section D-.

SECTION D: Community Ownership and Sense of Responsibility and Sustainability of Rural WASH Services

	Statement	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
1	Community members consider water facilities as belonging to the community					
2	Community members feel responsible for protecting water facilities					
3	Weak ownership leads to neglect or misuse of water facilities.					
4	Community members are willing to contribute to maintaining water facilities.					
5	Community ownership has contributed to the sustainability of water services.					
6	Community members protect water facilities from misuse or vandalism.					
7	Community members report misuse or damage of water facilities when it occurs.					
8	Lack of community responsibility contributes to frequent breakdowns of water facilities.					

Please rate your agreement to the following statements on a 5 point Likert scale (Strongly Agree = 5; Agree = 4; Neutral = 3; Disagree = 2; Strongly Disagree = 1). Please provide only one response per question of Section E-.

SECTION E: Sustainability of Service delivery in Rural Water projects

	Statement	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
1	Water services in this community are reliable throughout the year.					
2	Water facilities are generally well maintained.					
3	Many water facilities stop functioning shortly after installation					
4	water services are likely to continue functioning in the future.					
5	Community participation is essential for sustaining water services.					
6	Water services meet the daily needs of most households in this community.					
7	Repeated breakdowns of water facilities affect household wellbeing					

Thank you for completing this questionnaire. Your feedback is valuable and will contribute to the better understanding of community participation in water areas of South Kivu Province.

APPENDIX II: IN-DEPTH INTERVIEW (IDI) GUIDE

Topic: Community participation and sustainability of service delivery in rural water projects in Walungu territory, South Kivu, DRC

Target Respondents:

- Water committee members
- Local leaders
- Local authorities
- NGOs or Development actors involved in rural water projects

Objective:
To collect in-depth qualitative information on community participation processes and how they influence the sustainability of rural water services in Walungu Territory, South Kivu DRC

Introduction (5 minutes)

- Introduce yourself and explain the purpose of the interview.
- Explain the nature of the study and the key themes being explored.
- Assure confidentiality and seek permission to record the conversation.

Section A: Background Information (5 minutes)

Questions:

1. What is your role or position in relation to water services in this community?
2. How long have you been involved in water activities or projects in this area?

Section B: Community Participation in Decision-Making (10–15 minutes)

Questions:

1. How were community members involved in identifying the need for the water project?

2. Can you describe the role played by the community in deciding the location, type, or design of the facility?
3. In your opinion, how much influence did the community have over key project decisions?
4. What challenges, if any, limit effective community participation in decision-making?

Probes:

- How inclusive were the decision-making processes?
- Can you share any specific examples where community participation influenced project decisions?

Section C: Capacity Building (10–15 minutes)

Questions:

1. What types of training were provided to community members or committee members?
2. Do you think the training provided was sufficient to enable communities to manage the system? Why or why not?
3. Are refresher trainings or follow-up support provided after project implementation?
4. What challenges affect the effectiveness of training and capacity building in this community?

Probes:

- How does training influence the community's ability to manage and maintain water facilities?

Section D: Operation and Maintenance Participation (10–15 minutes)

Questions:

1. How are operation and maintenance activities organised within the community?

2. What role do community members play in routine maintenance and repairs?
3. How are maintenance funds collected and managed, if applicable?
4. What happens when the system breaks down?

Probes:

- What challenges affect effective operation and maintenance of water facilities?

Section E: Community Ownership and Sense of Responsibility (10–15 minutes)

Questions:

1. Do community members consider the water facility as their own? Please explain.
2. How does ownership influence the way the facility is used and maintained?
3. What factors strengthen or weaken the sense of responsibility among community members?

Probes:

- How does ownership affect willingness to contribute labour or money for maintenance?

Section F: Sustainability of Rural WASH Services (10–15 minutes)

Questions:

1. In your view, what factors have contributed to the continued functioning or failure of water facilities in this community?
2. How sustainable do you consider the current water services to be?
3. What measures could improve the long-term sustainability of these services?

Probes:

- How can community participation be strengthened to enhance sustainability?

Section G: Closing Question (5 minutes)

1. Is there anything else you would like to add regarding community participation and the sustainability of water and sanitation services in this area?

APPENDIX III: Map of the study area



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APPENDIX IV: Plagiarism Certificate

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I HEREBY CONFIRM THAT **MUYALO MAHAMBA CHRISTINE** REG NO: **1064462**, SUBMITTED A CHECK OF ANTIPLAGIARISM ON EVALUATION OF **COMMUNITY PARTICIPATION AND SUSTAINABILITY OF SERVICE DELIVERY IN RURAL WATER AND SANITATION PROJECT IN SOUTH KIVU, DEMOCRATIC REPUBLIC OF CONGO. A THESIS SUBMITTED TO THE FACULTY OF SOCIAL SCIENCE IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE IN MASTER OF ARTS IN PROJECT PLANNING AND MANAGEMENT AT CATHOLIC UNIVERSITY OF EASTERN AFRICA.**

Verification by Systems Librarian:

Name: HARUN MAINA ..... Signature: ..... Date: 27/1/2026

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APPENDIX V: Data Collection Letter



THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

Faculty of Arts and Social Sciences

Department of Social Sciences and Development Studies

5th May 2026

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: MUYALO MAHAMBA CHRISTINE- REG. NO. 1064462

This letter is to confirm that the above-named individual is a Post-graduate student pursuing a **Master of Arts in Project Planning and Management** at The Catholic University of Eastern Africa.

As part of the degree requirements, the student is required to undertake a research study with the title:

"COMMUNITY PARTICIPATION AND SUSTAINABILITY OF SERVICE DELIVERY IN RURAL WATER AND SANITATION PROJECTS IN WALUNGU TERRITORY, DEMOCRATIC REPUBLIC OF CONGO".

The information gathered during this study will be used solely for academic purposes and will be handled with strict confidentiality.

Any assistance accorded to him will be highly appreciated.

Yours faithfully,

THE CATHOLIC UNIVERSITY OF EASTERN AFRICA HEAD OF DEPARTMENT 05 MAY 2026 SOCIAL SCIENCES AND DEVELOPMENT STUDIES

Dr. Mary Mutisya
HoD, Department of Social Sciences and Development Studies

THE CATHOLIC UNIVERSITY OF EASTERN AFRICA (CUEA) P.O. BOX 62157 00200 Nairobi - KENYA
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Founded in 1984 by AMECEA (Association of the Member Episcopal Conference in Eastern Africa)

APPENDIX VI: Research permit



RÉPUBLIQUE DÉMOCRATIQUE DU CONGO
Province du Sud-Kivu, Territoire de Walungu

Administration du Territoire

N/Réf : 056./AT/WLG/2026

AUTORISATION DE RECHERCHE

L'Administrateur du Territoire de Walungu,

Vu la demande présentée par **Madame Christine Muyalo Mahamba**, étudiante à la **Catholic University of Eastern Africa (CUEA)**, en vue de réaliser une étude scientifique dans le Territoire de Walungu ;

Après examen de ladite demande ;

AUTORISE

Madame **Christine Muyalo Mahamba** à mener une recherche académique intitulée :

« **Community Participation and Sustainability of Service Delivery in Rural Water Projects in Walungu Territory, Democratic Republic of the Congo** »

Cette recherche est réalisée dans le cadre de son mémoire universitaire à la **Catholic University of Eastern Africa (CUEA)**.

La présente autorisation est valable du 11/05. **au** 31/06/**2026** et est délivrée exclusivement pour les besoins de cette recherche académique.

Fait à Walungu, le 11/05/2026.

MUSHAGALUSHA BISIMWA Lucien

L'Administrateur du Territoire de Walungu