**ASSESSING THE IMPACTS OF INFRASTRUCTURE AND MANAGEMENT ON WATER PROJECTS SUSTAINABILITY IN MOROGORO MUNICIPAL, TANZANIA**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF PROJECT MANAGEMENT**

**DEPARTMENT OF MARKETING, ENTREPRENEURSHIP AND MANAGEMENT**

**THE OPEN UNIVERSITY OF TANZANIA**

**2024**

#  CERTIFICATION

The undersigned certify that they have read and recommends for acceptance by the Open University of Tanzania a dissertation entitled; **“*Assessing the Impacts of Infrastructure and Management on Water Projects Sustainability in Morogoro Municipal, Tanzania*”** in partial fulfillment of the requirements of the Degree of Master of Project Management of the Open University of Tanzania.

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…………………………………

Signature

………………..……..…………

Date

# DEDICATION

I dedicate this dissertation to my parents and family who always supported me spiritually, morally and materially. Their endless love, prayers and encouragement are great, so great that I will forever aim to show the same to my children. God bless them always.

# ACKNOWLEDGEMENTS

My faithful thanks to the Almighty God who granted me the ability and power to complete this work. I also extend my thanks to both parents especially my mother for encouraging me to study at this level, my supervisor(s) Dr. Salvio Macha, whose advice, encouragement, enthusiasm and demand for good scholarly work have facilitated the completion of this study.

Finally, specific thanks to all my colleagues as well as my staff members for their moral support that encouraged me in whole period of my research work and report writing.

# ABSTRACT

Community participation highly impacts water management and infrastructures thus crucial for the development and sustainability of any project. However, little attention has been given on the impact of infrastructure and management in water projects sustainability. The study was conducted in Kilakala and Kihonda wards in Morogoro Municipal, where purposive and simple random sampling techniques for sampling 100 household heads were used. Descriptive statistical analysis, content analysis, binary logistic regression analysis was used as methods of analysis from data collected through interviews and questionnaire methods of data collection. Community participation scored a grand mean score of 1.93. Also, water infrastructure adequacy of water infrastructure had a grand mean of 2.8. Further, there was moderate effectiveness of water project management with the mean value (2.74). Moreover, income, age, and sex were statistically significant affecting community participation in water development projects. Moreover, poor water infrastructure was the main challenge facing water projects sustainability. Conclusively, there was limited community participation in water development projects.

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# LIST OF ABBREVIATIONS

|  |  |
| --- | --- |
| KIIs | Key Informant Interviews |
| MORUWASA | Morogoro Urban Water Supply and Sanitation Authority |
| MW | Municipal Water |
| NBS | National Bureau of Statistics |
| SDGs | Sustainable Development Goals |
| SSA | Sub Saharan Africa |
| TOC | Theory of Change |
| UN | United Nations |
| UNDP | United Nations Development Programme |
| UNGA | United Nations General Assembly |
| UNICEF | United Nations International Children’s Emergency Fund |
| URT | United Republic of Tanzania |
| WHO | World Health Organization |
|  |  |

# CHAPTER ONE

# INTRODUCTION

## 1.1 Overview

The chapter comprises of background of the study, statement of the problem, objectives of the study, research questions, scope, significance, limitation and delimitation of the study.

## 1.2 Background of the Study

Water is an essential resource for survival and sustained growth. On the other hand, many areas of the world, particularly in Africa, continue to struggle with the accessibility and availability of safe and clean water. Around 2.2 billion people lack access to clean drinking water, and 4.2 billion lack access to hygienic sanitation, according to the United Nations (UN) Water Development Report 2021, with 660 million of these people living in Africa (UN, 2021). According to the report, Tanzania is one of the developing nations where poor access to potable water and sanitation remains a major obstacle to socioeconomic growth and the fight against poverty. Despite this, there is a severe water crisis in many countries due to the rising global demand for water, which is being fueled by urbanization, economic expansion, and population growth (Boretti & Rosa, 2019). On a worldwide basis, the lack of water creates a serious problem.

In many developing nations, particularly in Sub-Saharan Africa, having access to clean, safe water is a major concern (WHO, 2019). Waterborne infections have spread due to poor water quality and insufficient sanitation facilities, which has resulted in high death rates, particularly among children under the age of five (UNICEF, 2017). Many African nations still have limited access to water supply and sanitation services, leaving the majority of the populace dependent on ponds and rivers for their water needs (UNICEF, 2019). Several things, such as poor management of water projects and insufficient infrastructure, have been blamed for this predicament.

One of the nations with a major issue in providing its population with access to clean, safe water is Tanzania. The proportion of the population using upgraded water sources has increased from 50% in 2000 to 66% in 2017, indicating that the nation has achieved some progress in recent years (UNICEF, 2020). Rural and urban areas still have different levels of access to clean water, with urban areas having a higher rate of access than rural areas. The situation is significantly worse in rural areas, where locals have limited access to clean water sources and frequently use contaminated wells and rivers (NBS, 2020). Insufficient infrastructure and poor project management are a few of the things that have led to Tanzania's low access to clean drinking water. In addition, there is still a big problem with Tanzania's water projects' quality and sustainability.

## 1.2 Statement of the Problem

Despite the abundance of water sources in Morogoro region, provision of adequate and sustainable water supply remains a significant challenge, leading to water scarcity and related issues such as poor sanitation and hygiene, health problems, and environmental degradation (Mwakalinga *et al.,* 2017). Morogoro region has several water sources, including rivers, lakes, and underground aquifers, which should provide sufficient water for the population. However, water projects in the region have failed to meet the needs of the growing population, resulting in water shortages, especially during the dry season (UNICEF, 2021). In Morogoro Municipal, Tanzania, despite being close to the Wami River, which is a reliable source of water, inadequate access to safe and clean water is still a significant problem, particularly during the dry season.

Several studies have reported that inadequate water supply in Morogoro Municipal is due to various factors, including poor infrastructure, inadequate management, and low investment in the water sector (Mhina, 2021; Kiper, 2019). One of the main reasons for the unsustainability of water projects in Morogoro region is the lack of proper management and maintenance (Mziray *et al.,* 2019). The water infrastructure, including pipelines, pumps, and water treatment facilities, has deteriorated due to poor maintenance and inadequate funding. This has resulted in leakages, water losses, and inefficient distribution, which further exacerbate the water scarcity problem (Mhina, 2021). Therefore, the information on the impact of infrastructure and management challenges is still scarce and has been given little attention.

## 1.3 Objective

### 1.3.1 General Objective

The general objective of this research study is to assess the impacts of infrastructure and management on water projects sustainability in Morogoro municipal, Tanzania.

**1.3.2 Specific Research Objectives;**

1. Role of adequacy of water infrastructure on sustainability of water projects in Morogoro Municipal.
2. Role of effective water project management on sustainability of water projects in Morogoro Municipal.
3. To identify the challenges facing water project sustainability in Morogoro Municipal.
4. Role of community participation in the sustainability of water projects in Morogoro Municipal.

## 1.4 Research Questions

### 1.4.1 General Research Question

What are the factors that affect the sustainability of water projects in Morogoro Municipal, Tanzania?

### 1.4.2 Specific Research Questions

1. What is the current state of water infrastructure in Morogoro Municipal, and how does it impact the sustainability of water projects?
2. How effective is the management of water projects in Morogoro Municipal, and what is its impact on the sustainability of water projects?
3. What are the challenges facing water project sustainability in Morogoro Municipal, including financial constraints, institutional and regulatory frameworks, and community involvement?
4. What is the role of community participation in the sustainability of water projects in Morogoro Municipal, and how can it be improved?

## 1.5 Significance of the study

Information from the study is crucial in identifying the underlying causes of the inadequate water supply and proposing sustainable solutions. The study will evaluate the state of water infrastructure and management in the municipality and analyze their impacts on the sustainability of water projects. It will also identify best practices in the water sector that can be adopted in Morogoro Municipal and other similar urban areas in Tanzania.

The findings of the study provide valuable insights into the challenges and opportunities for sustainable water supply in Morogoro Municipal and inform policymakers, water service providers, and other stakeholders on the need for investment in water infrastructure, management, and governance. The study's results will also contribute to the achievement of Sustainable Development Goal 6 (SDG 6), which aims to ensure availability and sustainable management of water and sanitation for all (UN, 2015).

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Overview

This chapter provides a review of the literature relating to the study. The chapter captures the theoretical background in an attempt to provide the basis for an appropriate conceptual and theoretical framework and the empirical review which explores ideas from other literature works.

## 2.2 Conceptual Definitions

The conceptual definition involves the meaning of various terms that have been used during the study.

### 2.2.1 Water Projects

Water projects refer to initiatives aimed at providing access to safe and clean water to individuals and communities. These projects may include the construction of water supply systems, such as wells, boreholes, and dams, as well as the implementation of water treatment processes to purify water for consumption. In Tanzania, water projects have become increasingly important due to the country's growing population and the need to address water scarcity and waterborne diseases.

According to a report by the Tanzanian Ministry of Water, the government has invested heavily in water projects in recent years, with the aim of providing water to at least 95% of the population by 2025. One such project is the Rural Water Supply and Sanitation Program, which aims to provide sustainable water supply and sanitation services to rural communities. The program has been successful in increasing access to clean water in many rural areas of Tanzania. Water projects play a critical role in providing access to safe and clean water to individuals and communities in Tanzania. The government and various organizations have invested heavily in such projects, with the aim of addressing water scarcity and improving public health.

### 2.2.2 Sustainability of Water Projects

The sustainability of water projects in Tanzania refers to their ability to continue providing access to safe and clean water to communities in the long term. This involves ensuring that water sources are maintained and protected, water infrastructure is properly managed, and communities are empowered to manage their water resources. Sustainable water projects in Tanzania are crucial for addressing the challenges of water scarcity, improving public health, and promoting economic development.

According to the United Nations Development Programmed (UNDP), sustainable water management is a key priority for Tanzania, as the country faces increasing water stress and climate change impacts (UN, 2021). Sustainable water projects in Tanzania require a coordinated effort between the government, civil society organizations, and communities, to ensure that they are implemented in a way that is environmentally, socially, and economically sustainable. For instance, the Tanzanian government has established the National Water Policy, which emphasizes the importance of sustainable water management and promotes the participation of communities in water resource management.

Ensuring the sustainability of water projects in Tanzania is also essential for achieving the Sustainable Development Goals (SDGs) set by the United Nations. SDG 6 aims to ensure access to water and sanitation for all, and Tanzania has committed to achieving this goal by 2030 (UN, 2021). To achieve this, sustainable water projects that consider the needs of communities and promote their participation are necessary.

### 2.2.3 Water Project Infrastructures

Water project infrastructure refers to the physical structures and systems that are designed and constructed to provide safe and clean water to communities. This includes a range of facilities such as dams, water treatment plants, pipelines, and distribution networks. In many cases, water project infrastructure also includes sanitation facilities, such as toilets and wastewater treatment plants, as access to sanitation is closely linked to access to clean water.

The design and construction of water project infrastructure can vary depending on the context and location. In some areas, it may be necessary to construct large dams and reservoirs to capture and store water, while in others, decentralized systems such as rainwater harvesting or small-scale groundwater abstraction may be more appropriate (Luh *et al.,* 2017). Infrastructure projects may also need to be tailored to the specific needs of communities, considering factors such as population size, water demand, and topography.

The maintenance and operation of water project infrastructure is critical for ensuring the long-term sustainability of water projects. Regular maintenance and repairs help to ensure that infrastructure remains functional and reliable, reducing the risk of failures and interruptions to water supply. In addition, effective operation and management practices can help to optimize the efficiency of water systems, ensuring that water is delivered to communities at the lowest possible cost (Hutton *et al.,* 2015). Effective management may involve the establishment of water user committees or the implementation of tariff systems to ensure that the costs of water services are distributed fairly among communities.

### 2.2.4 Water Project Management

Water project management refers to the process of planning, implementing, and monitoring activities related to the development, operation, and maintenance of water project infrastructure. Effective management is critical for ensuring the sustainability of water projects and the provision of reliable water services to communities. According to Memon *et al.* (2020), effective water project management involves the coordination of multiple stakeholders, including government agencies, water utilities, and community groups, to ensure that water projects are designed and implemented in a way that meets the needs of communities while minimizing environmental and social impacts.

One key aspect of water project management is ensuring the sustainability of water systems over the long term. This requires the development and implementation of appropriate operation and maintenance plans, as well as the establishment of systems for monitoring and evaluating water quality and quantity. According to Muriithi *et al.* (2018), effective water project management also involves the promotion of water conservation and the adoption of sustainable practices such as rainwater harvesting and wastewater reuse.

Another important aspect of water project management is ensuring that water services are delivered in an equitable and affordable manner. This requires the establishment of tariff structures that are transparent and fair, as well as the development of systems for identifying and addressing the needs of vulnerable communities.

## 2.3 Theoretical Review

The theoretical review helps to relate the already existing theories, the relationship between them and the current study.

### 2.3.1 Theory of Community Participation

According to Eklund (1999) theory of community participation, decisions about projects and programs that affect people's lives are made, planned, carried out, and evaluated with the active participation of people in the community. Community participation involves including all relevant stakeholders, ensuring that diverse voices, including marginalized and vulnerable groups, have the opportunity to participate in decision-making processes. Also, empowering communities to take an active role in identifying problems, setting priorities, and implementing solutions (Eklund, 1999). This empowerment fosters a sense of ownership and accountability. Also, the theory of community participation acknowledges that community members possess valuable local knowledge and insights that are essential for designing contextually appropriate interventions. Further, it encourages collaboration between community members, government agencies, NGOs, and other stakeholders to jointly plan and implement projects. Moreover, the theory ascertains capacity building activities to equip community members with the skills and resources necessary to actively participate in project activities (Eklund, 1999). The theory also highlights the need to address socioeconomic factors that may influence community participation, such as poverty, education, and access to resources. The theory could be used in this study to assess socioeconomic drivers of community participation in water project sustainability in Morogoro Municipal, Tanzania.

## 2.4 Empirical Review

The objective of the empirical literature review in this study is to identify the research gap by providing insights into the research problem as it has been studied by other academics. It justifies the subject of the study and, more crucially, it contributes knowledge to the scholarly work that has been advanced by earlier research.

### 2.4.1 Empirical Literature Review Worldwide

Smith *et al.* (2018) conducted a study to examine the causes of inadequate access to clean water in developing countries. The study found that poor infrastructure and management of water projects were significant factors contributing to the problem. The researchers recommended the development of sustainable water management systems and increased investment in water infrastructure to address the issue. Williams *et al.* (2020) conducted a study to assess the impact of climate change on water resources. The study identified changes in precipitation patterns and increased water demand due to population growth and urbanization as key challenges facing water management. The researchers recommended the development of adaptive management strategies and increased investment in water conservation and management. Garcia *et al.* (2022) conducted a study to evaluate the effectiveness of water conservation strategies in urban areas. The study found that rainwater harvesting and grey water reuse were effective in reducing water demand and improving water management in cities. The researchers recommended the adoption of these strategies to promote sustainable water use in urban areas.

### 2.4.2 Empirical Literature Review in Africa

Access to clean water is a fundamental right that has a significant impact on public health and economic development. Despite efforts to improve water access, many communities in Africa still lack access to clean and safe water. Infrastructural and management issues have been identified as major factors contributing to inadequate water access. In a study conducted in Nigeria, Oyegoke *et al.* (2020) found that inadequate water infrastructure was a significant barrier to access to clean water in rural communities. The study highlighted the need for investment in sustainable water infrastructure to improve water access in rural communities.

Another study conducted in Ethiopia by Haji *et al.* (2019) examined the impact of water management practices on water access in urban areas. The study found that poor water management practices, including inefficient water distribution systems and inadequate water treatment facilities, were major barriers to access to clean water. The study recommended the adoption of sustainable water management practices to improve water access in urban areas. A study conducted in South Africa by Nhapi *et al.* (2018) explored the impact of water quality on water access in urban areas. The study found that poor water quality, resulting from inadequate water treatment and management practices, was a significant barrier to access to clean water. The study recommended the adoption of effective water treatment and management practices to improve water quality and access to clean water in urban areas.

Asare-Donkor *et al.* (2017) examined the impact of community participation in water projects on water access. The study found that involving communities in the planning and implementation of water projects led to increased access to clean water. The study highlighted the importance of community participation in improving water access.

### 2.4.3 Empirical Literature Review in Tanzania

Tanzania is one of the countries in Africa that faces challenges with inadequate water access. The provision of safe and clean water in Tanzania has been an ongoing challenge. Infrastructure and management are among the main factors that contribute to poor access to water. Senkondo & Mdoe (2019) examined the challenges facing water infrastructures in Tanzania. The study identified inadequate infrastructure, limited water sources, and poor management practices as the main challenges facing the water sector in Tanzania. The study recommended the adoption of sustainable infrastructure and management practices to address these challenges and improve water access in Tanzania.

Also, Marwa *et al.* (2019) found that poor management practices, including inefficient water distribution systems and inadequate water treatment facilities, were major barriers to access to clean water in Tanzania. The study recommended the adoption of effective management practices to improve water access in Tanzania. Another study conducted by Lyimo *et al.* (2018) examined the impact of community participation in water projects on water access in Tanzania. The study found that involving communities in the planning and implementation of water projects led to increased access to clean water. The study highlighted the importance of community participation in improving water access in Tanzania.

Mbwette *et al.* (2017) examined the impact of water quality on water access in rural Tanzania. The study found that poor water quality, resulting from inadequate water treatment and management practices, was a significant barrier to access to clean water in rural areas of Tanzania. The study recommended the adoption of effective water treatment and management practices to improve water quality and access to clean water in rural Tanzania.

### 2.5 Research Gap

Prior research has concentrated on the obstacles causing water scarcity and a few of its associated problems (Mwakalinga *et al.,* 2017; Mziray *et al.,* 2019). The majority of the issues cause Morogoro Municipal to have an insufficient supply of water services. Thus, it is necessary to look into how management issues and infrastructure affect the provision of water services.

### 2.6 Conceptual framework

The study will be guided by the conceptual framework conceptual framework for explaining the factors for sustainability of water projects which involves several intermediate variables and dependent variable (Dummy). The independent variables are factors which alters the dependent variable. The dependent variable is the sustainability of the water project, which can be measured by the community participation in water sustainability projects. The framework highlights the importance of community participation for achieving sustainability in water projects.

**Dependent variable**

Sustainability of the water project: Participation

* Participate (Yes)
* Not Participate (No)

**Independent variables**

* Occupation
* Age
* Education level
* Income
* Sex

Figure 1.1: Conceptual framework (Developed by author)

# CHAPTER THREE

## RESEARCH DESIGN AND METHODS

## 3.1 Overview

This chapter consists of the whole set of research methodology which gives the methods and techniques that were used by the researcher during the study. This includes the area of study, research design, sampling and sampling techniques, sample size, data collection methods, data presentation methods, and data analysis plan or techniques.

## 3.2 Research Strategies

Positivism research philosophy was used in this study. The current study adopted the cross-sectional design. According to Setia (2016), the design allows data to be collected at a single point in time. In addition, it allows the collection of data that can be used for descriptive studies as well as for the determination of relationships between variables.

The research approach for this study included the mixed method research approach, which combines qualitative and quantitative data collection and analysis methods (Creswell & Plano Clark, 2017).

### 3.2.1 Study Population

The study population for this study will involve the local community members in Morogoro municipal and will include the household respondents.

### 3.2.2 Area of the Research or Survey

The study was conducted in Morogoro municipal district, Morogoro, Tanzania. Morogoro urban district is one of the six districts of the Morogoro region of Tanzania. It contains the city (Morogoro), the capital of the Morogoro Region, and no villages. Morogoro urban district covers 260 square kilometers (100 sq mi). It is bordered to the east and south by the Morogoro Rural district and to the north and west by Mvomero District. As of 2022, the population of Morogoro Urban district is 440 000. Morogoro municipality is selected based on various criteria, such as the availability of different types of water sources, the extent of water scarcity, and the diversity of water users (Kassenga *et al.,* 2019; Mahoo *et al.,* 2018). Therefore, selecting areas of Morogoro municipality as the study area for this assessment could provide valuable insights of the study.

## 3.3 Sampling Frame, Design and Procedures

The study population for this study involved the local community members in Morogoro municipal and included the household respondents. The study involved a multi-stage sampling method; the first stage involved purposively selection of wards under study (Kilakala & Kihonda). Second stage, involved random selection of respondents in the selected wards. Third stage, random selection of key informants in the areas under study and the water authorities.

## 3.4 Sample Size Determination

Slovins formula for sample size determination was used in this research study

n = N / (1 + Ne2)

where; n is the sample size, N is the sample population (400 000), e is the error tolerance level (1%).

n ≈ 100 respondents.

## 3.5 Methods of Data Collection

### 3.5.1 Data collection methods

To enable triangulation both quantitative and qualitative data were collected, details are given below;

#### 3.5.1.1 Household survey

A semi-structured questionnaire with both closed and open-ended questions was administered to each of the selected participants. The questionnaire involved collection of data associated with the sustainability of water projects.

#### 3.5.1.2 Key Informant Checklists

Key Informant interviews were conducted to the water authorities’ heads. A total of 8 key informant interviews were conducted throughout the study.

## 3.6 Data Processing and Analysis

**Objective 1; To assess adequacy of water infrastructures in Morogoro Municipal water projects.**

Content analysis together with descriptive analysis were used as the method of analysis for this objective.Multiple response analysis as part of descriptive statistical analysis was used in addressing various infrastructures adequacy found in the study area. Qualitative data were collected from Key Informant Interviews (KIIs). Additionally, structured questionnaire and Key informant checklist were used as data collection tools.

**Objective 2; To evaluate the effectiveness of water projects sustainability in Morogoro municipal.**

Descriptive analysis was used in evaluating the effectiveness of water projects. Interviews and structured questionnaires were used as the method of data collection and data collection tool respectively.

**Objective 3; To identify challenges facing water project sustainability in Morogoro municipal**

Content analysis together with descriptive analysis were used as methods of analysis for this objective. Multiple response analysis was used in addressing the constraints facing water projects sustainability. Qualitative data were collected from Key Informants Interviews.

**Objective 4; To determine role of community participation in sustainability of water projects in Morogoro municipal.**

Descriptive statistical analysis and binary logistic regression were used as the method of analysis for this objective. Roles of the community in the sustainability of water projects and the factor which influence their participation in the water projects were collected and measured. A structured questionnaire was used as data collection tool while interviews was used as the data collection methods.

Binary Logistic Regression was used to determine the association between the socio-economic factors (occupation, education level, employment status, income level, age, and sex were used as independent variables) and whether there is community participation or not. This model was used because the dependent variable was a dummy variable (Categorical variable) (Yes or No). The error term in the equation represents It shows the variation between a dependent variable's actual values and those predicted by the independent variables in the model.

The Binary Logistic Regression equation as follows:

Ln (P/1-P) = *βo*+***β****iX*i+*£*.

Where,

 P= Probability of participation in development project,

(1-P) represents the probability of non-participation,

**β**o = Constant,

*Xi*= explanatory variables that are expected to affect community participation in water projects, and

*£*=Error term.

The p-value of (<0.05) was used to determine whether differences or relationships between variables were statistically significant.

Table 3.1; Measurement of Variables (Categorization and definitions of explanatory factors)

|  |  |  |
| --- | --- | --- |
| **Variables** | **Expected outcome** | **Measurements** |
| Occupation |  (±) | Measured on nominal scale |
| Education level | (±) | Measured on nominal scale  |
| Income | (±) | Measured on ratio scale  |
| Age | (±) | Measured on ratio scale |
| Sex | (±) | Measured on nominal scale |

**Source:** Data analysis 2023

# CHAPTER FOUR

# RESULTS AND DISCUSSIONS

## 4.1 Overview

This chapter presents and discusses the findings of the study in accordance to the specific objectives. The general objective of the study was to evaluate the factors that affect the sustainability of water projects in the Morogoro municipality. The study had four specific objectives; the first one was to assess the adequacy of water infrastructure, the second was to evaluate the effectiveness of water projects management, the third was to identify challenges facing water project sustainability, and the fourth was to determine the role of community participation in the sustainability of water projects in Morogoro municipal.

## 4.2 Role of community participation in the sustainability of water projects in Morogoro Municipal

### 4.2.1 Community Participation Approaches

Refers to the results below two approaches were named to be used to involve community to participate in in sustainability of water projects, which are participatory approaches (involving local community in every stage of a project and they have a voice) and non-participatory approaches (local community are just listener to project implementers). The result shows that, most respondents suggested the approach used was non-participatory approach (60.7%) while a group of Participatory approaches makes only 39.3%. Also, the respondents asserted that;

"*The project implementer did not involve the community members (household members) at designing, initial and planning stages*”.

(Key informant Interview, May 2023)

Figure 1 shows that most of the more than half respondents (60.7%) who are the household members were just listeners on different meetings which involves the waters projects and infrastructure in the study area. This shows that, there is low level of participation on the water sustainability projects since the household members are only the listeners in the meetings which everyone member is supposed to give his/her opinions concerning the matter at hand. This implies that the local are not able to give views concerning the development project. This argument could be highly influenced by the low level of education that most of the respondents had primary education which is still low level of education for most of the community members to be able to give their views concerning the water sustainability projects. The research study argument is in line with the study by Bjornlund (2020) who reported that education is the most important factor to be considered when involving the community in different development projects.

Figure 4.1: Approaches Used to Involve Community to Participate in Water Projects

## 4.3 Community Participation Level on Water Projects

Level of community participation in different scenarios of water projects were identified. Results show that a statement “our water project is done basing on the selected priorities” had a means score of 1.6 (Low), a statement “Decisions related to our water projects are made by us” had a mean score of 1.32, and a statement “I participate in choosing the implementation methods” had a mean of 3.76. Also, the statement “I contribute water user free regularly to our water committee” had a mean score of 1.68, where a statement “I always participate in the construction of the water projects” had a mean score of 2.03, a statement “I contribute to the cost of operating the water point” had a mean score of 2.49. Further, a statement “My ideas regarding our water sources are always valued” had a mean score of 1.22, and a statement “I regularly participate in establish by laws” had a mean score of 1.93. Moreover, the grand mean score for the level of community participation in water projects in Morogoro Municipal was 1.93, indicating a low level of community participation in water development projects. The grand mean score results imply that the community members aren’t participating in different water projects. This results into unsustainability of the water projects in the district as community members are not involved and valued to give their inputs. According to Tantoh *et al.* (2021) water development initiatives may not be as successful or as sustainable if there is insufficient community involvement. It could be more challenging to guarantee that the initiatives fulfill the specific requirements and objectives of the local population without active participation and ownership from the community. However, there are some situations where community members shouldn't be involved, like when water development projects involve highly technical or specialized work that needs expert knowledge. In these cases, community members can still be informed about the project and its benefits, but the actual execution may be handled by experts with the necessary expertise (Nelson *et al.,* 2021).

Table 4.1; Level of Community Participation

|  |  |  |
| --- | --- | --- |
| **Level of Community Participation** | **Mean** | **Participation Level** |
| Our water project is done basing on the selected priorities | 1.6 | Low |
| Decisions related to our water projects are made by us | 1.32 | Low |
| I participate in choosing the implementation methods | 3.76 | High |
| I contribute water user fee regularly to our water committee. | 1.68 | Low |
| I always participate in the construction of the water projects | 2.03 | Low |
| I contribute to the cost of operating the water point | 2.49 | Moderate |
| My ideas regarding our water sources are always valued | 1.22 | Low |
| I regularly participate in establishing bye laws | 1.34 | Low |
| **Grand mean** | 1.93 | Low |
| **Source:** Data analysis 2023 |  |  |
|  |  |  |
|  |  |  |

## 4.4 Adequacy of water infrastructure in Morogoro Municipal water projects.

Results in table 3 show that, water infrastructures were adequate to meet the needs with a mean value of 4.90. Also, water shortages were moderately frequent with the mean value of 2.7. Other, water infrastructures were not well maintained and reliable in the study area with the mean value of 2.2. Also, the results show that community members were not satisfied with the quality of piped water in the study area with the mean of 1.3. Also, the respondents agreed that good water infrastructures are important for the wellbeing of the people with a mean value of 4.6. Further, results show that water supply in the study area is not reliable and consistent with a mean value of 1.4. Results in Table 3, also show that the cost of water in the study area is of reasonable and affordable with a mean value of 2.3. Moreover, the grand mean for the adequacy level of water in the study area was 2.8 (mean) indicating that there is low level of water adequacy in the study area. This implies that the community members are not satisfied with the amount of water they receive from the MORUWASA. This was found in an argument with one of the key informants from MORUWASA who said;

*“It is true that we encounter several problems in delivery health and safe water to our clients, due to this most of our clients are not satisfied with our services. We really need to uplift even if it needs to work overtime so that our people should get the amount of water and the quality they deserve because they pay for these services”*

The findings are consistent with research by Adelodun *et al.* (2021), which found that while some industrialized countries may also encounter water supply constraints, developing countries will continue to experience more acute and pervasive water insecurity. Poor resource management, development strategies, agricultural methods, and environmental deterioration all have a significant impact on this.

Table 4.2; Adequacy level

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Statement** | **N** | **Mean** | **SD** | **Adequate Level** |
| Water infrastructure is adequate to meet our needs | 100 | 4.9 | 0.4 | High |
| Water shortages are frequent | 100 | 2.7 | 1.8 | Moderate |
| Water infrastructure is well-maintained and reliable | 100 | 2.2 | 0.9 | Low |
| Satisfied with the quality of piped water in Morogoro Municipal | 100 | 1.3 | 0.8 | Low |
| Water infrastructure is important for the well-being of the population | 100 | 4.6 | 1.0 | High |
| Water supply is reliable and consistent | 100 | 1.4 | 0.8 | Low |
| The cost of water is reasonable and affordable | 100 | 2.3 | 1.7 | Low |
| **Grand mean** |   | 2.8 | 1.1 | Low |

**Source:** Data analysis 2023

## 4.5 Effectiveness of water project management in Morogoro Municipal

Different statements were provided to measure the effectiveness of water project management. Results showed that water infrastructures were moderately maintained with a mean value of 2.48. Also, the water project moderately addressed water related health issues with a mean value of 3.1. The management of water project were not effective in addressing water shortages with the mean value of 1.96. Further, the management of water project was highly effective in addressing water related environmental issues with the mean value of 3.86. Moreover, there was no effectiveness of the water project management in ensuring water accessibility. However, the grand mean for the effectiveness showed that the management for ensuring water sustainability was moderately effective with a grand mean value of 2.74. This means that the management authorities have moderately tried improving the water sustainability practices, though a lot of work needs to be done for the water projects management to be effective so that the water supply be sustainable. The results are in line with the study by Bishoge (2021) who reported that many water services in Africa are working hard to expand access, but most haven't kept up with the growing demand or the need for improved service quality. Also, water coverage in Africa will require large investments that will have to be mostly paid for by government funds. Moreover, contribution of good financial performance to water coverage is weak.

**Table 4.3; Effectiveness of Water Project Management**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Statement** | **Count** | **Mean** | **SD** | **Effectiveness**  |
| Water infrastructure maintenance | 100 | 2.48 | 1.64 | Moderate |
| Addressing water related health issues | 100 | 3.1 | 1.55 | Moderate |
| Addressing water shortages | 100 | 1.96 | 1.55 | No |
| Addressing water related environmental issues | 100 | 3.86 | 1.47 | Yes |
| Addressing water accessibility | 100 | 2.31 | 1.5 | No |
| **Grand mean** |  | **2.742** |  | **Moderate** |

**Source:** Data analysis 2023

## 4.6 Factor Influencing Community Participation

A binary logistic regression model was used to define the socioeconomic factors that influence community participation in Morogoro municipal district, Tanzania. Occupation, educational level, income, age and sex were variables included in the model. The model summary shows that the independent variables fit well in the regression model (R2= 0.978; Wald=0.023). The Cox & Snell R Square and Nagelkerke R Square of 0.868 and 0.723, respectively. An R-squared of 0.868 in this situation means that the predictors in the model can account for about 86.8% of the variation in the outcome. Additionally, the logistic regression model explains roughly 72.3% of the maximum possible variation in the outcome variable, according to the Nagelkerke R-squared value of 0.723. Due to the socioeconomic characteristics that were utilized as independent variables, the logistic regression model has a good ability to explain the community participation based on these high values of R-squared. The results (Table 4.4) show that some explanatory variables such as income level, age and sex significantly influence the community participation in water projects while education level and occupation do not have significant influence at a 5% significant level (α).

Results on occupation of the respondents show that there was no significant influence of the respondent’s occupation on community projects participation (p=0.331), also the occupation of the respondents was positively associated with community participation in water development projects in Morogoro municipal (B=3.114). The results show that any community member can have an impact in community water development projects despite of his/her occupation. That is to say, the occupation of the community members influences the participation in the water sustainability projects. Every member in the community has his/her views concerning the betterment of the community development projects. The results are in line with the study by Tyhotyholo and Ncube (2023) who reported that who reported that a respondent’s occupation had a significant effect on the community members to participate in different community projects. However, most of the employed personnel have low participation in different community projects compared to the unemployed personnel (Magagan & Ngugi, 2021; Hlayisi, 2022).

Findings show that the education level of the respondents had a positive beta coefficient, implying that an increase in the level of education has the possibility of increasing respondents’ participation in the water development projects. Community members with higher education can engage effectively with the technical officials and other stakeholders in the planning and execution of water development projects.

The finding concurs with that of Burian (2017) and Ostad-Ali-Askari and Eslamian (2019) who reported that community members’ level of education highly influences their participation in different developmental projects. In addition, Stefanski *et al.* (2016) argues that the household head’s education is thought to boost the possibility of family members participation in different community activities. Hence, local residents with greater levels of education are more likely than their counterparts to have an impact on participation in different community projects.

The results in Table 4.4 suggest that the level of income an individual receives has a positive, significant influence on individual participation in sustainability of water projects (0.001<0.05), therefore the higher the income level the higher the participation in developments projects. The influence to individual participation increased at a rate of 0.806 for every additional shilling received by the respondents. The findings imply that for persons to participate in a project, they must already have amount of money so that they can go and participate in different community development projects as there is no money given in such occasions. Due to a lack of sufficient income majority of local residents don't participate in the projects carried out in such areas as they need significant sums of money before they engage themselves in community development projects (Ongachi *et al.,* 2018; Baloyi & Geyer, 2019).

The results in Table 4.4 show that age had positive relationship and significant with the community participation (0.000<0.05). Further, the results show that the unit increase in age of the community increases the chances of him/her in community development projects by 0.703 times. The results demonstrate that when a person becomes older, his or her likelihood of taking part in programs to develop water situation likewise increases. This could be highly influences by the experience and tragedy the elderly people faced and the sense of responsibility developed within themselves (Zikargae *et al.,* 2022). Moreover, the elderly or retired individuals may have more time available for community involvement compared to younger individuals who are actively employed or raising families; therefore, this extra time can facilitate their participation (Hassan *et al.,* 2017).

Moreover, as indicated by Table 4.4 the results show that sex has a significant influence (0.02<0.05) on community participation in development projects positively at a rate of 1.089. The results show that males are the ones who mostly participated in water development projects than females. This means that males were considered a lot to give views on the water development projects than women. This could be highly influenced by certain gender roles in the society where women are highly discouraged to be involved in decision making activities and leadership roles, on the other hand women might be expected to focus on household and caregiving roles thus limiting women participation in water development project activities (Rouhani, 2017; Asaolu *et al.,* 2018).

**Table 4.4 Socioeconomic Drivers of Community Participation**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variables** | **B** | **Df** | **Sig.** |
| Occupation | 3.114 | 3 | .331 |
| Education level | 6.336 | 4 | .216 |
| Income level | 0.806 | 1 | .001\* |
| Age | 0.703 | 2 | .000\* |
| Sex | 1.089 | 1 | .002\* |
| \*=Statistically significant at α = 0.05 |  |  |

## 4.7 Challenges facing water project sustainability in Morogoro Municipal

In Table 4.5, poor infrastructure was mentioned as the major challenge hindering water sustainability in the study area (38.6%), also, inadequate funding was among the challenges mentioned affecting the sustainability of water projects (29.1%), 1.9% of the respondents said poor community participation, 20.3% of the respondents said ineffective management, and 10.1% of the respondents said climate change. This implies that water infrastructures in the study area are not conducive for the water supplying sustainably. The results are in line with the study by Dangui and Jia (2022) who reported that poor access to water and sanitation infrastructure and related mortality in Sub-Saharan Africa of water supply and delivery are major challenges. Furthermore, weak governments, corruption, mismanagement of resources, poor long-term investment, and a lack of environmental research and urbanization highly influences the existence of poor water infrastructures (Anim & Ofori-Asenso, 2020).

Table 4.5 Challenges in Water Projects

|  |  |  |
| --- | --- | --- |
| **Challenges** | **Count** | **Percent (%)** |
| Poor infrastructure | 61 | 38.6 |
| Inadequate funding | 46 | 29.1 |
| Poor community participation | 3 | 1.9 |
| Ineffective management | 32 | 20.3 |
| Climate change | 16 | 10.1 |
| Total | 158 | 100.0 |
| \**Multiple response result* |  |  |

## 4.8 Results

Conclusively, results on demographic information showed that more than half of respondents were males (58%), also, majority were married (47%), and most had primary education (57%). Also, majority were self-employed. Further, there was low community participation in water development projects. The grand mean for water infrastructure adequacy was 2.8, which indicates a low level of water adequacy. Additionally, the mean score of 2.74 indicated a moderate effectiveness of water project management. Additionally, inadequate water infrastructure (38.6%) posed the biggest threat to the viability of the water projects. Moreover, on factor influencing community participation, age, sex, and income were significantly influencing community participation in water development projects, whereas occupation, and education level were not statistically influencing community participation in community development projects. Therefore, it is recommended that there should be increase in community involvement in water development projects, this could be achieved by involving a participatory approach. Also, effort should be made to actively engage women in water development projects. Initiatives to encourage and support female participation can help balance gender representation and enhance community involvement.

**CHAPTER FIVE**

**SUMMARY, CONCLUSION AND RECOMMENDATIONS**

# 5.1 Overview

This section covers the research, conclusion and recommendations which outlines the research in brief by presenting the key areas of the research, also the section present conclusion to the research and recommendations to respectively stakeholders.

## 5.2 Summary of the Study

The current study assessed the impact of infrastructure and management on water projects sustainability in Morogoro municipal. The study aimed at investigating the factors that affect the sustainability of water projects. The study specifically focused on assessing the adequacy of water infrastructures in water projects, evaluating the effectiveness of water project management in Morogoro Municipal, identifying the challenges facing water project sustainability in Morogoro Municipal, and determining the role of community participation in the sustainability of water projects in Morogoro Municipal. The study was guided by a community participation theory. Also, the study employed a cross-sectional research design with a mixed-method research approach. Further, descriptive statistical, content, Likert scale, and binary logistic regression analysis were used in this study.

## 5.3 Conclusion of the study

In conclusion, community involvement in water development initiatives was limited. A low degree of water adequacy is indicated by the grand mean of 2.8 for water infrastructure adequacy. Furthermore, the water project management's modest efficacy was indicated by the mean score of 2.74. Additionally, the largest risk to the water projects' feasibility was inadequate water infrastructure, accounting for 38.6% of the total. Furthermore, whereas occupation and education level did not statistically influence community engagement in community development projects, age, sex, and income did significantly influence community participation in water development projects.

**5.4 Recommendation of the study**

Therefore, it is recommended that there should be increase in community involvement in water development projects, this could be achieved by involving a participatory approach. Also, effort should be made to actively engage women in water development projects. Initiatives to encourage and support female participation can help balance gender representation and enhance community involvement.

## REFERENCES

Adelodun, B., Ajibade, F. O., Ighalo, J. O., Odey, G., Ibrahim, R. G., Kareem, K. Y., ... & Choi, K. S. (2021). Assessment of socioeconomic inequality based on virus-contaminated water usage in developing countries: a review. *Environmental Research*, *192*, 110309.

Anim, D. O., & Ofori-Asenso, R. (2020). Water scarcity and COVID-19 in sub-Saharan Africa. *Journal of infection*, *81*(2), e108-e109.

Asaolu, I. O., Alaofè, H., Gunn, J. K., Adu, A. K., Monroy, A. J., Ehiri, J. E., ... & Ernst, K. C. (2018). Measuring women's Empowerment in sub-Saharan Africa: exploratory and confirmatory factor analyses of the demographic and health surveys. *Frontiers in psychology*, *9*, 994.

Asare-Donkor, N. K., Awuah, E., & Amponsah, O. W. (2017). Community participation in rural water projects: A study of the Moringa Oleifera Foundation in Ghana. *African Journal of Environmental Science and Technology*, 11(10), 426-435.

Avtar, R., Tripathi, S., Aggarwal, A. K., & Kumar, P. (2019). Population–urbanization–energy nexus: a review. *Resources*, *8*(3), 136.

Baloyi, T. V., & Geyer, S. (2019). Perceptions and experiences of participants regarding the effectiveness of income-generating projects in alleviating poverty in the rural communities of the Ba-phalaborwa municipality, South Africa. *Gender and Behaviour*, *17*(4), 13970-13981.

Bishoge, O. K. (2021). Challenges facing sustainable water supply, sanitation and hygiene achievement in urban areas in sub-Saharan Africa. *Local Environment*, *26*(7), 893-907.

Bjornlund, V., Bjornlund, H., & Van Rooyen, A. F. (2020). Why agricultural production in sub-Saharan Africa remains low compared to the rest of the world–a historical perspective. *International Journal of Water Resources Development*, *36*(sup1), S20-S53.

Boretti, A., & Rosa, L. (2019). Reassessing the projections of the world water development report. *NPJ Clean Water*, *2*(1), 15.

Burian, S. J., Ward, M., Banuri, T., Chaudhry, M. A., Ahmad, S., Lashari, B., ... & Qureshi, A. L. (2017). Higher education capacity building in water resources engineering and management to support achieving the sustainable development goal for water in Pakistan. American Society for Engineering Education.

Connell, J. P., & Kubisch, A. C. (1998). Applying a theory of change approach to the evaluation of comprehensive community initiatives: Progress, prospects, and problems. In New approaches to evaluating community initiatives: Concepts, methods, and contexts (pp. 25-48). Aspen Institute.

Creswell, J. W., & Clark, V. L. P. (2017). *Designing and conducting mixed methods research*. Sage publications.

Dangui, K., & Jia, S. (2022). Water infrastructure performance in Sub-Saharan Africa: an investigation of the drivers and impact on economic growth. *Water*, *14*(21), 3522.

Dos Santos, S., Adams, E. A., Neville, G., Wada, Y., De Sherbinin, A., Bernhardt, E. M., & Adamo, S. B. (2017). Urban growth and water access in sub-Saharan Africa: Progress, challenges, and emerging research directions. *Science of the Total Environment*, *607*, 497-508.

Eklund, L. (1999). *From citizen participation towards community empowerment*. Tampere University Press.

Garcia, M., Okada, M., & Gwee, E. (2022). Water conservation strategies in urban areas: A review of rainwater harvesting and greywater reuse. Sustainable Cities and Society, 94, 103328.

Gomez, M., Perdiguero, J., & Sanz, A. (2019). Socioeconomic factors affecting water access in rural areas of low and middle income countries. *Water*, *11*(2), 202.

Gupta, A., Sahoo, S., Shukla, S., & Tripathi, R. M. (2021). Emerging threats of water pollution on human health: a review. Environment international, 153, 105828.

Haji, Y., Gezahegn, B., & Lefore, N. (2019). Water management practices and challenges in urban water supply systems: a case study of Addis Ababa City, Ethiopia. International Journal of Water Resources Development, 35(2), 253-269.

Hassan, F. A., Ong’ayo, H. A., Osore, M. K., Morara, G. N., & Aura, C. M. (2017). Effect of community participation in access to social services: a case study of hazina ya maendeleo ya pwani approach in coastal kenya. *Open Journal of Social Sciences*, *5*(11), 160-180.

Hlayisi, V. G. (2022). Increasing unemployment rate amongst health professionals: Will there be jobs for newly graduated South African audiologists post-COVID-19?. *South African Journal of Communication Disorders*, *69*(2), 909.

Hutton, G., Chase, C., & Haller, L. (2015). Water, sanitation and hygiene and health: a systematic review and meta-analysis. World Health Organization.

Kiper, T. (2019). Water Scarcity in Tanzania: Causes, Effects and Solutions. World Bank Blogs.<https://blogs.worldbank.org/water/water-scarcity-tanzania-causes-effects-and-solutions>.

Luh, J., Bartram, J., & Hug, J. (2017). Decentralized systems for potable water and the potential of membrane technology. *Water Research*, 115, 318-332.

Lyimo, J. G., Sikira, A. N., & Mushi, S. E. (2018). Community participation in water projects and access to clean water in Tanzania. International Journal of Scientific and Research Publications, 8(2), 201-208.

Magagan, K. C., & Ngugi, L. (2021). Influence of project management practices on performance of projects in Unilever Kenya Ltd. *International Academic Journal of Information Sciences and Project Management*, *3*(6), 392-418.

Marwa, F. A., Mallya, J. G., & Ramadhani, M. A. (2019). The impact of water supply management on access to clean water in Tanzania. International Journal of Scientific and Research Publications, 9(1), 13-19.

Mbwette, T. S. A., Magigi, W., & Kaseva, M. E. (2017). Water quality and access to clean water in rural Tanzania. Physics and Chemistry of the Earth, Parts A/B/C, 100, 165-169.

Memon, F. A., Mahar, R. B., & Baloch, M. A. (2020). Challenges of water resource management in developing countries: A case study of Pakistan. *Journal of Cleaner Production,* 247, 119238.

Mhina, A. S. (2021). Water resource management and water use conflicts in Ngerengere water catchment, Morogoro Tanzania. (Doctoral dissertation). Sokoine University of Agriculture.

Muriithi, I. M., Kimemia, D., Njeru, R. W., & Ndung’u, S. G. (2018). Sustainable water resources management: A case of Thika sub-catchment, Kenya. *Water Resources Management*, 32(3), 939-951.

Mwakalinga, A. M., Kaseva, M. E., & Mziray, E. N. (2017). Assessment of the Status of Water Supply, Sanitation and Hygiene in Morogoro Rural District, Tanzania. *Tanzania Journal of Science,* 43(2), 175-188.

Mziray, A. E., Katima, J. H. Y., & Kyessi, A. G. (2019). Factors affecting implementation of rural water projects in Tanzania: a case of Mkuranga district. *Journal of Water, Sanitation and Hygiene for Development,* 9(1), 113-123.

NBS. (2020). Population Distribution by Administrative Units. Retrieved from [https://www.nbs.go.tz/nbs/takwimu/census2012/Population%20Distribution%20by%20Administrative%20Units-Regional%20Profiles--Vol%20I.pdf](https://www.nbs.go.tz/nbs/takwimu/census2012/Population%20Distribution%20by%20Administrative%20Units-Regional%20Profiles--Vol%20I.pdf%22%20%5Ct%20%22_new)

Nelson, S., Drabarek, D., Jenkins, A., Negin, J., & Abimbola, S. (2021). How community participation in water and sanitation interventions impacts human health, WASH infrastructure and service longevity in low-income and middle-income countries: a realist review. *BMJ open*, *11*(12), e053320.

Nhapi, I., Gumbo, J. R., & Murwira, A. (2018). Water quality and access in peri-urban areas: A case study of the Driefontein Aquifer, South Africa. Physics and Chemistry of the Earth, Parts A/B/C, 104, 42-49.

Ongachi W., Onwonga R., Nyanganga H., Wangia S. & Chimoita E., (2018). Farmers’ knowledge, attitude, and perception of video-mediated learning vis-à-vis Farmer Field School on Striga weed management in Western Kenya. University of Nairobi, Kenya, International *Journal of Education and Development using Information and Communication Technology (IJEDICT),* 2018, Vol. 14, Issue 2, pp. 195-210

Ostad-Ali-Askari, K., & Eslamian, S. (2019). Sustainable water management and higher education. *Encyclopedia of Sustainability in Higher Education*, 1884-1892.

Oyegoke, A. S., Akinwale, O. P., & Oyetunji, A. O. (2020). Impact of water infrastructure development on access to clean water in rural Nigeria. Water Supply, 20(1), 340-347.

Rakodi, C. (2016). The urban challenge in Africa. In *Managing urban futures* (pp. 63-86). Routledge

Reweta, W. S. J. (2001). *Urban water supply in Tanzania: the case of Hai Water Project in Kilimanjaro Region and Dar es Salaam city*. Colorado State University.

Rouhani, L. (2017). Unpacking community participation: A gendered perspective. *Current Issues in Comparative Education*, *20*(1), 31-44.

Senkondo, E. M., & Mdoe, N. S. (2019). Challenges facing water infrastructures in Tanzania. Journal of Environmental Management and Tourism, 10(6), 1196-1207.

Setia, M. S. (2016). Methodology series module 3: Cross-sectional studies. *Indian journal of dermatology*, *61*(3), 261.

Smith, J. D., Bartram, J., & Hutton, G. (2018). Water, sanitation, and hygiene in schools: status and implications of low coverage in Ethiopia, Kenya, Mozambique, Rwanda, Uganda, and Zambia. International journal of hygiene and environmental health, 221(3), 409-417.

Stefanski, A., Valli, L., & Jacobson, R. (2016). Beyond Involvement and Engagement: The Role of the Family in School-Community Partnerships. *School Community Journal*, *26*(2), 135-160.

Sweya, L. N., Wilkinson, S., Kassenga, G., & Lugomela, G. (2021). Development of a tool for measuring resilience of water supply systems in Tanzania: technical dimension. *Journal of Water Resources Planning and Management*, *147*(2), 04020107.

Tantoh, H. B., Simatele, D. M., Ebhuoma, E., Donkor, K., & McKay, T. J. (2021). Towards a pro-community-based water resource management system in Northwest Cameroon: Practical evidence and lessons of best practices. *GeoJournal*, *86*, 943-961.

Tyhotyholo, T., & Ncube, B. (2023). The rhetoric of community participation in urban South African water governance. *Utilities Policy*, *82*, 101573.

UN. (2015). Transforming our world: The 2030 Agenda for Sustainable Development. [https://www.un.org/ga/search/view\_doc.asp?symbol=A/RES/70/1&Lang=E](https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E" \t "_new)

UN. (2021). Water Development Report 2021: Data and insights on SDG 6.1 & 6.2. Retrieved from [https://www.unwater.org/publications/water-development-report-2021/](https://www.unwater.org/publications/water-development-report-2021/%22%20%5Ct%20%22_new)

UNICEF. (2017). Progress on Drinking Water, Sanitation and Hygiene: 2017 Update and SDG Baselines. Retrieved from [https://www.unicef.org/publications/index\_96611.html](https://www.unicef.org/publications/index_96611.html%22%20%5Ct%20%22_new)

UNICEF. (2019). Water, Sanitation and Hygiene. Retrieved from [https://www.unicef.org/wash/index\_101757.html](https://www.unicef.org/wash/index_101757.html%22%20%5Ct%20%22_new)

UNICEF. (2020). Tanzania: Water, Sanitation and Hygiene. Retrieved from [https://www.unicef.org/tanzania/water-sanitation-and-hygiene](https://www.unicef.org/tanzania/water-sanitation-and-hygiene%22%20%5Ct%20%22_new)

USAID. (2011). How to build a theory of change. Retrieved from [https://www.usaid.gov/sites/default/files/documents/1865/How-To-Build-A-Theory-of-Change.pdf](https://www.usaid.gov/sites/default/files/documents/1865/How-To-Build-A-Theory-of-Change.pdf%22%20%5Ct%20%22_new)

WHO. (2019). Water sanitation hygiene. Retrieved from [https://www.who.int/news-room/fact-sheets/detail/water-sanitation-hygiene](https://www.who.int/news-room/fact-sheets/detail/water-sanitation-hygiene%22%20%5Ct%20%22_new)

Williams, A. P., Allen, C. D., Millar, C. I., Swetnam, T. W., Michaelsen, J., Still, C. J., & Leavitt, S. W. (2020). Forest responses to increasing aridity and warmth in the southwestern United States. Proceedings of the National Academy of Sciences, 117(21), 11946-11952.

World Health Organization and UNICEF. (2021). Progress on household drinking water, sanitation and hygiene 2000-2020: five years into the SDGs. Geneva: World Health Organization.

Zikargae, M. H., Woldearegay, A. G., & Skjerdal, T. (2022). Assessing the roles of stakeholders in community projects on environmental security and livelihood of impoverished rural society: A nongovernmental organization implementation strategy in focus. *Heliyon*, *8*(10).

# APPENDICES

## Appendix 1

**Research Budget**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **ACTIVITY** | **ITEM** | **COST** | **TOTAL COST** |
| 1 | Research development | Stationary services | 900,000 | 1,000,000 |
| Internet  | 100,000 |
| 2 | Ethical permit |  |  | 250,000 |
| 3 | Data collection | Transport | 750,000 | 1,920,000 |
| Meals | 360,000 |
| Accommodation  | 160,000 |
| Communications (phone calls and internet bundles) | 150,000 |
| Field assistance | 250,000 |
| Interview  | 250,000 |
| 4 | Data analysis |  |  | 700,000 |
| 5 | Report submission | Dissertation production and publication |  | 1,000,000 |
|  | TOTAL |  |  | 4,870,000/= |

## Appendix 2

**Work Activity**

|  |  |
| --- | --- |
| **YEAR** | **2023** |
| **ACTIVITIES** | **Jan-Apr** | **May-June** | **July-Aug** | **July-Aug** |
| Proposal development and presentation |  |  |  |  |
| Data collection and analysis |  |  |  |  |
| Report writing and submission of the dissertation |  |  |  |  |

## Appendix 3;

**Questionnaire for Household Respondents**

**Introduction**

Dear Sir/Madam

I’m, **ANSGAR THOMAS KABUTELANA**, a post graduate student pursuing MSc. Project Management at Open University. Currently, I am conducting a study on **“Assessing the Impacts of Infrastructure and Management on Water Projects Sustainability in Morogoro Municipal, Tanzania”.** The study is guided by three objectives which are to; assess adequacy of water infrastructures in Morogoro Municipal water projects; evaluate the effectiveness of water projects sustainability in Morogoro municipal; identify challenges facing water project sustainability in Morogoro municipal; and determine role of community participation in sustainability of water projects in Morogoro municipal. In order to ensure an objective and comprehensive assessment and to capture all important results and emerging lessons, I kindly ask for your cooperation in providing evidence-based responses to each question. Your responses, which should be based on verifiable and available evidence, will provide valuable inputs for preparing my MSc Thesis. Please avoid simple Yes/No answers to the extent possible and provide brief explanations, supported by relevant evidence and references to relevant reports, which can provide further details. Please be assured that the responses you provide are for academic purposes and will strictly be kept confidential. Your assistance in responding to the following questions will help the study achieve its stated objectives. I sincerely thank you for your collaboration and cooperation.

**SECTION A (PART 1): Personal background information**

Please fill in where the space is provided and *tick* **()** where applicable to indicate your response

Name of ward: ........................Name of subward:.............................Date of interview:.................

1. Sex

a) Male

b) Female

2. Age: ………………………………………………………………..

3. Marital Status of the respondent

1) Single 3) Divorced/Separated 5) Never married

2) Married 4) Widow/Widower

4. Education level of the respondent.................... [Years of schooling].

5. Main Occupation of the respondent

**SECTION B; ADEQUACY OF WATER INFRASTRUCTURES IN MOROGORO MUNICIPAL**

1. How would you rate the adequacy of water infrastructure in your area?
a. Very adequate
b. Adequate
c. Somewhat adequate
d. Inadequate
e. Very inadequate
2. How often do you experience water shortages in your area?
a. Daily
b. Weekly
c. Monthly
d. Rarely
e. Never
3. How satisfied are you with the quality of water provided by the Morogoro Municipal water projects?
a. Very satisfied
b. Satisfied
c. Somewhat satisfied
d. Dissatisfied
e. Very dissatisfied
4. Have you ever experienced any water-related health issues in your area?
a. Yes
b. No
5. How accessible is the water infrastructure in your area?
a. Very accessible
b. Accessible
c. Somewhat accessible
d. Inaccessible
e. Very inaccessible
6. How reliable is the water supply in your area?
a. Very reliable
b. Reliable
c. Somewhat reliable
d. Unreliable
e. Very unreliable
7. Have you ever experienced any interruptions in the water supply in your area?
a. Yes
b. No
8. How effective is the maintenance of the water infrastructure in your area?
a. Very effective
b. Effective
c. Somewhat effective
d. Ineffective
e. Very ineffective
9. How often do you receive information about the water infrastructure in your area?
a. Daily
b. Weekly
c. Monthly
d. Rarely
e. Never
10. What suggestions do you have for improving the adequacy of water infrastructure in Morogoro Municipal water projects?
a. Increase investment in water infrastructure
b. Improve maintenance of existing infrastructure
c. Increase public awareness of water conservation
d. Increase public participation in water management
e. Other (please specify)
11. Perception towards adequacy of water infrastructures in Morogoro Municipality

*Tick* **()** *where applicable to indicate your response based on the following Likert scale*

Likert scale: 5= Strongly Agree; 4= Agree; 3= Neutral; 2= Disagree; 1= Strongly Disagree.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Perception Statements** | **5** | **4** | **3** | **2** | **1** |
| The water infrastructure in my household in Morogoro Municipal is adequate to meet our needs. |  |  |  |  |  |
| I experience water shortages or disruptions in my household in Morogoro Municipal frequently. |  |  |  |  |  |
| I believe that the water infrastructure in Morogoro Municipal is well-maintained and reliable. |  |  |  |  |  |
| I am satisfied with the quality of piped water in Morogoro Municipal. |  |  |  |  |  |
| Investing in upgrading and expanding the water infrastructure in Morogoro Municipal is important for the well-being of the population. |  |  |  |  |  |
| The water supply in my household in Morogoro Municipal is reliable and consistent. |  |  |  |  |  |
| The cost of water in Morogoro Municipal is reasonable and affordable for my household. |  |  |  |  |  |
| I believe that the government should invest more in improving the water infrastructure in Morogoro Municipal to meet the needs of the population. |  |  |  |  |  |
| The water infrastructure in Morogoro Municipal is well-maintained and regularly serviced. |  |  |  |  |  |
| I am aware of the measures taken by the government to improve the water infrastructure in Morogoro Municipal. |  |  |  |  |  |

**SECTION C; EFFECTIVENESS OF WATER PROJECT MANAGEMENT**

1. How would you rate the effectiveness of water project management in Morogoro Municipal?
a. Very effective
b. Effective
c. Somewhat effective
d. Ineffective
e. Very ineffective
2. How satisfied are you with the communication between the water project management and the community?
a. Very satisfied
b. Satisfied
c. Somewhat satisfied
d. Dissatisfied
e. Very dissatisfied
3. How transparent is the decision-making process of the water project management?
a. Very transparent
b. Transparent
c. Somewhat transparent
d. Not transparent
e. Very not transparent
4. How responsive is the water project management to community needs and concerns?
a. Very responsive
b. Responsive
c. Somewhat responsive
d. Not responsive
e. Very not responsive
5. How effective is the maintenance of the water infrastructure by the water project management?
a. Very effective
b. Effective
c. Somewhat effective
d. Ineffective
e. Very ineffective
6. How satisfied are you with the quality of water provided by the water project management?
a. Very satisfied
b. Satisfied
c. Somewhat satisfied
d. Dissatisfied
e. Very dissatisfied
7. How effective is the water project management in addressing water-related health issues?
a. Very effective
b. Effective
c. Somewhat effective
d. Ineffective
e. Very ineffective
8. How effective is the water project management in addressing water shortages?
a. Very effective
b. Effective
c. Somewhat effective
d. Ineffective
e. Very ineffective
9. How effective is the water project management in addressing water-related environmental issues?
a. Very effective
b. Effective
c. Somewhat effective
d. Ineffective
e. Very ineffective
10. What suggestions do you have for improving the effectiveness of water project management in Morogoro Municipal? Tick all that applies (√)
a. Increase community participation in water project management
b. Improve communication between the water project management and the community
c. Increase transparency in the decision-making process of the water project management
d. Increase responsiveness to community needs and concerns
e. Other (please specify)

**SECTION D; CHALLENGES FACING WATER PROJECT SUSTAINABILITY**

1. How would you rate the sustainability of water projects in Morogoro Municipal?
a. Very sustainable
b. Sustainable
c. Somewhat sustainable
d. Unsustainable
e. Very unsustainable
2. What are the major challenges facing water project sustainability in Morogoro Municipal?
a. Poor infrastructure
b. Inadequate funding
c. Lack of community participation
d. Ineffective management
e. Climate change
f. Other (please specify)
3. How effective is the management of water resources in Morogoro Municipal?
a. Very effective
b. Effective
c. Somewhat effective
d. Ineffective
e. Very ineffective
4. How effective is the maintenance of water infrastructure in Morogoro Municipal?
a. Very effective
b. Effective
c. Somewhat effective
d. Ineffective
e. Very ineffective
5. How effective is the communication between the water project management and the community in Morogoro Municipal?
a. Very effective
b. Effective
c. Somewhat effective
d. Ineffective
e. Very ineffective
6. How effective is the community participation in water project management in Morogoro Municipal?
a. Very effective
b. Effective
c. Somewhat effective
d. Ineffective
e. Very ineffective
7. How effective is the implementation of water conservation measures in Morogoro Municipal?
a. Very effective
b. Effective
c. Somewhat effective
d. Ineffective
e. Very ineffective
8. How effective is the implementation of climate change adaptation measures in Morogoro Municipal?
a. Very effective
b. Effective
c. Somewhat effective
d. Ineffective
e. Very ineffective
9. What suggestions do you have for improving the sustainability of water projects in Morogoro Municipal? Tick all that applies (√)
a. Increase funding for water projects
b. Improve infrastructure for water projects
c. Increase community participation in water project management
d. Improve communication between the water project management and the community
e. Increase implementation of water conservation measures
f. Increase implementation of climate change adaptation measures
g. Other (please specify)

**SECTION E; THE ROLE OF COMMUNITY PARTICIPATION IN THE SUSTAINABILITY OF WATER PROJECTS**

1. How important is community participation in the sustainability of water projects in Morogoro Municipal?
a. Very important
b. Important
c. Somewhat important
d. Not important
e. Very not important
2. How involved are you in the management of water projects in your community?
a. Very involved
b. Involved
c. Somewhat involved
d. Not involved
e. Very not involved
3. How effective is the communication between the water project management and the community in Morogoro Municipal?
a. Very effective
b. Effective
c. Somewhat effective
d. Ineffective
e. Very ineffective
4. How effective is the community participation in the management of water projects in Morogoro Municipal?
a. Very effective
b. Effective
c. Somewhat effective
d. Ineffective
e. Very ineffective
5. How effective is the implementation of community-led water projects in Morogoro Municipal?
a. Very effective
b. Effective
c. Somewhat effective
d. Ineffective
e. Very ineffective
6. How effective is the implementation of community-led water conservation measures in Morogoro Municipal?
a. Very effective
b. Effective
c. Somewhat effective
d. Ineffective
e. Very ineffective
7. How effective is the implementation of community-led climate change adaptation measures in Morogoro Municipal?
a. Very effective
b. Effective
c. Somewhat effective
d. Ineffective
e. Very ineffective
8. What suggestions do you have for improving community participation in the sustainability of water projects in Morogoro Municipal? Tick all that applies (√)
a. Increase community awareness of the importance of water conservation
b. Increase community involvement in water project management
c. Improve communication between the water project management and the community
d. Increase funding for community-led water projects
e. Other (please specify)

***Thank you for your cooperation***

**Contact Information**

**Phone Contact: *0656807111***

**Email:** *ansgarthomsy@gmail.com*

**Key Informant Checklist**

1. What are the main factors that contribute to the sustainability of water projects in the municipality?
2. How do socio-economic factors affect the sustainability of water projects in the municipality?
3. What are the environmental factors that impact the sustainability of water projects in the municipality?
4. How does the institutional arrangement for water project management affect the sustainability of water projects in the municipality?
5. What are the challenges faced by water projects in the municipality in terms of long-term reliability and equipment maintenance?
6. How does the growing demand for water in the municipality affect the sustainability of water projects?
7. What measures have been taken to ensure the sustainability of water projects in the municipality?
8. How does the revenue generated by water projects in the municipality impact their sustainability?
9. What role do community engagement and participation play in ensuring the sustainability of water projects in the municipality?
10. How can the sustainability of water projects in the municipality be improved in the future?