ASSESSING SUSTAINABLE WATER AND SANITATION PROJECT MANAGEMENT IN RURAL AREAS OF KENYA: IMPACT ON SAFE WATER AVAILABILITY AND HYGIENIC PRACTICES IN FUNYULA SAMIA SUB-COUNTY

BY

VIVIAN NASIRUMBI WABWIRE

SUPERVISOR

AWOKE GUADIE (PHD)

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DECLARATION

I, Vivian Nasirumbi Wabwire, declare that this thesis is my own original work and it has not been presented and will not be presented by me to any other university for similar or any other degree award, and all sources of material used for this thesis have been duly acknowledged.

Signature:

Vivian N. Wabwire (Author)

Date _____22nd MARCH 2024_____

ADVISOR APPROVAL SHEET

This is to certify that the thesis entitled **"Assessing sustainable water and sanitation project management in rural areas of Kenya: Impact on safe water availability and hygienic practices in Funyula Samia Sub-County"** submitted in partial fulfillment of the requirements for the degree of **Master of Science in Water Policy,** the Graduate Program of the Pan Africa **Institute for Water and Energy Sciences (incl. Climate Change),** and has been carried out by Vivian Nasirumbi Wabwire Id. No **PAUWES/2022/MWP03**, under my supervision. Therefore, I recommend that the student has fulfilled the requirements and hence hereby can submit the thesis to the Water Program for defense.

Awoke Guadie Alemu (PhD)		**21/03/2024**
Name of Principal advisor	**Signature**	**Date**

DEDICATION

This work is dedicated to my family for being my source of motivation and support.

EXAMINERS' APPROVAL PAGE

This topic: Assessing sustainable water and sanitation project management in rural areas of Kenya: Impact on safe water availability and hygienic practices in Funyula Samia sub-county

Submitted by: Vivian Nasirumbi Wabwire

Approved by: We examiners' board approve that this thesis has passed through the defense and review process.

Chairperson	Signature	Date
External Examiner	Signature	Date
Internal Examiner	Signature	Date
Principal advisor	Signature	Date
(DGC/SGC)	Signature	Date

Signature and stamp of the Institute

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ACRONYMS

SPSS	Statistical Package for the Social Sciences
SDGs	Sustainable Development Goals
WASH	Water Supply, Sanitation, and Hygiene
UNCEF	United Nations Children's Fund
WHO	World Health Organization
ADB	Asian Development Bank
KESHP	Kenya Environmental Sanitation and Hygiene Policy
CLTSI	Community-Led-Total Sanitation Intervention
CIDA	Canadian International Development Agency
DFID	Department for International Development
NERCORMP	North Eastern Region Community Resource Management Project
WRUA	Water Resources Users Associations
AfDB	Kenya Integrated Water Sanitation and Hygiene Program
IWA	International Water Association
KIWASH	Kenya Integrated Water Sanitation and Hygiene Program
KESHSF	Kenya Environmental Sanitation and Hygiene Strategic Framework
ODF	Open Defecation Free
WVK	World Vision Kenya
USAID	U.S. Agency for International Development

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ABSTRACT

Water is an essential commodity for the sustenance of human life and economic progress. However, it is a scarce resource and it is access and use often generates competition and conflict among the users. Water resources management authority has provided guidelines on the administrative organization and standard operations of community-based water projects in Kenya and government managed projects. The success or failure of water and sanitation projects in rural areas can be influenced by level of community participation and ownership, training and education of the project leaders, governance structure of the project and basic management skills of leaders among other factors such as financial and technical support. Prudent use and management of the water resource is therefore fundamental. The purpose of this study was to assess sustainable water and sanitation project management in Kenya rural areas, especially Funyula-Samia sub-county was considered for investigation. The aim was to identify factors that determine sustainable water, sanitation and hygienic practices management in the rural areas of Kenya. The study also investigated how do integrated and institutional management of water and sanitation projects programs impact on sustainability of water supply and hygiene practices in rural areas. The study adopted a descriptive survey design to collect primary and secondary data. The total target population comprised 2000, from 200 respondents were purposively selected. The sample comprised management committee (n=34), official (n=3), and project (n=163) members in the three water projects. Primary data was collected using questionnaires, observations, and interviews. The questionnaires were administered to randomly selected individuals in each sample category so as to collect both quantitative and qualitative data. The data was compiled, given codes and input into SPSS version 26 for statistical descriptive and correlation analysis. Results revealed that factors such as training on various areas [project management ($R=0.602$, $p< 0.001$), technical expert ($R=0.753$, $p< 0.001$), financing ($R=0.894$, $p< 0.002$)], and community involvements ($R=0.875$, $p< 0.006$) have significant relationship to sustainable water management projects and factors such as community capacity building ($R=0.679$, $p< 0.001$), hygiene practices training ($R=0.80$, $p< 0.001$), behavioural change communication ($R=0.70$, $p< 0.001$), and continuous monitoring ($R=0.90$, $p< 0.001$) have significant relationship with sustainable sanitation management programs. Stakeholder involvement and financing have also significant relationship with water and sanitation programs leading accessible clean water and improve hygiene practices of rural people. Overall, the findings of this study indicated that rural water and sanitation management

programs still face challenges to implement sustainable development goal 6 (SDG-6), which have been targeted to achieve clean water and sanitation to all by 2030. More investment that directs project leader and member training, and finance to increase infrastructure development is recommended to achieve SDG-6.

Keywords: Water and sanitation, Management programs, Sustainability community, Stakeholder involvement.

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

Water is one of live saving resources that human being cannot survive without. A sustainable supply of adequate safe water, sanitation and hygiene services are fundamental for economic, environmental and health activities. The World Population Data Sheet of 2020 demonstrates that the global total populace is projected to increase from 7.8 billion in 2020 to 9.9 billion by 2050. This level represents an increase of more than 25% from 2020. Approximately, 2 billion people around the world do not have safely managed drinking water services, 3.6 billion people do not have safely managed sanitation services, and 2.3 billion lack basic hand washing facilities. Gaps in access to water supply and sanitation, growing populations, more water-intensive patterns of growth, increasing rainfall variability, and pollution are combining in many places to make water one of the greatest risks to economic progress, poverty eradication and sustainable development. Sanitation is critical to health, economic growth and the environment. Investing in sanitation is about safeguarding human health, investing in people and transforming lives. Approximately 446,000 children under 5 years die due to diarrhea linked to inadequate WASH. This amounts to 9% of the 5.8 million deaths of children younger than 5 years (World Bank Data, 2021).

Human development depends on strategies and policies with time bound objectives at all levels. In 2015, the United Nations General Assembly put out 17 Sustainable Development Goals (SDGs) to assist with making a better fairer world by 2030 and be a "blueprint to accomplish a superior and more supportable future for all". The SDG-6 specifically, sets the objectives of accomplishing; general and evenhanded admittance to protected and reasonable water for all, admittance to sufficient and equitable sanitation and proper hygiene for all just as end disposal of human faeces in open spaces. The projected access to safe water and sanitation (SDG-6) would contribute to improved health by annihilation of the water-borne infections. For example, cholera and diarrhea that influence most youngsters under age of 5 and furthermore eradicate poverty expanded admittance to safe water and sanitation is anticipated to reduce death rates of the poor in the low income countries. Without expanded sanitation, a facility that securely isolates human waste from human contact individuals must choose the option to utilize insufficient communal pit toilets or to practice open poop. For women and young ladies, finding a spot to go to the latrine outside; regularly delaying until the front of obscurity, can leave them

powerless against misuse and rape. In certain regions of the planet, there is next to zero consciousness of good sanitation and hygiene practices and their role in decreasing the spread of illness. Notwithstanding, it is generally the situation that in any event, when individuals do know about good hygiene behavior, they lack soap, safe water and washing facilities they need to make positive changes to secure themselves and their local community (UNICEF/WHO, 2021).

Accessibility to safe water and sanitation is a precursor for progress in health (SDG-3), education (SDG-4), nutrition decent Work (SDG-2) and economic growth and development of a country (SDG-8), meaning that without access to proper sanitation and hygiene the realization of both the 2030 and 2063 agenda remains an elusive dream. Water will be an instrument of bringing prosperity as it is directly connected to the 17 SDGs. The number of people without access to water is growing in Sub-Saharan Africa (SSA). It is the only region of the world where this is happening. About 387 million people lived without access to basic drinking water services in SSA by 2020, which was 350 million people (WHO, 2000).

As of October 2022, about 226 million people in Eastern and Southern Africa did not have access to basic water services, and 381 million people lacked access to basic sanitation services. The situation is worse in rural areas than in cities. And nine countries (Angola, Democratic Republic of Congo, Ethiopia, Kenya, Madagascar, Mozambique, Sudan, Tanzania, and Uganda) are home to 80% of under served people in the region. Addressing people's need for water and sanitation in these nine countries and continuing to make progress in other parts of the region is key to improving people's lives and boost economic growth. As African countries continue to rapidly urbanize and climate change wreaks havoc on rain patterns and water supplies, the need for innovative and efficient water production, storage, and delivery is stronger than ever. The challenge is to ensure that governments, private sector, and households continue to invest in water and sanitation solutions until all Africans have access to these life-saving, time-saving, and business-creating basic services. Kenya has made significant milestones in improving WASH sector through enactment of sanitation and hygiene policies.

The Kenya Vision 2030 has a goal of ensuring a universal access to safe water and improved sanitation services to all. The vision is also captured in the Kenya Environmental Sanitation and Hygiene Policy (KESHP) 2016–2030, whose main objective is to ensure 100% access to

improved sanitation services by 2030. The constitution of Kenya 2010 in Article 43(1) recognisances access to safe water and sanitation services in adequate quantities as a basic right to every Kenyan. In December 2012, Kenya government and UNICEF jointly implemented a Community-Led-Total Sanitation Intervention (CLTSI) in Busia County to tame poor sanitation that was at 42% vs 49% National. The CLTSI was to achieve total sanitation among Busia County households through sanitation behavior change.

Kenyan government and civil society entities have long been committed to ensuring that water is available, accessible, adequate, safe, and affordable for all citizens. However, the country struggles with physical and economic water scarcity. Four-fifths of the country is arid or semi-arid and prone to drought, and many areas are unable to take advantage of water resources that could help improve livelihoods due to lacking investment. Kenya has been classified as water scarce Country (Birongo and Quyen, 2005) and it is projected that by 2025, the per capita water availability will have dropped to 235 m^3as a result of the increase in population. Kenya is classified among the most water scarce countries in the world. This, coupled with more frequent cycles of severe weather and depleting natural resources, making the country challenged to have domestic water for various uses. Approximately 60% of Kenyans have access to safe drinking water, and 29% have access to basic sanitation. In Kenya, 9.9 million people drink directly from contaminated surface water sources and an estimated five million people practice open defecation. Only 25% have hand-washing facilities with soap and water at home.

Water insecurity, along with a lack of sanitation and hygiene products and services, puts public health at risk (SDG-3), undermines economic growth (SDG-8), fosters political instability (SDG-16), and perpetuates inequalities (SDG-10). Climate change (SDG-13) exacerbates these challenges, and global shocks and stressors, such as the COVID-19 pandemic and Horn of Africa drought, have put a spotlight on the importance of strong water and sanitation governance, finance and institutions for building household and community resilience and protecting economic gains (Water, Sanitation and Hygiene Fact Sheet 2023,USAID.GOV/KENYA). Achieving sustainable water supply remains one of the goals of 3rd world countries. In Africa, many water projects have been done by the governments, development partners and the communities though most of them do not last more than five years after commissioning (Water Supply & Sanitation Collaborative Council, 2012). Hence, there is need for more research, formulation and implementation of sustainable policies and

strategies that will help in sustainability management of water and sanitation projects especially in rural areas. The millennium development goal declaration of the year 2000 aimed at reducing by half the World's population without access to sustainable safe drinking water by 2015. This was a stepping stone towards full global water coverage by the year 2025 as set by the Global Water Partnership Framework for Action and the African Water Vision (ADB, 2007).

Sustainability is the continuation of benefit flows to the local community without the help of the initiators who stimulated those benefits in the first place. Several projects in rural areas in Africa stall after the withdrawal of the donors. Donors play a significant role in the social development process in all regions of the world. They are particularly critical in circumstances where State funds are limited, political situations are fluid, natural disasters resulting from both predictable and unpredictable environmental circumstances occur, ethical strife is rampant and the level of per capital income severely restricts the ability to purchase needed goods and services-social, education and economic. In Central America, donor funded projects were more sustained because of the strength of the institution implementing the projects. The other factors that contributed to sustainability of the projects were; their activities were fully integrated into established administrative; gained significant funding from the national sources and also there was a strong capacity building component. In India, NERCORMP reported a significant degree of success in social mobilization and institutional capacity-building at the community level (Tango International, 2009). The case study attributed much of this success to an emphasis on participatory group formation and a project design reflecting community priorities. Moreover, projects were implemented with significant local contributions of labor, materials and, in some cases cash (Tango International, 2009).

In South Africa, sustainability has undergone major research by natural scientists and environmentalists in order to propound the issue of wise use of resources, both renewable and non-renewable, so that they are made available in right quantities to future generations (Lyson et al., 2001; Treurnicht, 2000). Much of this has been in the field of sustainable development. Joaquine (1994) did a study on development sustainability through community participation in which he associated project failure with weak institutional linkages, scarcity of resources and low workforce motivation. Dempster (1998) and David et al. (2006) define sustainability as the ability of an activity or system to persist. For the purpose of this research, sustainability is defined as the ability of donor aided programs to create systems that continue to connect and impact on the beneficiaries even after the programs are wound up.

In Kenya, Okun (2009) in his study of factors affecting sustainability of donor funded projects in arid and semi-arid areas in Kenya; observes that, there is need to educate and empower the local community on the sustainability of projects to ensure that they able to articulate the goals and objectives of the project and push them forward after withdrawal of donor funding. He adds that, the beneficiaries must be consulted during project conception, preparation and implementation process. Adhiambo (2002) in her work also assessed factors that affect effectiveness of donor funded development projects in Kibera; and noted that there is need to encourage more involvement especially the community in the project planning and implementation in order to increase the probability of sustainability of the projects. Kitonga (2011) in his study on factors affecting sustainability of donor funded rural water projects in Kitui recommended community preparedness to participate in and manage donor funded projects capacity building is key factor. Mureeithi (2012) in his work on influence of community capacity building on performance of water resources users association (WRUA) in water catchment management in Tharaka–Nithi observed that there is need for WRUAs to be capacity build not only in training but on skills of networking, information and knowledge management. The WRUAs support in technical, infrastructure, equipment and human in early stages of WRUA operation in order to make them self-sustaining. Sustainability of water projects in Kenya is questionable. Many water projects stall immediately after the donors' withdrawal. Water being a basic necessity to human beings there is need to establish the reasons why such projects. Institutional development, financial factors, community participations are major determinants of such sustainability.

In Africa and other developing countries national and regional governments, local and international NGOs and other concerned organizations invest large sums every year for the implementation of rural water supply projects (Gebrehiwot, 2006). Despite these huge investments, IRC (2011) observed that despite success in the provision of new rural water infrastructure in the last two to three decades, between 30 to 40% of facilities either do not function or are operating below capacity in most countries in Africa. Therefore, most of the projects fail to achieve their intended objectives of providing water and sanitation services to target communities (Gleik 2006). Most of these projects fail to deliver on their mandate, because weaknesses in design, poor quality construction, use of inappropriate technologies, lack of sufficient resources and management related issues. The situation is compounded by the continuous use of community-based management model of service delivery.

Achieving universal coverage for water supply and adequate sanitation provision is the shared vision of all stakeholders who strive to protect both the health of the population and the environment. Achieving goal number six of the SDG requires approaches that are self-sustaining in WASH service delivery. Whereas the responsibility of water and sanitation service provision has remained the domain of the governments, low investments in the sector coupled by management challenges has affected the main water and sanitation service providers to expand their coverage and further ensure service delivery most communities. As a result of this, there are many actors that have come on board to provide the water and sanitation services to those communities that are undeserved as gap fillers, majority providing these crucial services in rural and peri-urban areas. These are mostly community-based groups, private entrepreneurs, faith based organizations, and amongst others. They mostly provide these services at small and medium scale.

In relation to implementation of projects, sustainability is the probability that a project shall continue long after the outside support is withdrawn. Consequently, while thinking of project sustainability, three things must be born in mind; the community, project results and external assistance. A project is sustainable if the community/beneficiaries are capable on their own without the assistance of outside development partners, to continue producing results for their benefit for as long as their problem still exists. There have been several projects funded by donors such as the World Bank, DFID, CIDA, and USAID among others, to help alleviate poverty in Kenya. Most of these projects have been designed for various communities living in Kenya. Urban and rural communities have been the centre of focus for many donor funded projects. The question that this paper seeks to answer is that why the management programs of these projects not sustainable and their impact not felt after donor withdrawal.

1.2. Statement of the problem

Clean potable water and standard sanitation is basic needs that no one should live without in the 21st century. Water is life and proper standard sanitation brings dignity to people's life. Without achieving this, people's life becomes unbearable and economic sabotage. Rural water and sanitation project beneficiaries often complain of the projects taking long to be completed, others not completed at all and others after completion they break down after some time. The UN water report (2008) states that in many regions of the world, accessibility of water in both

amount and quality are by and large seriously influenced by climatic fluctuations and environmental change. Kenya is a country that has developed policies, institutions management frameworks and still encourages both government and private investor's collaboration in water and sanitation sector development. With all this effort the aim is for equity water and sanitation services access for all in Kenya. Despite all looking good in records on the ground things are different, urban and rural areas still experience their own problems of population increase and over dependence on the infrastructure that was laid down during colonial era and this leads of pollution of our precious resource. Rural areas due to geographical location, terrain of the area and institutions and policies are not functional at the local area in the management of water and sanitation projects they still experiences inadequate access to safe water and standard sanitation services. According to Mumma (2005), 2.5 million in Kenya get their water from rural water projects. Implementation of the projects is faced with so many challenges such politics play out, embezzlement of funds, rejection of the project by the locals and undertaking poor quality work. A few successfully implemented projects they later face the problem of sustainability.

The Kenyan government, the County Governments in collaboration with various non-governmental organizations and international partners, has implemented several water and sanitation programs to enhance the sustainability. However, the long-term sustainability of these programs has been successful on few areas facing lots of challenges but majority of the programs have not been sustainable long enough to serve the community, which is to enhance safe water availability, and promote improved hygiene practices are areas and overall improving the living standard of the people and contributing to the economy of the country. Studies revealed that there is knowledge gap of studies done to investigate the post project implementation assessment sustainability management of both community managed and government indicating that there is a local knowledge gap on water projects' sustainability management program issues in Kenya. Onana, Ojibo and Buduong' water projects are one such project that has not had a post implementation assessment of its sustainability carried out prompting the researcher to carry out this needed assessment in Funyula-Samia in Busia County Kenya.

1.3. Objectives of the study

1.3.1. General objective

The main objective of this study was to assess sustainable water and sanitation project management in rural areas of Kenya: Impact on safe water availability and hygienic practices in Funyula Samia sub-county/

1.3.2. Specific objectives

This study was based on the following specific objectives:

- To identify factors that determine sustainable water projects management programs that ensure clean water supply in rural areas.
- To ascertain factors that determine sustainable sanitation projects management programs that enable sanitation/hygienic practices in the rural areas.
- To investigate how integrated and institutional management of water and sanitation projects do programs impact it is sustainability of water and hygiene projects in rural areas.

1.4. Research questions

The following are research questions:

1. What are the key factors that determine the sustainability of water projects management programs in rural areas?
2. What are the key factors that determine the sustainability of sanitation projects management programs in rural areas?
3. How integrated and institutional management of water and sanitation projects do programs impact it is sustainability of water supply and hygiene practices in rural areas?

1.5. Hypothesis

- Null Hypothesis (H0): There is no significant relationship between the implementation of water and sanitation management programs and safe water availability and hygiene in rural areas.
- Alternative Hypothesis (H1): The implementation of water and sanitation management programs has a significant positive impact on safe water availability and hygiene in rural areas.

CHAPTER TWO: LITERATURE REVIEW

2.1. Concept of sustainability theory

The concept of sustainability gained wider use after the World Commission on Environment and Development published a report titled "Our common future" (Brundtland,1987) which defined sustainability as "development which meets the needs of current generations without compromising the ability of future generations to meet their own needs". According to IFAD strategic framework 2007-2010 (IFAD, 2007) sustainability amount to ensuring that the institutions supported through projects and the benefits realized are maintained and continue after the end of the project. This definition acknowledges that assessment of sustainability entails determining whether the results of the project will be sustained in the medium or even longer term after the project has been handed over to the beneficiaries.

It is of importance to have established a sound literature base around which this study is built, so as to address the aim of this research. According to Tyrrel & Howsam (1999), organizational sustainability, at a broader level, consists of three components: the natural environment, society, and economic performance. It is widely accepted that to achieve sustainability, we must balance economic, environmental, and social factors in equal harmony. In this study, we refer sustainability to the ability of project beneficiaries to maintain and sustain project activities, services, and any measure initiated by a project so as to last long after the expiration of the funding period (Figure 1) shows a visual representation of these three components.

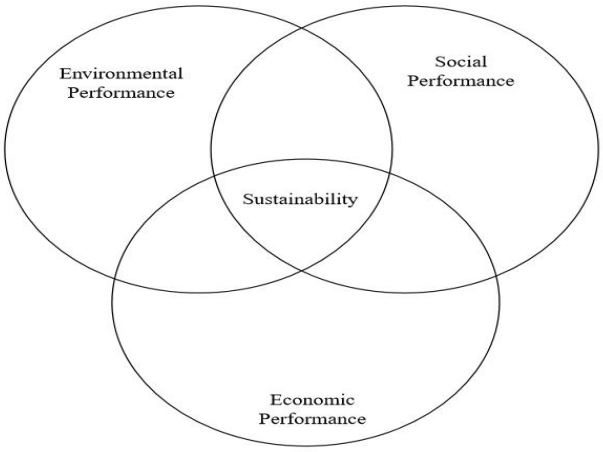

Figure 1. Virtual representation of three components of sustainability (Carter & Rogers, 2008): A framework of sustainable supply chain management

The social dimensions of managing water projects may involve things like village-level coordination, compromise, financial management and decision-making. Increasingly, local people are being required to pay into a community fund for every liter of water they use. This roles into the economic development aspect where by a village committee is set up, a bank account opened, and a custodian appointed to collect fees. The committee is effectively charged with running water project to ensure sustainable supply to the people in the locality. Several dimensions of project sustainability have been considered depending on the nature of the sector or project. Each of these dimensions has the capacity to influence project sustainability management programs in one or way or another. The sustainability planning and monitoring guide on methodology for participatory assessment (MPA) for community-driven Development programs (2000) described the following five dimensions applicable for assessment of water projects sustainability including, technical, financial, institutional, social and environmental sustainability.

Technical sustainability refers to the reliable and correct functioning of the technology and, for water supplies, the delivery of enough water of an acceptable quality. Equity aspects relate to the technology meeting the demands of all user groups. Requirements for technical sustainability include: A technically good design, which is adhered to in construction and operation, and first-rate workmanship and materials. Financial sustainability is very important for sustainable development. Systems can only function if financial resources meet at least the costs of operation, maintenance, and common repairs. Equity elements relate to who pays for all this and how fairly payments are shared between and within households.

To keep systems operational, accessible and widely used, communities need institutions. Institutions have cultural characteristics, agreed and valued procedures and rules for operation, and varying capacities for management and accountability. Equity considerations require looking at the extent of voice of all the user groups, especially the poor and the women, in organizations. Users will only sustain services that satisfy their expectations. This means services which they can easily access, that are in accordance with their socio-cultural preferences and practices, and services that they consider worth the cost they incur to obtain them. It also includes looking at how fairly the burdens and benefits from the services are shared across different socio-economic, gender, and ethnic groups that manage and control the services.

Environmental sustainability is key for sustainable development. Water resources face multiple threats. Over-extraction and contamination of water sources industrialization and waste disposal threaten reliable and safe drinking water supplies. Water supplies and sanitation facilities themselves threaten the environment through the unsafe disposal of wastewater and human and solid waste. In dry areas, lack of drainage of wastewater has created new risks of insect breeding that have brought outbreaks of diseases such as malaria, dengue, and filariasis. It also incorporates fair sharing of responsibility among users for the protection of their environment and water resources.

In general, the theory of sustainability brings out three aspects as common elements in its definition namely: the limits of available resources; the interdependence of human activities both in the present and future generations; and, issues of equity in distribution of a benefit (goods or services). The concept has also been extended to incorporate institutional or management sustainability which brings in the theory of community management model. This model is the most widespread institutional model used to manage rural development project including water supplies in Africa. The assumption is that community participation leads to ownership and control over management and operation of their development projects leading to sustained community water service going at a level satisfactory to most users and environmentally sounds without explicit exclusion of particular user groups.

2.1.1. Sustainability of rural water supply and sanitation as a concept

Water and sanitation services have a critical importance to the development of societies and are essential to public health, general welfare, and a decent standard of living; therefore they must be sustainable (IWA, 2015). In water and sanitation projects, we cannot talk of sustainability without mentioning operation, maintenance issues and management structures and institutions. Safe and clean drinking water supply is sustainable only if the water consumed is not overexploited but naturally replenished, and facilities are maintained in a condition that ensures reliable and adequate portable water supply. The benefits for the water supply should continue to be realized over a prolonged period of time (Mdendemi, 2013).

The most quoted definition of sustainability is “development that meets the needs of the present without compromising the ability of future generations to meet their needs” (Carter & Rogers,

2008). However, according to Carter et al., (1999), the definition of sustainability should not be taken as a static concept, for them what is required of sustainable water and sanitation is a fixed or improving output, water supply and sanitation services which are constant, which may be achieved through evolving and adaptive delivery mechanisms. The Agenda 21 by the UN provides a general framework for examining the sustainability of water and sanitation services. The document declares that ‘‘sustainability is the integration of environmental and development concerns for the fulfilment of basic needs and improved living standards for all’’ (UN, 1992). We have eight main sustainability factors, presented as building blocks and include policy context, institutional arrangements, financial and economic issues, community and social aspects, technology and natural environment, spare parts supply, maintenance, and monitoring (Bartram & Elimelech, 2009). For each of these factors, issues relating to planning, effective demand, financing, and management are explored along with guidance for addressing sustainability.

2.1.2 Sustainability of water and sanitation programmes in rural areas

According to the Carter et al. (1999) study on the impact and sustainability of community water supply and sanitation programmes in developing countries, they offer the ‘‘sustainability chain,’’ involving a four essential links (Figure 2**)** to achieve sustainability, where the failure of any one of which endangers the entire enterprise. Those component elements are motivation, maintenance, cost recovery, and continuing support.

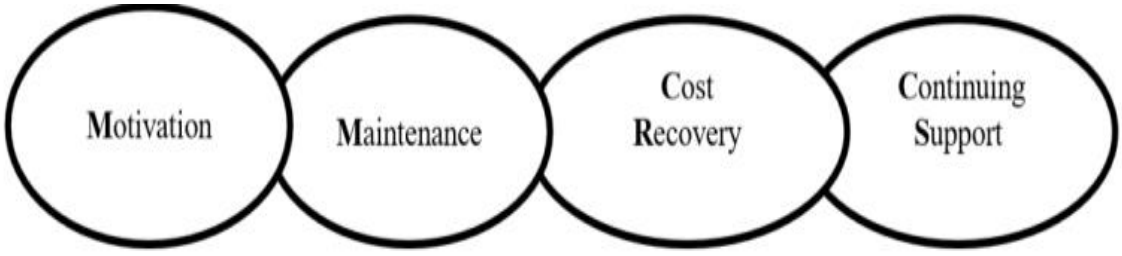

Figure 2. Sustainability chain (Carter et al., 1999).

Firstly, according to Carter et al. (1999), rural area community needs to understand and accept the new water and sanitation facilities in order to be motivated to utilize them. It is therefore important to invest in education and involving the community, even it might be a time consuming activity, it increases ownership and motivation increases rapidly as the benefits of

the activities become clear. Secondly, as for any other type of technology, maintenance organization is necessary for water and sanitation programmes and community committees may have an important role in that (for which they need training), but in almost all circumstances the committees will need support by some district, regional, or national level organization. Thirdly, all costs associated with the utilities have to be covered, including any subsidies, by water charges preferably by the community. Lastly, the authors emphasize that community and external support agencies need to jointly support water and sanitation provisions on a long term basis, until there are enough good practices within a community to the point where there is no going back.

2.2. Factors that affect WASH projects management programs

Project management which will incorporates proper alignment of activities with the needs of the community. Coordination of activities will take place at different levels including local, national and international with the aim of improving ownership and efficient service delivery. It focuses on providing leadership to meet specific objectives. According to Weinberg (2008), community-based projects are complex in nature and require different management skills to handle. In his study McDade (2004) contends that good management will ensure that adequate local resources and human.capacity are in place to sustain the project without external intervention. During the implementation stage of the project. Kirsch (2000) suggests that a project management team has to be equipped with technical expertise related to the project apart from project management related skills. Some of the activities conducted during project implementation including but not limited to identification of the scope, gathering requirements, resource management, relevant training, budget, and schedule estimation, advising on technical architecture, risk management, and preparation for risk mitigation.

Financing is fundamental to the success of WASH projects. Yang and Jackson on their research findings of stalled pumped-hydro energy storage conducted in the United States revealed that financial uncertainties were a limiting factor for many projects (Yang & Jackson, 2011). Based on capacity assessment of the local community to meet the costs. The concept of an ideal project management considers sustainable resource utilization regarding whether some assets should be replaced or maintained. It helps majorly in price monitoring that ensures project sustainability after a period (Yang, 2011).

Financial viability has three significant aspects which include: availability of adequate funds to finance project cost, particularly funds drawn from the government budget, project expenditure recovery from beneficiaries and appropriate incentives that ensure delivery of the project. Also, a financial plan is necessary to ensure there will be enough funds to finance project requirements, particularly funds obtained from government budget and other incentives required for participation in the project. In an ideal situation, it applies to the duration of execution to ensure enough capital is available for the investment and other requirements. For those projects which do not produce sufficient funds to cover operating expenses. The calculation should be done for the fiscal impact of the project for every step of its development (Sneddon, 2006).

Technological choice and technical training expert is on projects sustainability especially on water supplies and sanitation issues is very important. Different professionals within the sector have adopted a new way of describing cost efficient, simple technologies that suit local conditions and are managed by the community. Appropriate, progressive, alternative, Village level Operation, and Maintenance technologies are a few examples of them (Brikke,2003). These researchers argued that projects must include proper technology and integrate operation and maintenance into the development of the project from the initiation stage. They proposed the involvement of sustainable technology at the community level.

Performance analyses of WASH systems in many countries revealed improvement in communities where households were able to decide on appropriate system type and service level they required (Brikke,2003). Among technical factors proposed to influence sustainability of services are choice, complexity and technical capacity of the technological system. The design of the system and complexity of the technology have a direct link with the relative weighting of these factors (Harvey, 2007). Sustainability of facilities provided is modified by incorporating the private sector in the service delivery to the community and stressing the idea of sound financial management. All the above can be implemented when proper legal and institutional framework is in place. Clear policies and strategies must be in place at the national level that supports sustainability (Brikke, 2003).

According to Marsden (2007), community engagement is an integral part of stakeholders support. Involvement of the community plays a critical role in the water supply systems sustainability. There is an increase in Sustainability rate of projects due to ownership and management schemes at the community level. Chappel (2005) supports the fact that community participation increases project efficiency. In his study, he recommended that there should be adequate community involvement during the planning stage of the project. Community participation is described as a process by which various individuals from all sects take control of decisions which affect their lives. It involves collaboration of both men and women in decision making, design and implementation of the projects (Mushtaq, 2004). Participation of the community increases project effectiveness because of the objectives which are met and the benefits to the society. It also helps in building beneficiary capacity through active participation and training during project planning and implementation.

Monitoring and follow-up in developing countries still remain unsustainable delivery of WASH services to reach largely rural population. In most African countries, current water point functionality at 75%. What will the figure be in another five years' time if reliance on temporary unskilled staff is maintained. Water and sanitation project staffs are hired through the formal and permanent government channels. The aim is to retain skilled workers even after completion of the works, and that they continue to support service delivery beyond the project time frame. Monitoring, evaluation, and learning facilitates tracking the project's progress against its objectives. Evaluating the project's impact or effectiveness is an essential outcome. Lessons learned from the findings enhance future decision-making and practice. Each work package is crucial in ensuring a project's successful implementation and sustainability.

Integrated water resource management (IWRM) and its embedding in the 2016 Water Act, practical implementation at the grassroots level, especially in schools, community projects and local institutions, remains minimal. The ministry of Water and Sanitation in collaboration with other organization in relation to water and sanitation has urged residents to value their sanitation facilities to prevent the spread of diseases in communities. This call coincides with the global commemoration of World Toilet Day, observed annually on 19 November. World Toilet Day aims to raise awareness about the

importance of dignified and safely managed sanitation facilities and highlights the need to prevent the spread of illnesses in communities.

Governance Department of Water and Sanitation grappling with severe institutional and governance issues, compromising its effectiveness. The country's water infrastructure is often inadequate.Governance, Power Relationships, and Conflict Resolution. Good governance is essential for decision-making in the project and for determining who the decision-makers are. Power relations in community-based projects encompass the power dynamics within the community, which has a major influence on the project. Conflict resolution addresses diverse interests and perspectives often present within a community.

2.3. WASH sustainable management programs in Kenya

Kenyan Governments and development actors have made huge investments in the water sector, especially in the rural areas for the past two decades. According to CIDA (2000), increase in investment in water supply development in both the rural and peri-urban areas in the last decade by both government and development partners, has not resulted in the desired levels of service anticipated. In spite of this enormous opportunity presented by the existing gaps in service provision for water and sanitation services, most of the small scale WASH service providers, particularly the community managed ones have not measured up to the expectations of their customers and the community in service provision. In most cases, these systems are often poorly maintained and suffer frequent breakdowns leading to stagnation in coverage and poor and/or no services at all.

With community-based management, traditionally being based on voluntary principles and mostly operating without legal status or clear contracts, skills, and accountability to do so, achieving sustained service delivery has often been difficult. Provision of business development services for these WASH services is therefore cornerstone in instilling a sense of professionalism and enabling them develops the necessary business acumen required to improve and expand their service.

2.4. Integrating NGOs in WASH management programs in Kenya

The USAID designed the Kenya Integrated WASH (KIWASH) project to institutionalize catalytic models of sustainable WASH services delivery and improve hygiene behaviors.

KIWASH is working with nine counties, six in Western Kenya (Busia, Kakamega, Kisumu, Migori, Nyamira and Siaya) and three in Eastern Kenya (Kitui, Makueni and Nairobi). Overall, KIWASH aims at significantly impacting on the supply of water and sanitation services among poor urban and rural households (Owour, 2019).

Sustainable WASH service delivery requires sound investments and strengthening the operation structures of all the actors involved, particularly recognizing the important role played by small and medium WASH enterprises. Strengthening the capacity of WASH enterprises to improve and expand on their services requires a holistic approach of creating systemic change and strengthening the operational capacity that responds to the customer needs. Achieving this requires planning and executing interventions that are premised on the existing situation for the WASH enterprises coupled with the available market opportunities and demand for the services and/or products. Therefore, it requires a systemic way of delivering appropriate capacity development interventions. KIWASH project developed the capacity development action plan to guide implementation of the planned activities to achieve that holistic approach. The implementation of the capacity development action plan activities entail various stages: (a) engaging stakeholders; (b) selecting WASH enterprises for incubation; (c) assessing capacity needs of selected WASH enterprises; (d) developing enterprise capacity plans; and (e) implementing targeted capacity building.

The overall objective of these capacity development interventions was to instill a business-like management practices in the WASH enterprises' way of operating their businesses especially on financial management, service quality, coverage, user satisfaction, non-revenue water, etc. This has seen most of the WASH enterprises adopt good business practices like planning, budgeting, financial reporting, and embracing accounting systems.

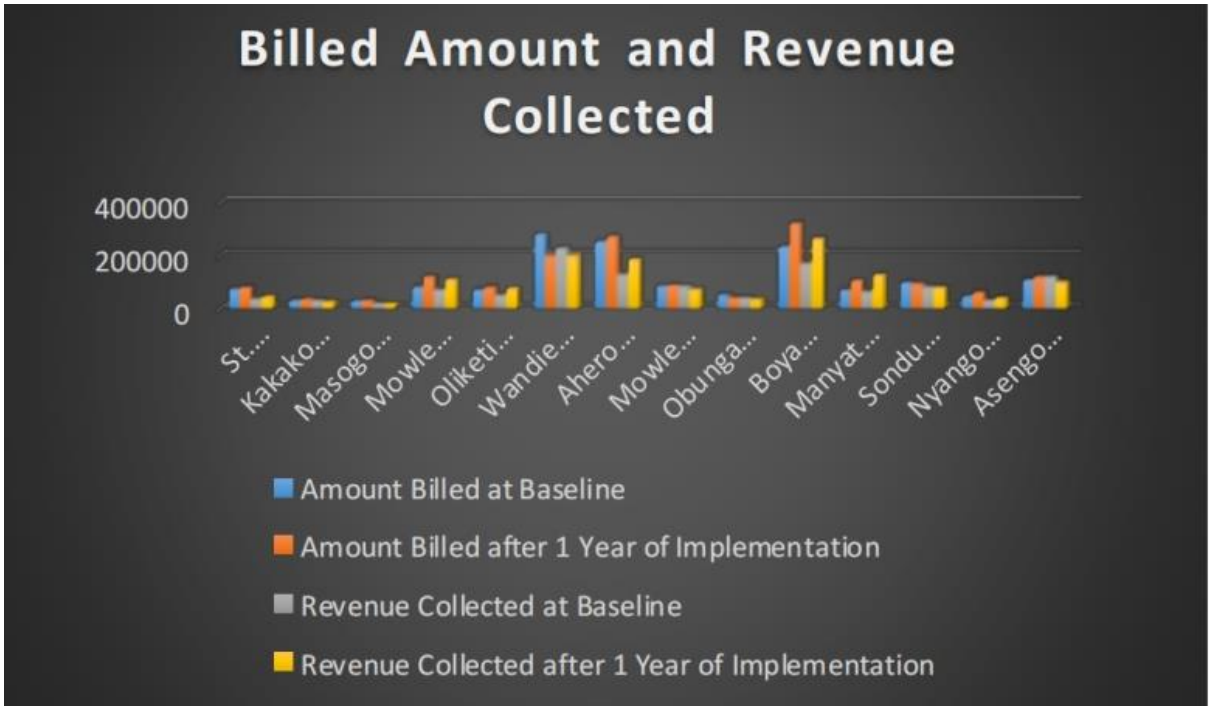

Figure 3. Comparison of the average monthly Revenue Billed vs. Collected in Kshs. at baseline and one year later for 14 WASH enterprises in Kisumu County (KIWASH Cap Assessment Report, 2019)

Most of the enterprises that benefited from the technical assistance by KIWASH have already begun to record notable progress on key performance parameters, including increase in the number of customers, increase in revenues, improvements in customer care and outreach, and registration as legal entities. This is confirmed by the outcome of WASH enterprise cap assessment exercise carried out at the end of the first year of implementation in comparison with the set baseline for some of the parameters. For instance, the number of household connections for water enterprises increased by 3% (to 7925 connections during the annual assessment from 7725 connections at baseline). The number of customers benefiting from sanitation services doubled to 1807 from 989 over the same period. The increase in the numbers was directly attributed to the improvements in services provided by these WASH enterprises as a result of the capacity development interventions received. Besides, average revenue billed increased by 18% to Ksh 104, 901 during the annual assessment from Kshs 88, 680 at baseline while average revenue collected increased by 39% to Kshs 94, 950 during the annual assessment from Kshs 68, 055 at baseline. Figure 3 shows improvements in revenue and revenue collection efficiency for selected 14 WASH enterprises in Kisumu County.

WASH sector if supported by a number of Non Governmental Organization which includes USAID, Department for International Development, the government of Germany, the European Union (EU), the U.N. Refugee Agency, and various World Vision**.**

2.5. World vision WASH projects management in rural areas

Looking at World Vision's work which has operated in Kenya started in since 1974, providing hope and assistance to children and communities, engaging in WASH activities in a variety of settings—households, communities, schools, healthcare facilities, remote rural settings, urban areas, emergencies, and in fragile contexts.

By 2024, World Vision Kenya (WVK) operates in 23 of 47 counties, in partnership with decentralized government agencies, nongovernmental organizations (NGOs), faith-based organizations, and communities. World Vision's community-based approach and 47-year presence in the country give us the longevity and experience to take quality, sustainable WASH interventions to scale. The ultimate goal of World Vision's work is improved child well-being, which can only be achieved through sustainable, equitable access to and management of clean water, dignified sanitation, and appropriate hygiene behaviors.

The footprint of WVK's WASH Program includes 20 sub-counties with a total of 46 wards that have been prioritized for significant WASH investment over the coming years. The Kenya WASH Programs staffed by 40 experts in water supply engineering, sanitation, behavior change, hydrogeology, and monitoring and evaluation. The country-wide reach of our WASH program is supported by a budget of more than $8 million annually. WVK is managing WASH-related grants funded by USAID, Department for International Development, the government of Germany, the European Union (EU), the U.N. Refugee Agency, and various World Vision support offices. WVK follows strict World Vision/USAID,/EU design, monitoring, and evaluation quality standards, and the organization has had 95% audit compliance for the last three years.

Water Supply and Quality

Since the inception of World Vision's WASH programming in Kenya, bringing life-changing clean water to the marginalized and vulnerable has been central to their mission and organizational identity. This distinctive, unwavering focus has guided WVK as they have reached nearly 1.9 million people with improved WASH interventions from 2011 through 2019.

World Vision embraces a holistic approach to helping communities advance up the SDG drinking water ladder, supporting targeted investments in new infrastructure while strengthening the systems that sustain water supply and ensure quality.

2.5.1 Training community management team of rural water and sanitation projects

Over the past five years, World Vision Kenya helped form and train more than 500 WASH committees and trained 1,657 people in repair and maintenance of WASH infrastructure. In World Vision Kenya's 2020 program evaluation, the rate of water points functioning at the time of visit was higher than average at 81%, which speaks to significant sustainability efforts the WVK team has made to strengthen community management of water systems.

Regardless of the water system technology used, WVK begins each project by engaging the county government for commitment and co- funding. For example, in Mutomo sub-county, WVK and the county agreed to finance a large water pipeline that has had full government buy-in. To date, the government has contributed more money to the construction of the system than WVK, has set aside budget for ongoing operation and maintenance costs, and is now interested in exploring additional water pipeline construction with World Vision. World Vision does not stop with the construction of large systems like that in Mutomo. Instead, we then focus on building the capacity of government systems to operate and maintain water facilities long-term. The government then appoints a water service provider to operate and manage the system. WVK continues to follow up to ensure proper management and operation through training of the management teams, but as a stakeholder, not as a financier.

In addition, WVK trains artisans to create sanitation businesses. For example, WVK trained a group of artisans in the Katito area to make concrete latrine slabs, pit linings, and superstructures, which supports local entrepreneurship and increases latrine affordability for households working to improve their sanitation. The group consists of 12 members, 10 of whom are women. To date, the group has constructed more than 100 latrines.

World Vision Kenya also has trained 1,260 faith leaders on sanitation and hygiene messages to share with their congregations and communities over the last five years (2016-2020). These trained leaders are instrumental in improving latrine coverage and hand-washing rates in communities. Faith leaders are uniquely trusted and thus are important influencers when it comes to changing behaviors and attitudes that have a significant impact on community health.

2.5.2. Employing innovation for sustainability of WASH projects

World Vision recognizes the critical importance of cost-recovery for operation and maintenance of water systems. Two approaches used include water kiosks and insurance policies. WVK is installing more water kiosks and automated water dispensers that require pre-payment to increase cost-recovery and sustainability. Overall, prepaid meters have a better cost recovery than the pay-as-you-fetch approach. They also improve the availability of water since community members can draw water at any time without having to wait for a caretaker to open a water point for business. Between 2015-2020, the rate of water points where tariffs were effectively regulated, collected, and properly managed increased to 46.1%, partly based on prepaid water fee-collection systems.

To build water system resiliency and reduce the financial burden on communities, WVK is empowering communities to sustain water systems by linking water committees to insurance firms that help shield rural communities from hardships caused by the sudden failure of mechanized water projects. This innovation aims to help strengthen water system governance, reduce downtime, and shield communities from water shortages that cause families to use unsafe water. systems, including solar panels, pumps, and water tanks. The policies pay for claims related to fire, theft, equipment breakdown or malfunction, and violence or terrorism. When components of the water system break down, the insurer moves in quickly to finance repairs or replacement of malfunctioning components. This has helped to avoid water shortages that cause families to resort to using unsafe sources and helps prevent women and children from walking long distance.

According to an internal WASH impact evaluation conducted in 2019, WVK's WASH program contributed to the following:

A 15% increase in households using water from an improved source

A 20% increase in households with access to an improved and safe sanitation facility

A 75% increase in parents or caregivers practicing appropriate hand-washing behavior

2.5.3. Encouraging innovative financing for sanitation improvements

World Vision Kenya designs WASH projects including water-user association members being involved in Village Savings and Loan Associations where members contribute money and then can take out a loan to fund sanitation and hygiene infrastructure if they don’t have enough funds

to buy products outright. World Vision Kenya has also connects people who require latrines with local microfinance institutions that can lend them money to build improved sanitation facilities.

2.5.4. Governance and financing

Improved WASH governance and financing—including re-engineering community-based management approaches, strengthening regulatory oversight, and implementing innovative financing approaches—are critical enablers for achieving progress under SDG 6 and ensuring long-term sustainability of water projects. Embracing a systems-based approach to build sustainable and resilient WASH solutions is linked to the capacities of local stakeholders, with county and national governments as critical components of that system.

Governments, the private sector, nonprofits, and civil society all need to leverage additional financing for WASH, recognizing that no single WASH actor has the resources to independently achieve the SDGs.

A key aspect of long-term sustainability of water systems is the funding available for operation and maintenance. While World Vision advocates for county governments to set aside funding for large repairs, tariff collection is the main source of funding for smaller repairs. In most areas, the tariff cost is approximately USD 5 cents per 20-liter jerrycan, which is collected by the water service provider. Households with private connections have water meters and pay for water based on the quantity used according to the water meter.

Important elements of WVK's approach in WASH governance and financing are as follows:

Engage at the National level

World Vision has prioritized engagement and advocacy with the national government as a critical component of our broader WASH strategy. WVK staff helped draft the national Kenya Environmental Sanitation and Hygiene Policy and Strategy 2015- 2030, which is key to country planning toward achieving universal coverage. The Ministry of Health at the national level also has established technical working groups to address issues surrounding sanitation and hygiene. These working groups have membership across both the private and public sectors, and each group is led by a different organization. WVK convened the hygiene promotion technical working group and is a member of the sanitation promotion and school WASH technical working groups. These groups play major roles in influencing policy on sanitation and hygiene.

For example, the hygiene promotion technical working group helped develop the national menstrual hygiene management policy and strategy, which will be launched as the pandemic conditions permit.

2.5.5. Gender integration in WASH projects for its sustainability

To address gender inequalities, World Vision's WASH program ensures the engagement of women, girls, men, and boys in the design, a location, and management of facilities so no person or group of people are excluded from enjoying their rights. One example of this is Baby WASH—a World Vision initiative that integrates WASH in healthcare facilities with maternal, newborn, and child health; nutrition; and early childhood development interventions to achieve greater impact for mothers and children to improve health outcomes and avert death in the first 1,000 days of life. The Baby WASH project in the Osiligi area has transformed the lives of women by paying special attention to the health needs of women before, during, and after delivery.

The BabyWASH project introduced a set of inclusive WASH interventions focused on health facility improvements. These included the expansion and improvement of prenatal, delivery, and post-natal services within the facility; providing access to safe water at the health facility; and construction of gender-segregated sanitation facilities as well as hand-washing facilities in key service areas. This initiative helped ensure safe delivery and post-natal care at the local health facility—a situation that has attracted more mothers to use its services. One of the facilities in Osiligi reported 19 average monthly deliveries in 2020, up from zero in 2018. As a result, home deliveries were common and were linked to high maternal complications and death related to unskilled deliveries.

2.5.6. Integrating with other private-sector to strengthen and sustain WASH projects

WVK also encourages private-sector involvement to support sustainability. For example, through the Grundfos Lifelink pre- pay platform, community water committees secured sufficient revenue to fund operation and management costs of water supply systems. WVK also worked with the private sector under USAID/ Switzerland Development Cooperation funding through the Kenya RAPID (Resilient Arid Lands Partnership for Integrated Development) program to develop an online water management service platform. This facilitated water resource mapping, planning, and management, which will be replicated in counties outside of the target area. Additionally, World Vision has been working with microfinance institutions to

link loan products to WASH behavior- change programming. So far, purchase of household water tanks has been very popular. Across two wards in the span of four months, 84 WASH loans have been disbursed with a total value of 2 million Kenyan shillings (USD $19,500).

Partner with county governments

WVK has invested heavily in supporting county governments by contributing to water policies and regulations in Wajir and Makueni counties, and co-financing water systems in Kitui and West Pokot. For example, WVK partnered with the Kitui County government to secure an additional $2.3 million for the Mutomo Water Project.

2.5.7. Mobilizing communities to advocate for change

WVK uses our hallmark Citizen Voice and Action (CVA) local advocacy model to inform and empower communities to advocate for improved WASH services with public officials. WVK employs this approach in most operating areas, enabling citizens to demand the right to safe water and hold local governments accountable.

The model begins by making communities aware of the roles and responsibilities of local government in WASH service provision and then communities evaluate the performance of local government against key service delivery indicators. Communities then engage public leaders and highlight areas of weak performance.

WVK has influenced budget planning through the formation of CVA groups that advocate with county governments for improved service delivery at all levels, beginning at the ward level. In the Wema program area, World Vision helped establish an umbrella WASH committee with representation from all community water projects in the area, which is registered as an association and has a central office for easy access by community members.

Issues that cannot be solved at the individual WASH committee level are referred to the umbrella committee. This has worked well for community water project sustainability—at no time has there been a leadership gap in any water project in the program area. This umbrella organization led the way for the development of an insurance policy for community water projects between Britam (a private insurance company in Kenya) and the Wema community. Further, when World Vision transitioned out of Wema area program it was a priority to strengthen the umbrella WASH committee in September 2020, and community advocacy efforts supported the handover of projects to the county government for management in

partnership with the umbrella WASH committee. The county committed to manage and sustain the projects developed by WVK in partnership with the Wema community.

2.5.8. Partnerships for effective WASH

Over the years, WVK has built strong partnerships at the local, national, and global levels to develop joint efforts that address the WASH challenges in Kenya and foster sustainability for WASH investments. World Vision helps build capacity of government agencies and community-based organizations to improve their ability to implement, monitor, and sustain WASH interventions within their jurisdictions.

At the local level, WVK partners with community-based organizations in the WASH sector in our program areas to ensure improved WASH in communities. As a result of its national-level engagement, WVK has cultivated strong relationships with the ministries of Water and Irrigation, Sanitation, Health, and Education, which provide overall oversight, coordination, and direction to all WASH implementing partners in Kenya. WVK works with the Ministry of Water and Irrigation in project design, joint monitoring visits, and capacity building, and provides support for training WASH committees on water governance.

In addition, World Vision has strong collaborative relationships with international NGOs operating in Kenya, such as Catholic Relief Services, CARE, and Food for the Hungry. WVK also collaborates with international academic institutions such as the University of North Carolina in the U.S and Jomo Kenyatta University of Agriculture and Technology in Kenya. These partnerships have led to innovations and continued research in various programming areas within the WASH sector. For example, WVK works with the University of North Carolina to periodically evaluate and assess our WASH program in Kenya for decision- making and program improvements.

2.6. Policies and integrated institutional management of WASH projects in Kenya

The adoption of a new constitution in 2010, which created the devolved governance system and changed the sanitation and hygiene sector in Kenya. With this change of power, new laws, policies and plans were needed to match the new governing structure. The Kenya Environmental Sanitation and Hygiene Strategic Framework (KESSF) notes " with sanitation made a guaranteed human right and its services having been devolved to 47 County governments, a practical change in the procedure and way to deal with sanitation and hygiene

service conveyance should critically be addressed to speed up progress" (GoK, 2016).

A new water law, the Water Act 2016, brings the water and sanitation sector in line with the constitution, the Ministry of Health has adopted an environmental sanitation policy and framework, and the Ministry of Water and Sanitation is currently developing a new policy. However, more work remains to be done. Kenya Vision 2030, which is the drawn out development plan for the country for 2008–2030, includes sanitation in a number of instances (GoK, 2007). Sanitation facilities are incorporated as framework that is an establishment for Kenya Vision 2030. Furthermore, water and sanitation are the third of seven critical social areas for putting resources on the people of Kenya. Having a set up vision, widespread access lines up with the SDG rule of abandoning nobody.

Targets in the KESSF included: to increase access to improved rural sanitation facilities by at least half and declare 100% of villages open defecation free (ODF) by 2030, and to increase access to improved metropolitan sanitation facilities by essentially half and proclaim 100% peri-metropolitan and casual settlements ODF by 2030. To achieve the objectives in rural regions, the following activities are undertaken: facilitate reception of total sanitation model for communities of populace of under 5,000, initiate and guarantee latrines construction and appropriate use (minimal expense choice, adequately utilized and kept clean), initiate programs for inspiration, technical advice and negligible sponsorship (through supply of materials just to penniless gatherings locally) for the development of ventilated pit restrooms and safe removal of wastewater. During the implementation face of the WASH programmes, sanitation and hygiene services, the WASH Programme will pursue the following implementation strategies:

Creation of demand for basic sanitation services. The WASH Programme will promote and support the CATS approach, which aims to achieve open defecation free (ODF) communities by creating new social norms around latrines. Coupled with the creation of new demand for improved sanitation, low-cost approaches will allow for families to move up the sanitation ladder to durable basic sanitation solutions. Women and girls will be empowered to take a leading role, while men and boys will also be engaged. At the outset, the Programme will analyze the situation in each community—including risks, community demand and preferences—to determine possible fields of intervention for the post- ODF phase, e.g., health, nutrition, food hygiene, construction techniques, income-generating activities.

Promotion of behaviour change in key hygiene practices. In close collaboration with UNICEF's C4D section, the WASH Programme will promote hygiene behaviour change in the four key areas of hand washing, menstrual hygiene management, safe handling of water, and safe disposal of excreta. This area of work will draw on UNICEF's comparative advantage in introducing innovative approaches. Responding to communities' concerns about the affordability of soap, the Programme will support local, low-cost production of soap using models already tested in some provinces.

Improving access to basic sanitation and hygiene services in schools and health/nutrition centres. The WASH Programme will develop, finance and monitor models for overcoming bottlenecks to scaling up sanitation and hygiene services in schools and health/nutrition centres. To support girls' enrolment and retention in school, sex-separate toilet models and standards, including menstrual hygiene management facilities for girls, will be established. Health/nutrition centres will be equipped with sanitation and hand-washing facilities. Attention will be given to improving safety and dignity at childbirth, with special consideration to adolescents

Drinking water services, the WASH Programme will pursue the following implementation strategies:

Water supply development. The WASH Programme will support interventions to increase access to safe, affordable and sustainable water services for the rural poor with an emphasis on raising community demand, community awareness of water availability and risk assessment and community participation in program design and implementation. In all cases, special attention will be paid to vulnerable and disadvantaged groups, including women and girls, groups marginalized on the basis of ethnicity, communities affected by climate change and emergencies, people with disabilities, and the poorest households, with special attention to those experiencing multiple disadvantages.

Water safety planning. The Programme will emphasize the safety of the entire water supply system from source to point of consumption, with attention to environmental, health, engineering and social aspects. Particular attention will be given to raising awareness and skills for safe water storage among those who handle water at the household level (usually women and girls). To ensure a complete cycle of preventive measures, the Programme will identify

hazards, hazardous events and risks, necessary monitoring activities, and a verification schedule to ensure a complete cycle of preventive measures.

Mitigation of risks and resilience to shocks. The Programme will support the incorporation of measures for mitigating risks and building resilience to the effects of climate change, environmental degradation and disasters within communities and WASH sector systems and programme designs. Attention will be given to the protection of water resources, adaptation to increasing water scarcity and deteriorating water quality, and disaster-resilient water and sanitation technologies and systems.

Promotion of accountability. To enhance the sustainability of water supply services, the WASH Programme will promote accountability throughout the chain of responsibility, including the national government, service providers, and water users at the community level.The Programme will support a process whereby the national Rural Water and Sanitation Agency (AHAMR) delegates authority to the Communes (de-concentrated government administrative units), which in turn delegate authority for water management to the volunteer Communal Water Management Boards (RCE). RCEs are elected by Water Point Committees, which are themselves elected by local water users. The AHAMR will at the same time provide capacity building support directly to the RCEs. The Programme will also strengthen the delegated management framework for water supply services in peri-urban areas, small towns and rural areas in support interventions for improving water quality at the household level.

Strengthening monitoring and evaluation systems. The Programme will support the establishment and strengthening of monitoring and evaluation systems at national, sub-national and community levels, including the introduction of innovative tools to generate real-time, disaggregated data.

Enhancing sector coordination and partnerships. The WASH Programme will maintain and strengthen coordination and partnerships among all key actors in the sector—including Government bodies, NGOs, United Nations agencies, donors, other development and humanitarian partners and private enterprises—to ensure effective, cooperative, harmonized, timely and cost-effective WASH sector planning, implementation and monitoring. In the process, the Programme will encourage gender sensitivity and programming for the advancement of women. The engagement of private enterprises in the coordination mechanism will ameliorate the bottleneck of weak private sector development in the sector.

Policy advocacy. The Programme will continue to engage in policy dialogue and advocacy for the development of guidelines, standards and planning and budgeting mechanisms. It will also continue supporting the government in addressing the bottleneck of weak coordination among government bodies in the WASH sector.

The water resources in Kenya are owned by the government of Kenya. Water resources management institutions are given powers to undertake their duties by the Kenya Water Act 2016.This Act provides for the regulation, management, and development of water resources and sewerage services in line with the Constitution. Authorities shall, in administering or applying this Act, be guided by the principles and values set out in Articles 10, 43. 60 and 232 of the Constitution.

The purpose of the 2016 Water Act is to align the water sector with the Constitution's primary objective of devolution. The act recognizes that water-related functions are a shared responsibility between the national government and the county government. In the water Act we have different institutions managing and regulation water resources, water infrastructures, water providers and consumers who are communities on the ground. The water Act is devolved hence has institutions that handle water issues from the National to the county level.

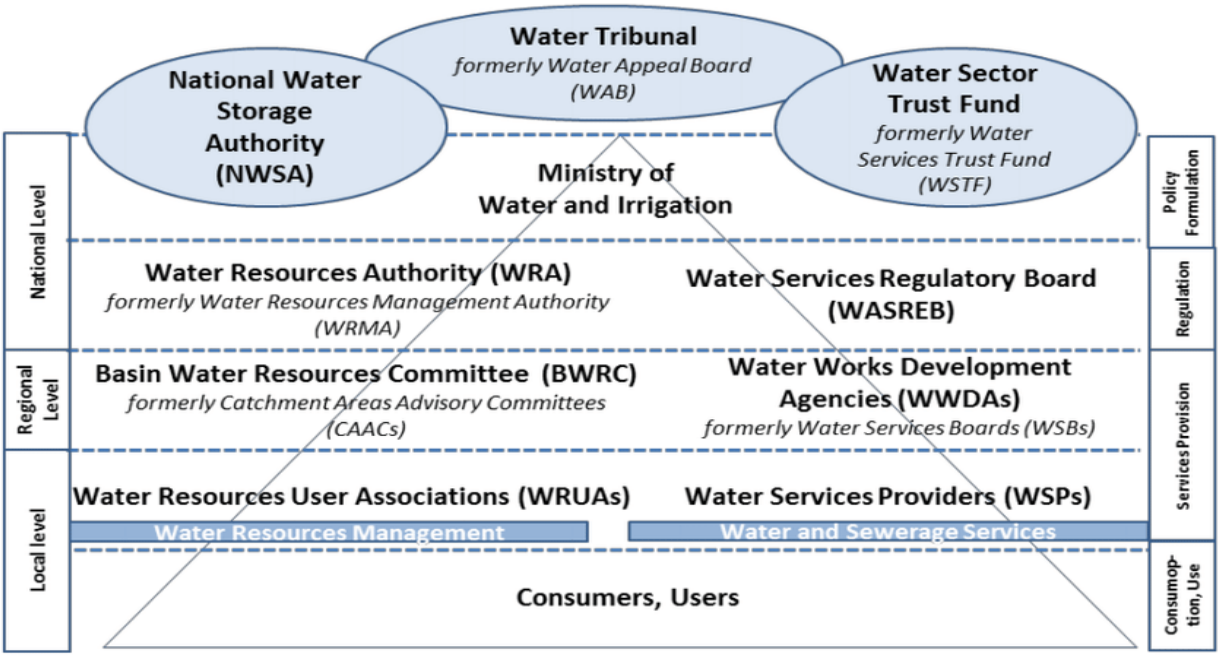

Figure 4. Institutions that support sustainability water and sanitation management programs in Kenya

National level

Ministry of water and irrigation

Prior to 1974, the Ministry of Water and Irrigation was a department in the Ministry of Agriculture, the 1992 Ministry of Land Reclamation and Regional Development, and the 2001 Ministry of Environment and Natural Resources. 2015Ministry of water and Natural resources was split to form the Ministry of water and irrigation.

The Ministry of Water and Irrigation (MWI) is the key institution responsible for the water sector in Kenya. The Ministry is divided into five departments: Administration and Support Services, Water Services, Water Resources Management, Irrigation, Drainage and Water Storage, and Land Reclamation. To ensure water resources availability and accessibility by all. To contribute to national development by promoting and supporting integrated water resource management to boost water availability and accessibility.

Improving the sustainable management of water resources; Improving the supply of water and sewerage services; Improving utilization of land through irrigation and land reclamation; Strengthening institutions within the Ministry and also the water sector; Mobilizing resources and promoting efficiency in their utilization; Improving the management and access to water resources information.

Water Resources Authority

Kenya's Water Resources Management Authority (WRMA) is a state corporation under the Ministry of Water and Irrigation established under the Water Act 2002 and charged with being the lead agency in water resources management in the country.

WRMA was established as a corporate body through a gazette notice No. 8140 of **14th November 2003** pursuant to the Water Act (2002) and was operationalized in July 2005.

WRA **collects all information on water resources, analyses, stores and disseminates it**. This information is critical for water allocation, water resources investment decision making, and modeling, to enact scenarios to better understand the impact of climate change in the future

The Authority is tasked with formulating and enforcing standards, procedures, and Regulations for the management and use of water resources and flood mitigation, regulating the

management of water resources, receiving applications for water permits for abstraction, and ensuring adherence to conditions of the permits, determining water use fees and permits gives permits within 6months, advising the Cabinet Secretary in matters of formulating policies of national water resource management and coordinating with other bodies in better regulation of water resources.

Water Services Regulatory Board (WASREB)

The Water Services Regulatory Board (WASREB) is a non-commercial State Corporation established in March 2003 as part of the comprehensive reforms in the water sector. The mandate of the institution is to oversee the implementation of policies and strategies relating to the provision of water and sewerage services. The board sets standards and enforces regulations that guide the sector in ensuring that customers are protected and have access efficiently, affordably, effectively, and equitably and sustainable services, and also provides for the financial sustainability of Water Service Providers (WSPs), by allowing financing of operations, opportunity cost recovery, and a return on capital that sustains services and ongoing investments.Issue licenses for the provision of Water Services, Determine standards for the provision of Water Services to consumers, Establish procedures for handling complaints by consumers against licensees, Monitor compliance with established standards for the design, construction, operation and maintenance of facilities for Water Services and Monitor and regulate licensees and to enforce license conditions.

Water Tribunal

The proposed Water Tribunal Rules 2019 will provide an operational procedure for the Water .Tribunal and in effect contribute towards the protection and realization of the constitutional rights to clean and safe water, consumer rights to quality goods and services, and access to justice (Articles 43, 46, and 48 of the Constitution respectively). Water Tribunal Rules 2019 is to provide the procedure governing the operations, and the effective functioning, of the Water Tribunal.

Water Sector Trust fund (WSTF)

WSTF is remitted with improving water access quality in low-income areas it achieves this through using innovative financing mechanisms, community empowerment and engagement, and technical assistance.

The Source of funds for the WSTF mandate has been expanded to incorporate funds from the national budget, County government, donations, and grants, among others.

National Water Harvesting and storage Authority

The authority's functions are: on behalf of the national government developing national public water works to be used in the storage of water resources and control and maintaining this infrastructure, and providing the Cabinet Secretary with information regarding water storage and techniques to manage floods, developing a policy for water harvesting and enforcing strategies to reap water and on behalf of the national government, undertaking water emergency responses during drought.

Regional level

Basin water resources committees

A basin water resources committee is responsible for managing water resources within the basin areas. A drainage basin refers to an area where surface water flows into a single point for instance lakes, streams, or rivers. Under the Water Act 2016, they are tasked with the role of advising the Water Resources Authority along with county governments on issues concerning conservation and use, the granting, adjustment, or cancellation of permits, water resources protection, managing water resources information systems, reviewing basin areas' water management strategies, facilitating the establishment and functioning of water resource users and also associations activities to mitigate floods.

The committees also share information between basin areas and the Water Resources Authority and develop water allocation plans to boost the equitable sharing of water within basin areas.

Waterworks development agencies

The agencies are liable for the development, maintenance, and management of water and sewerage infrastructure within the counties. Their mandate is to confirm the standard of citizenry life by improving access to safe water and sanitation services through infrastructure development and capacity building at the county level.

Under the Water Act 2016, they are tasked with developing, maintaining, and managing national public water works, operate the waterworks, provide technical services and training to county governments and water service providers and provide the cabinet secretary with technical support in discharging his/her duties.

Local level

Water Resources User Associations (WRUAs)

These are community-based associations composed of riparian land owners, water abstractors, commercial business owners, and other stakeholders who share a similar water resource. The associations were established for collaborative water resources management and conflict resolution among users.

They control abstractions through monitoring abstraction activities in an effort to safeguard reserve flows for downstream water users, monitor waste dumping into water sources to control pollution, protect springs in order to improve the access to clean water, offer training to farmers on proper farming methods to control soil erosion. They also collect hydrological data in their sub catchments including measuring stream flows, turbidity, reading rain gauges and data on sediment loads. This data is used in the formulation of water allocation plans. WRUAs encourage efficient water resources management efforts through mobilising problem-solving at the grass-root.

Water Service Providers

Providers involves private partners, non-governmental organization and an individual, they are answerable for providing water services in an efficient and economical way. They also can purchase or acquire equipment and facilities, land, or request to acquire land in regard to the applicable laws. They are also tasked with the responsibility of building mechanisms to handle consumer complaints. They achieve their role through conducting water treatment, construction of water infrastructure that supplying clean water to homes, monitoring non-revenue water levels to avoid losses, collection, conveyance, and treatment of wastewater. They are also involved in catchment conservation efforts.

Consumers and Users

Consumers these are the community on the grass-root, they have a role of paying bills on time, allowing service providers to have access to water points, reporting unauthorized consumption, maintaining water equipment in good condition, paying for the maintenance of equipment that results from negligence, and providing feedback on services given.

2.7. Stakeholder theory

The stakeholder theory developed by Freeman (1984) defines a stakeholder as any individual or group of persons who may impact or are affected by the projects or its results. The theory says that a stakeholder is anyone interested or involved in or affected by a company such as employees, community, suppliers, financial institutions and government agencies. This theory was supported by Pedrini and Ferri (2019) who argued that managers have a fiduciary responsibility to defend the interests of stakeholders. Managers must operate in the best interests of stakeholders and the company while protecting each party's long-term interests. Enlightened value maximization is the link that Jensen (2020) sees as existing between objective function and stakeholder theory. This suggests that managers take into account the process of producing value for stakeholders whenever they make trade-offs. Project stakeholders can be the clients, the project team, the community or the government. These people's interests are likely to be influenced by the project's implementation or its completion. As opined by Chinyio and Plomolaiye (2020), stakeholders can affect the activities, objectives and even survival of the project. Accordingly, stakeholders could be beneficial in facilitating the attainment of the goals of the project or antagonistic when they protest the mission of the project.

In his opinion, Khwaja (2019) argued that lack of support from stakeholders may lead to project failure. Stakeholders should be involved in the design and implementation of the project. This can be achieved through meetings and public forums to contribute their ideas and gain their commitment to the project. When major stakeholders are involved in the project's conception and implementation, ownership is more likely to be permanent. In this study, there are many stakeholders with different interests. These stakeholders include the local community, the government agencies (both county and national governments), other non-governmental organizations and the project team. Thus, the stakeholder theory will aid in understanding the demands of stakeholders and how their participation might affect the sustainability of Funyula Samia Sub- County's water, sanitation, and health programs.

CHAPTER THREE: MATERIALS AND METHODS

3.1 Introduction

This chapter presents the study area, study design and methodology, data collection techniques, data analysis, criteria for interpretation of results, and ethical considerations was applied in the study.

3.2 Study area

Funyula Constituency is one of the sub-counties (or constituencies) of Busia County. It comprises of one district (Samia District), one division (Funyula Division), seven (7) locations and twenty- nine (29) sub-location (Figure 5). Under the devolved structure, the sub county has four (4) electoral wards namely: Namboboto/Nambuku, Nangina, Ageng'a/Nanguba, and Bwiri and seventeen county villages administration units. Based on the national government system of administration, the constituency has 265 villages headed by a headman/liguru. Funyula Constituency lies between latitudes 0l'36"south and 033' north and latitudes 33 54'32" east and 24 25'24" east. It borders Uganda to the west, Budalangi Constituency to the south, Ugenya Constituency to the east and Matayos Constituency to the north. The Constituency shares Lake Victoria with Budalangi Constituency and Uganda. The constituency covers an area of 281.2Km2, with 17km^2 being under Lake Victoria water mass.

The soil types in Funyula Constituency consist of poorly drained clay soils and well drained soils, deep with moderate water holding capacity. There are two rainy seasons in the Sub County namely: the long rains that run from March through to May and the short rains which start in August through to October. The dry season of the year is from December through to February and June/July. The mean annual rainfall is 1270 mm. The climate favours two cropping seasons in a year. This means that the constituency is suitable for crop cultivation, livestock rearing, brick making, murram excavation and stone mining. Crops such as maize, sorghum, sweet potatoes, soya beans, green grams, cow peas, bean among others are grown in most parts of the Sub County. Quick maturing crops like vegetables, sunflower and simsim are grown during short rains.

This climatic condition also favors cultivation of other crops like cassava, avocados, oranges, bananas, watermelons and others. The maximum temperatures range from 26 degrees Celsius

and 30 degrees Celsius while the minimum ranges from 14 degrees Celsius and 18 degrees Celsius. Humidity is relatively high because of the proximity to Lake Victoria. The wind blows at an average rate of 6 km/h from East. Sunrise is at 7:00 am and sunset 6:46 pm.

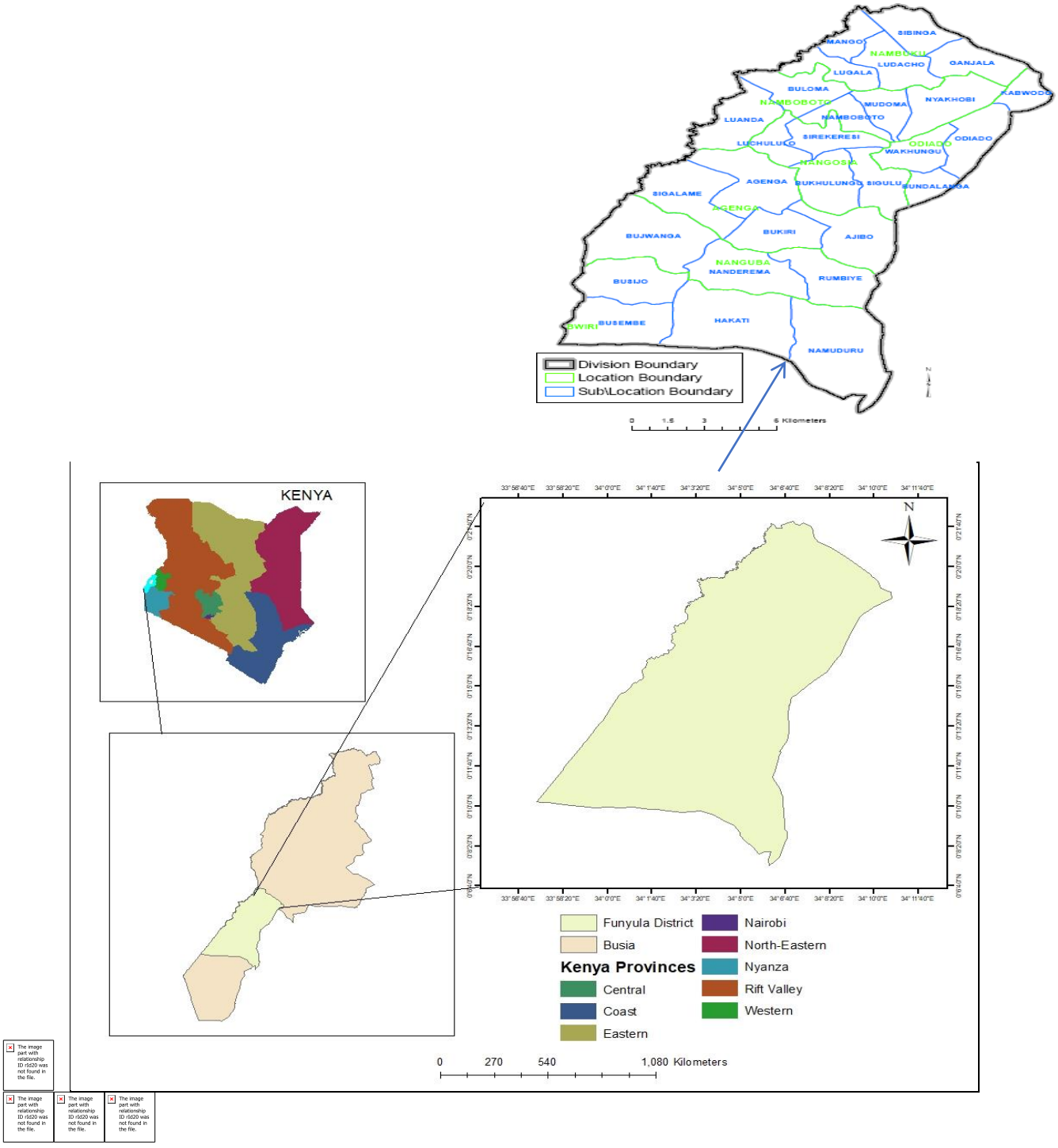

Figure 5. Map of Kenya, showing Funyula -Samia Sub -County, Administrative and Political Units

Samia hills were initially covered with many trees that formed local indigenous forests. The forests no longer exist due to increased farming and deforestation which has seen most of these trees felled and left most of the hills on the southern parts of the Sub County bare, save for a few planted trees and remaining shrubs. This change in climate has reduced rain intensity in the Sub County and significantly affected rain fed agriculture, as there are few places one can find food crops during the dry period. This has further led to food insecurity, and high rates of malnutrition in the community. The Sub-county has one permanent river (River Sio), 6 shallow wells, 140 boreholes and 8 protected springs .The number of households with access to piped water and portable water are 3,000 and 4,000 respectively. Funyula/Samia has no sewerage system and disposal of solid waste is a major challenge. The poor solid and liquid waste disposal condition in urban centres is made worse by the growth of unplanned settlements and low environmental education amid the local community.

Further under environment sector, wetlands and hills are encroached and degraded since the land is cultivated to river/stream banks' leading to soil erosion which goes in the river raising riverbeds resulting to flooding.

3.3 Study design

This section contains a structural narrative describing the relationships between the variables of the study (Figure 6). The framework has possible underlying factors influencing sustainability of management programs of WASH projects. The conceptual model is a conceptualization in functional form. It shows the three independent variable on the left and how they influence the dependent variable on the right which is the sustainability of WASH projects.

The components which have been conceptualized as independent variables include factors that contribute to sustainable management programs of water projects, second one is on the factors that determine sustainable management programs of sanitation projects and the third on how institutional management structure leads to sustainable management of water and sanitation projects.The dependent variable for the study which is sustainability of WASH projects interplays with the intervening variable like natural events which are beyond human control. How these events are controlled matters a lot and affect the project either positively or negatively. This is a factor that cannot be manipulated and therefore will influence the sustainability of the WASH projects.

The research used descriptive survey design to collect primary data. Descriptive survey research design is appropriate in defining respondent characteristics (Newby, 2010). This research design was used to collect both quantitative and qualitative data. According to Creswell (2018) quantitative data was to measure numerical variables and analyse with descriptive statistical procedure. The design was appropriate for this study because it helped in describing the characteristics of the sampled population and is appropriate for generalising the finding of the entire population.

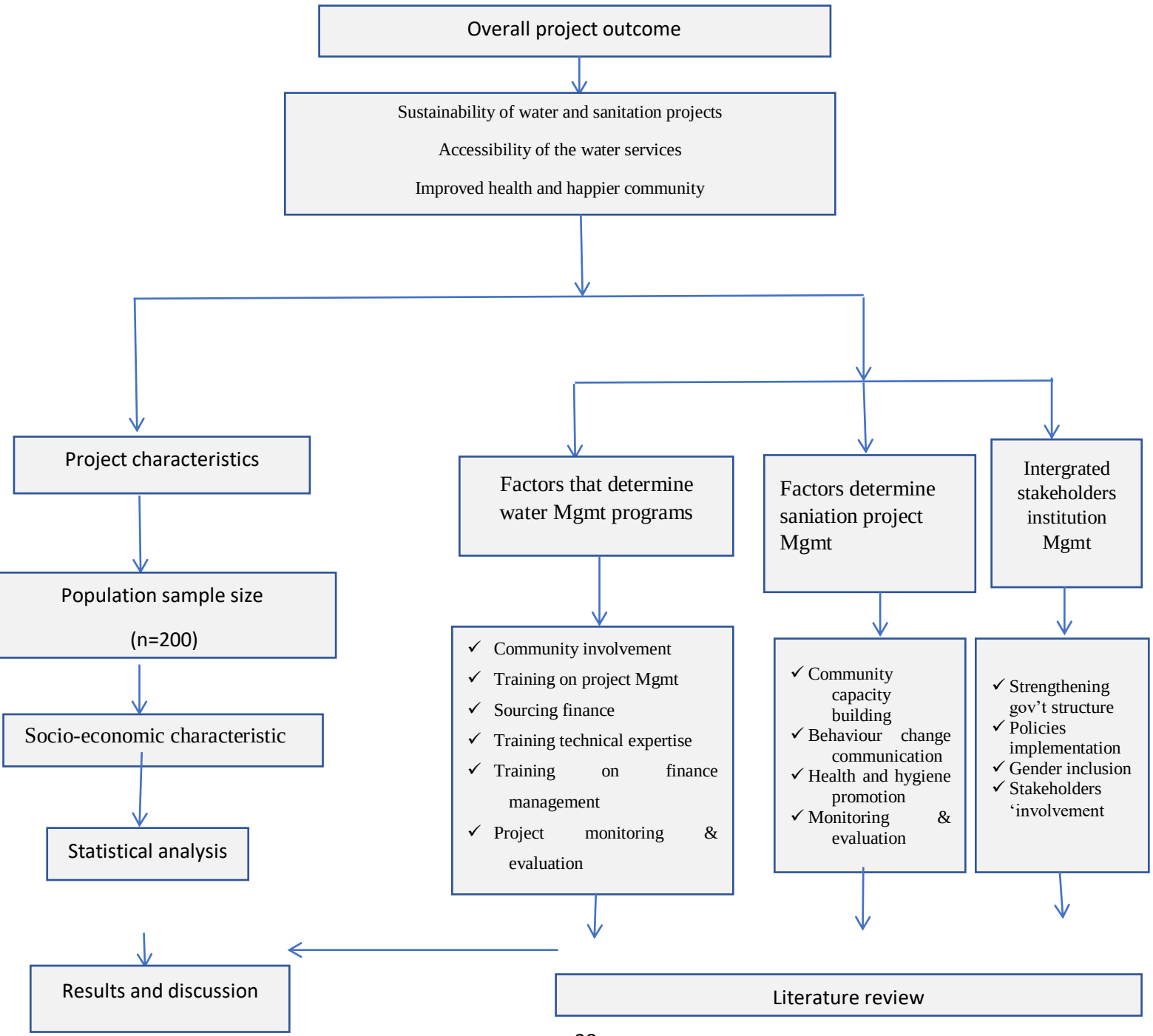

Figure 6. Schematic diagram showing framework of the study

The research targeted population was 2000 people who reside Funyua central, Nangina and Ageng'a/Nanguba ward and those dependants on water projects (Table 1). Data was collected on three water projects, two communities managed that is Ojibo and Buduong'water projects and one managed by the county government which is Onana water project. The researcher targeted specifically project registered members, management committee members and interviewing officials such as water development officers.

The researcher made arrangement with the management committee leaders and projects officers in governments and non-governmental organization to brief then about the research study and the administering the questionnaire in the area. Project member were provided with questionnaires which researcher helped read the question understand and later answered, management committee leaders focal group discussion was conducted and conducted interviews for the project officers.

Mugenda and Mugenda, (2003) recommended that when a descriptive study design is used the target sample population of 10% is adequate. The researcher used sample size of 200 of the target population. The sample size was obtained from the 3 water projects in Funyula-Samia sub-county.

Table 1. Sample size of three the projects

Water projects	Mgmt committee	Project	Total	Sample
Onana	2	58	600	60
Ojibo	16	24	400	40
Boduong'	19	81	1000	100
Total	**37**	**163**	**2000**	**200**

3.4. Data collection techniques

The study used open and closed ended questions to collect primary data from the committee leaders and project members. This study also used structured interview questions to collect primary data from the projects officials. Questionnaires being collected door to door part household hold by the research team, this helped responded being directed to understand the

questions before answering, which helped to get responses for all the questionnaires without leaving any questionnaires without being answered. Structured interviews were applied because it provided an opportunity to collect in depth information that could have been left out by the questionnaires.

3.5. Data analysis techniques

Mugenda and Mugenda (2003) assert that 1 to 10% of the questionnaires are adequate to be used for piloting. This study used five per cent of the self-administered questionnaires for piloting using test retest method. A mock face to face interview was used to test structured interview guide instrument. The pilot study results were subjected to Cronbach's Alpha test to determine the consistency of the instructors' instruments. The Cronbach constant generally falls between 0 and 1. When this coefficient approaches 1.0, it indicates a higher reliability of the items under investigation. George and Mallery (2003) laid down some guidelines; where $\alpha \geq 0.9$ Excellent (High-Stakes testing) $0.7 \leq \alpha < 0.9$ Good (Low-Stakes testing), $0.6 \leq \alpha < 0.7$ Acceptable, $0.5 \leq \alpha < 0.6$ Poor $\alpha < 0.5$ Unacceptable. When the Cronbach value is equal to or more than 0.6 it indicates the reliability of the instruments. However, when the results are below 0.6 it is an indication of unreliability of the instruments used.

3.6. Ethical consideration

The researcher applied for the permission from the university and clearance from the project officers and committee leaders. A brief was done and explanations for the respondent to understand what they are expected of them. Participation in the assessment was to be optional, and participants can opt out of the evaluation without charge. Research is solely intended for educational purposes. No unique identity details were obtained from the respondents. Names of respondents involved in the studies was kept confidential

CHAPTER FOUR: RESULTS AND DISCUSSIONS

4.0 Introduction

This chapter comprises of data analysis gathered in the study, findings and interpretation. Results are presented in form of tables of frequencies and percentages. The analyzed data is arranged under themes that reflect the research objectives.The study also sought to study and understand the household in the communities served by the water and sanitation projects in Funyula Samia Sub-County.

A total of 163 questionnaires, 58 of which were administered to Onana members, 24 to Ojibo members, 81 to Buduong' members, then interviews administered to 2 officials of Onana, 16 committee leaders of Ojibo and 19 committee leaders of Buduong and were all completed.The researcher and research assistants administered the questionnaires themselves by visiting the household and thus achieved 100% response rate.

4.1. Demographic information

The background information of the respondent's is crucial for describing the characteristics of the participants in the study. The respondents were requested to indicate the name of the project they were member, their gender, level of education and the duration the project since established. A socio-economic characteristic of the respondents was important in this study to understand their gender and age, education level, main occupation, household size, annual household income

Table 2. Socio-economic characteristics of the respondents

		Frequency	Percent
Gender	Female	96	58.2
	Male	67	41.8
Age	≤20	1	.6
(year)	21-40	66	41.2
	>41	93	58.2
Education	None	12	7.3
	Primary	80	49.1
	Secondary	36	23.0
	Tertiary (Colleges/Unviversity)	34	20.6

Occupation	Business person	38	23.31
	Farmer	89	54.60
	Other profession	36	22.09
Income	1000-5000	80	49.1
(Ksh)	5001- 10,000	36	23.0
	10,000-50,000	34	20.6
	>50,000	12	7.3

The Table 2 illustrates the demographic details that were obtained through interviewing of 200 local people involved in the stud. Most respondents identified as female, comprising 56.4% of the total, while 41.8% identified as male. These findings highlight a slightly higher representation of females compared to males in the household composition and women are more involved in water and sanitation matters in Funyula sub-county and constituting 41.2%, are within the "21-40 years" age range, while 58.2% are aged "41 years and above. Almost half of the respondents (49.1%) completed primary education. About 23.0, and 20.6%, and 7.3% also completed secondary, and tertiary (college and universities) education. This data underscores the importance of understanding the educational composition of the surveyed population. This implies, the ability of reading and writing in rural water users could help to attain the objectives of trainings and managing their WASH projects (Kateta et al., 2015).

Occupation study indicates that most (54.6%) of the respondents identified as farmers. Business persons comprised 23.31% of the surveyed population, while 22.09% reported other professions. These percentages offer insights into the occupational composition of the surveyed population, highlighting the significant representation of farmers in the community (Yemataw et al., 2017). Income study indicates respondents' approximate monthly income, providing valuable insights into the financial landscape of the surveyed population. All 200 respondents offered valid responses regarding their income level. The data showcases a range of income brackets, with varying percentages of respondents falling into each category (Table 2). For instance, income levels of 1000-5000, 5001-10,000, 10,001-50,000, 50,001 and above were reported by 49.1, 23.0, 20.6 and 7.3% of respondents, respectively. Majority falling within 49.1% being farmers which is the same as other studies (Ogbonna, 2016).

Figure 7. Showing water projects Onana, Ojibo and Buduong

4.2. Water source details

Table 3 provides information on the types of water sources used by respondents, along with their corresponding frequencies and percentages. Among the surveyed population, 40.74% reported using pipe water as their primary water source, making it the most common source. Borehole water was used by 33.95% of respondents, while spring water accounted for 23.46%. A small proportion, 1.85%, reported using shallow wells. These findings offer insights into the distribution of water sources among the surveyed population, highlighting the prevalence of pipe water and borehole water supplies from water projects as primary sources (Glewwe et al., 2015). Among the respondents, 41.9% rely on the "Buduong" water project, making it the most depended upon among the listed projects. Following "Buduong," 24.8% of households depend on the "Ojibo" water project. "Onana" ranks third, with 30.3% of households relying on it.

Table 3 displays respondents' perceptions regarding the sustainability of their primary water source. Majority of respondents (73.4%) reported that their water source is sustainable,

meaning they can depend on it every day. Conversely, 25.4% of respondents indicated that their water source is not sustainable, suggesting limitations in its reliability. Additionally, a small percentage of respondents reported varying degrees of sustainability, such as being able to depend on their water source after a few days of the week or after one to two weeks. These findings provide insights into the reliability and accessibility of water sources among household in Funyula (Grace W. Njeru and Geoffrey M. Mwaniki, 2018).

Table 3. Water source details

Items	Alternative	Respondents	
		Frequency	%
Water Project	Buduong	72	43.9
	Ojibo	41	24.8
	Onana	50	30.3
Water source	Borehole water	3	3.0
	Pipe water	69	41.9
	Shallow well	41	24.8
	Spring water	50	30.3
Dependency on the water projects (week)	>1-2	2	1.2
	After few days	41	25.4
	Everyday	120	73.4
Period depended on the water project (year)	0-1	13	7.9
	2- 4	41	26.0
	≥5	109	66.1
Household daily water consumption (L)	<2000	140	86.1
	2000- 4000	21	12.7
	>4000	2	1.2
Water quality(colour, smell and test)	Excellent	56	33.9
	Fair	48	29.1
	Good	56	33.9
	Poor	5	3.0
Distance covered to collect water (minutes)	<30	144	90.57
	30- 60	11	5.66
	>60	8	3.77
Household water treatment method	Filtration	8	4.8
	Water-gaurd	57	34.5
	Chlorination	98	60.6
Repair and maintenance of the water projects (weeks)	1-2	110	66.7
	3-4	17	10
	Month	13	8.3
	Months to years	25	15

The table displays on period the majority (66.1%) reported depending on the water source for 5 years or more, indicating a longstanding reliance on the water source. Additionally, 26.0% of respondents indicated a dependency ranging from 2 to 4 years, while 7.9% reported a duration of 0 to 1 year. These results shed insights on the importance of ensuring sustainability of water projects in the community. This is supported by the high percentage of dependence on the community water projects (Grace W. Njeru and Geoffrey M. Mwaniki, 2018).

Table 3 displays the amount of water consumed by households per day, as reported by respondents. Among the surveyed population, the majority (86.1%) indicated a consumption of 0-2000 liters of water per day, reflecting a significant portion of households with relatively moderate water usage. Additionally, 12.7% of respondents reported consuming between 2000 to 4000 liters per day, while only a small proportion (1.2%) stated a consumption of 4000 liters or more daily. These results indicate that a household on average consumes 1193.94 liters.

(Average Consumption = [(142 * 1000) + (15 * 3000) + (2 * 5000)] / 165 = (142000 + 45000 + 10000) / 165 = 197000 / 165 ≈ 1193.94 liters/day).

Table 3 presents respondents' assessments of the quality of the water they currently use, considering factors like color, smell, and taste. A significant portion of respondents rated the quality as "Good" (33.9%) or "Excellent" (33.9%), indicating satisfactory or high-quality water in terms of these attributes. Additionally, 29.1% of respondents rated the water quality as "Fair," suggesting some room for improvement but generally acceptable quality.

Table 3 illustrates the distance between water sources and households, categorized by the time taken to reach the water source in minutes. Most respondents, accounting for 90.57%, reported that their water source is accessible within 30 minutes. Additionally, 5.66% indicated that it takes between 30 to 60 minutes to reach the water source, while 3.77% reported 60 minutes or more. These findings provide insights into the accessibility of water sources in relation to the distance from households, highlighting that the majority have relatively convenient access within a 30-minute radius and also a good number travel above 60minutes and being women as stated in table 1 (Foster et al., 2019).

Table 3 illustrates respondents' usage of water treatment methods within their households. A significant majority (60.6%) confirmed that their households utilize chlorination water treatment methods. Conversely, 34.5% of respondents reported that their households use water-

guard. Additionally, a smaller proportion of respondents (4.8%) indicated use filtration.This indicate the rural water users have knowledge on water treatment (Joseph Oundo et al.2019).

Table 3 illustrates respondents' perceptions regarding the timeliness of maintenance and repair activities for projects. The majority (66.7%) reported that maintenance and repairs is indeed done on time with 1-2 weeks, while a smaller proportion (10%) indicates takes 3-4 weeks. Additionally, a minority of respondents (8.3%) reported that maintenance and repairs are takes a months and 15% states that repair takes months to years depending on the intensity of the parts that need to be repaired . This distribution underscores the importance of financing rural water projects and training staffs on technical issues to prompt maintenance and repair activities for project sustainability, with the majority acknowledging timely maintenance and repair of projects they fall under (Dessalegn Obsi Gemeda and Larry A. Swatuk, 2014).

4.3. WASH management programs that contributes to sustainability

Table 4 outlines various programs aimed at ensuring the long-term sustainability of water projects. Respondents suggested these programs include stakeholder involvement in decision-making through conducting meetings (25.32%), connectivity of water pipelines (10.76%), diversifying water use for irrigation (7.59%), improved payment systems through metering (3.80%), registration of more members (6.96%), rehabilitation of water projects (5.06%), solar power installation (6.96%), sourcing funds to drill more boreholes (7.59%), and training staff on governance structure (6.96%), technical matters (5.70%), financial management (5.70%), and leadership and management (6.33%).

Table 4. The WASH management programs that contributes to sustainability

	Respondents	
Program	**Frequency**	**%**
Encourage environmental conservation	2	1.27
Involvement of stakeholders	41	25.32
Connectivity of water pipelines	18	10.76
Diversifying water use irrigation	12	7.59
Improved payment system through metering	6	3.80
Registration of more members	11	6.96

Rehabilitation of water projects	9	5.06
Solar power installation	11	6.96
Sourcing for funds to drill more borehole	12	7.59
Training of staffs on governance structure	11	6.96
Training of staffs on technical matters	10	5.70
Training on financial management	10	5.70
Training on leadership and management	10	6.33
Grand Total	**163**	100.00%

This diverse range of initiatives reflects a comprehensive approach to addressing various aspects crucial for the sustainability of water projects in our rural areas (Mushi et al., 2017).

4.4. Factors that determine sustainable water projects management programs

Table 5 indicates respondents from 163 stating factors that determine sustainability of water projects management programs. Yang & Jackson (2011) argues that availability of finances is fundamental to the success of WASH projects whereby financial uncertainties were a limiting factor for many projects. Concerning the effects of scarce resources on project sustainability, the respondents asserted that there was a weak accountability mechanism which led to stopping sustainability. This shows that most projects are not self- sustaining after funds withdrawal hence the need to design a mechanism to address sustainability issues. Which agree with study on Table 5 of the respondents 26% strongly agree, 62.42% agree only 5.45% are uncertain and 5.45% disagree. Majority of respondents agree that financing is important for rural water project sustainability.

The findings on training on management in Table 5 are in line with Weinberg (2008) who indicated that community-based projects are complex in nature and require different management skills. A project manager has to be equipped with both management related skills and technical skills to ensure sustainability of the projects. It contends to the studies conducted by Kirsch (2000) who indicated that project management activities include but not limited to defining project scope and requirements, resource management, offering relevant training, providing support on technical expertise, estimating budget and schedule and general risk management. Observation of the activities will ensure sustainability of the WASH project.Which agree with study on Table 5 findings 35.15% strongly agree, 52.73% agrees only 3.03% are uncertain and 8.48% disagree on management skills, Technical training

38.79% strongly agree, 43.64% agrees, 6.06 uncertain and 10.91% disagree. Majority of respondents agree that training on management skills and technical expertise is importants contributing factor to water project sustainability.

Table 5 findings on community involvement in planning, management and decision decision making in rural projects.Mushtaq (2004), in America Community participation is a process by which people from all sectors of the community (rich, poor, Men, women, uneducated and educated) can influence or control those decisions, which affect their lives. He argues that Community participation is very crucial especially during the initial stages of a project. Which agree with study on Table 5 40.61% strongly agree, 47.88%agrees, 2.42% uncertain and 7.88% disagree With the majority acknowledging positive levels of attendance and involvement among community project members, this depicts how crucial good community members' involvement is for effective project management and sustainability.

Respondents in Table 5 showed that the majority they are in agreement that continuous monitoring for water projects respondents states that 38.79% strong agree, 44.85% agree, 7.88% uncertain, 7.88% disagree. The majority states continuous monitoring repair, maintenance of the water project, having trained staffs on technical matters is important for sustainability of the management programs.The findings are consistent with another finding (Mwandosya et al., 2019), which states that continuous monitoring of project performance and community engagement contributes to improved sustainability outcomes in rural projects study done in Tanzania.

Table 5. Factors that determine sustainable water projects management programs

Variable	Response	SD	D	U	A	SA	M
Financing from donors is it improving the project and training on finance Management	Freq	-	8	8	103	43	1
	%	-	5.45	5.45	62.42	26.06	0.61
Training on management improving the project	Freq	-	14	5	86	57	1
	%	-	8.48	3.03	52.73	35.15	0.61
Training of technical experts is it	Freq	-	18	10	71	63	1

improving the project	%	-	10.91	6.06	43.64	38.79	0.61
Continuous monitoring of the project	Freq	-	13	13	73	63	1
	%	-	7.88	7.88	44.85	38.79	0.61
Community involvement in the planning or implementation improve the project	Freq	2	12	4	78	67	1
	%	1.21	7.88	2.42	47.88	40.61	0.61

SD=Strongly Disagree, D=Disagree, U=Uncertain, A=Agree, SA=Strongly Agree, M=Missing

4.5. Sanitation facilities management programs

Table 6 outlines the types of sanitation facilities currently available in households in Funyula sub-county. Most respondents (83.0%) reported having pit latrines, indicating a prevalent sanitation method in the surveyed area. Additionally, 8.5% of respondents stated that their households have both flush toilets and pit latrines, while 4.8% reported having only flush toilets. A small proportion of respondents (3.6%) indicated open defecation as their sanitation method. This indicates despite majority of people using pit latrine there is still those who practice open defecation due to poverty not being able to construct toilet (Suhail et al. 2017).

Table 6 provides information on the frequency of monitoring, emptying and maintenance of sanitation facilities, categorized by time intervals in years. Among the surveyed respondents, 68.08% reported that their toilets are emptied and maintained every 0-2 years. Additionally, 25.05% indicated a time interval of 2-5 years, while 6.87% reported 6years and above. These findings highlight variations in the maintenance practices of toilets among respondents, ranging with different years. Majority 68.08% stating they monitor, maintain there sanitation facilities within 0-2 years hence maintaining hygiene level (Mwandosya et al 2019).

Table 6. Respondents on sanitation facilities

Items	Alternatives	Respondents	
		Frequency	%
Sanitation facilities	Both flush and pit latrine	14	8.5
	Flush toilet	7	4.8
	Open defecation	6	3.6
	Pit latrine	135	83.0
Monitoring and maintenance of sanitation	<2	110	68.08

facilities (years)	2-6	45	25.05
	> 6	8	6.87
	1	100	60
Household dependency on sanitation facility (number)	2-3	40	20
	4-5	18	15
	>5	7	5
	Hand washing	150	88.1
Hygiene practices	Before meals	8	5.6
	After toilet	7	4.4
	Before cooking	1	1.9

Table 6 indicates the distribution of households based on the number of households depending on one toilet, along with their respective frequencies and percentages. Among the surveyed households, the majority (60%) reported having one household depending on a single toilet. Additionally, 20% of households reported having 2-3 households sharing one toilet, 15% represents 4-5 households reported sharing a toilet and (5%) 6 and above households depended on one sanitation facility.These findings provide insights into the distribution of toilet usage among households, highlighting variations in the number of households sharing a single toilet. Majority of the respondents 60% states that 1 household use one toilet and 40% they are sharing sanitation facilities among household hence there is great need to improve on sanitation facilities development and sustainable management.

Table 6 indicates 163 respondents' gave their view on hand-washing practices based on different scenarios in there household. Most respondents (88.1%) reported washing their hands every time they felt it was necessary, reflecting a high level of hand hygiene consciousness. Additionally, smaller proportions of respondents reported washing their hands after specific activities, such as after using the toilet (4.4%), before eating (5.6%). These findings underscore the importance of regular hand-washing as a crucial hygiene practice among the surveyed population (Unicomb et al.2016).

4.5.1 Factors that determine sanitation facilities management practices

The study sought to find out factors that determine sanitation facilities management practices.
Table 7 illustrates reviews of 163 of respondents on factors that determine sustainability of rural sanitation facilities. Majority of respondents (73.9%) strongly agreed, 11.5%, while the same proportions (11.5%) are uncertain and 3% disagreed that training of community of hygiene practice contributes to sustainable management program. These results indicate that majority of

households in Funyula Sub-County have access to water and soap for hand-washing thus being able to uphold hand hygiene. These results imply that a significant percent 73.9% of households/individuals in Funyula have received training on hygiene practices raising a training signifying importance of training on sanitation matters improves hygiene practices and the importance of upholding such practices. the findings are in line with (Lovleen et al. 2020) the paper may discuss the role of community participation and empowerment in CLTS programs, highlighting how these factors influence the effectiveness and sustainability of sanitation interventions within the context of water governance.

Table 7 also outlines respondents' adoption of new hygiene practices behavioral change because of training. Most respondents (57.6%) strongly agreed reported that they have indeed adopted new hygiene practices after receiving training. Conversely, 29.1% of respondents agreed indicated that they have adopted new hygiene practices following training. Additionally, 7.9% of respondents were uncertain about their adoption of new practices, while 5.5% disagreed. These results indicate low/average implementation of training knowledge on hygiene practices by respondents.The findings are in line with Dreibelbis et al. (2013) explores the effectiveness of Behavioral Change Communication (BCC) interventions in promoting the adoption of safe water, sanitation, and hygiene practices. providing insights into the efficacy of communication approaches in improving public health outcomes in rural areas.

Table 7. Factors that determine sustainability of sanitation facilities management programs. Satisfactory of sanitation needs [Number (%)]

Items	Strongly agree	agree	uncertain	Disagree
Training on hygiene practices	121 (73.9)	19(11.5)	19 (11.5)	4 (3.0)
Community capacity building	86 (53.9)	69 (41.2)	4(2.4)	4(2.4)
Behavioural change communication	93(57.6)	48(29.1)	13(7.9)	9(5.5)
Improvement of hygiene practices	59(35.8)	71(43.0)	18(12.1)	15(9.1)
Monitoring and maintain sanitation facilities	68(41.2)	73(45.5)	21(12.7)	1(6)

Table 7 indicates respondents view on community capacity building and how it contributes to sanitation facilities sustainable management programs 53.9% strongly, 41.2% agree, 2.4% are

uncertain and 2.4% disagree. Majority shows that empowering the community with knowledge and the training on hygiene practices contribute to sustainable management programs sanitation facilities in rural areas. The finding is in line with Sow S,et al. (2018) which states that hygiene education and community empowerment, in promoting sustainable sanitation and hygiene practices in rural communities study done in Ghana and Sierra Leone and Bartram J, et al (2016) also stated that hygiene training and community mobilization, improved on sanitation outcomes in rural areas and also CLTS is effective in promoting sustainable sanitation practices and improving health outcomes in rural areas, study done in Ethiopia.

Table 7 also illustrates the frequency at which sanitation facilities monitored and maintained according to respondents. Most respondents (45.5%) agreed reported monitoring and maintaining sanitation facilities frequently, indicating regular upkeep. Additionally, 41.2% of respondents strongly agreed (12.7%) were uncertain (.06%) disagreed. The majority of respondents agreed that continuous monitoring of sanitation facilities leads to improved management programs. Overall, the findings suggest a general commitment to regular monitoring and maintenance practices to ensure the cleanliness and functionality of sanitation facilities.The findings are in line with Huda et al. (2019) indicates that monitoring and evaluating w sanitation, and hygiene (WASH) programs in rural areas, contributes to there effectiveness and sustainability of WASH interventions.

4.6 Institution integrated management of rural projects

The researcher was to establish the institutions, NGOs and community leaders involved in rural projects management and there contribution to sustainability of the management programs in place. Figure 8 showing committee management team of Ojibo and Duduong water projects.

Figure 8. Showing Committee management team of Ojibo and Duduong water projects

4.6.1 Institutions management of the projects

Table 8 displays frequency and percentages of 163 respondents giving their views on institutional management of rural WASH projects, indicating the number and percentage of respondents associated with each project. In this case, there are three projects: Buduong and Ojibo are equally represented, each comprising 17 respondents representing committee management team and staffs, accounting for 47.2% of the total respondents respectively. Onana has 2 respondents representing 2 government officials because it is governed by the government, making up 5.6% of the total.

Table 8 also illustrates the duration of functioning management offices reported by respondents. It indicates that a significant portion (50%) have had their management offices operational for 10years and above, while 47.2% have had theirs functioning for 6- 10years, 2.8% have had a functioning office 1-5years. This suggests a substantial presence of well-established water projects management offices.

Table 8. Institutional management of water projects

Items	Alternatives	Response	
		Frequency	%
Water projects managed	Buduong	17	47.2
	Ojibo	17	47.2

	Onana	2	5.6
Existence of the management office	1-5	1	2.8
(year)	6-10	17	47.2
	>10	18	50.0
Qualification of the Management	Highly qualified	12	33.3
committee leaders	Not highly qualifies	24	66.7
Training of committee leaders	Project management	12	32
	Finance	10	30
	Technical	14	38
Contribution of NGOs to project sustainability	Trainings	15	40
	Funding	10	25
	Renovation	11	35
Stakeholders involved in the management of	Community	16	44
the projects	NGOs	12	32
	Government	8	24
	Annually	12	38.9
Management offices conducting meetings	Quarterly	19	52.8
	Annually & quarterly	5	8.3

The results displayed in the Table 8 above indicate that majority of them of water management teams/offices conduct their meetings very frequently that is quarterly 52.8% strongly agreed which is quarterly and annually, 38.9% agree that meeting is conducted annually and 8.3 % indicates office conducts meetings annually and quarterly. And Majority of respondents indicate meeting are held frequently that contributes to sustainable management of the projects

The majority (66.7%) indicated that leaders are not highly educated in Table 2, while the remaining respondents (33.3%) reported that leaders are all highly educated. Good education among leaders of water and sanitation projects is highly correlated with the success of these projects. A high percentage of these leaders being not well educated as indicated in the results above pose a great risk towards the sustainability of the management programs of projects in question.

Table 8 indicates training of committee leaders on different area such as project management, finances and technical, represented by this percentage respectively 32, 30% and 38%, respectively. The respondent is moderate hence indicating there is still less efforts being put in to train leaders in rural areas more effort has to be put in to contribute to sustainability of projects when donor withdraws.

Table 8 illustrates respondents' perceptions regarding the involvement of non-governmental organizations (NGOs) in project sustainability efforts. (25%) reported that NGOs contribute by

providing financial support for project funding. Conversely, anotherv40% of respondents stated that NGOs trainings of community project leaders. (35%) of respondents indicated that NGOs contribute to sustainability by conducting repair and renovation activities themselves, highlighting their direct involvement in project maintenance and upkeep.These findings underscore the varied roles that NGOs play in supporting the sustainability of water projects, both directly and indirectly.

Table 8 provides insights into coordination among stakeholders in the management of the project. It indicates that most respondents (32%) reported involvement from donors, while an equal percentage (24%) indicated involvement from government officers. 44% of respondents stated management by the community. These findings suggest a diverse range of external stakeholders actively participating in decision-making processes related to water projects, highlighting the importance of collaboration among various entities for project implementation and sustainability.The findings are in line with Funding Mechanisms and Stakeholder Engagement in Sustainable Rural Renovation Projects" by Samantha Green and Matthew Taylor, published in 2019.Which also states the importance on collaboration and financing by stakeholders rural water projects.

4.6.2 Factors that determine sustainability of institutions in rural WASH projects

Table 9 presents 163 respondents' perspectives on whether training of leaders and strengthening governance system contributes to sustainable management programs. The majority (52.8%%) strongly agree, while a smaller proportion (38.9%) simply agree, 5.6% they are uncertain and 2.8% disagree with this notion. Strengthening governance system based on laid down constitution and formulating policies that guide the management is highly correlated with the success and sustainability of these projects. This is supported by the 69.4% majority of the respondents.

Table 9 also states that Among the respondents, 63.9% strongly agree that integrating all stakeholders that are involved in the management and those that benefit from the project contributes to sustainable management programs of water projects. On the other hand, 69.4%% strongly agree that there, while 30.6% agree. These findings suggest that a significant portion of projects are indeed impacted by integration of stakeholder to varying extents, highlighting the

importance of considering finances and management on sustainability and resilience in project planning and implementation.

Table 9. Project management impact on sustainable of WASH

Variable	Response	SD	D	U	A	SA
Strengthening governance structure integrating other stakeholder	%	52.8	2.9	5.6	38.9	0
Will the water project management programs be sustainable in the future	%	4.85	6.67	9.09	53.94	25.45
Has water project implementation improved water availability in the community	%	1.21	4.24	9.09	64.24	21.21
The quality of water in terms of smell,taste and colour is good with good management programs	%	1.21	3.03	24.85	35.76	35.15
Does the Water satisfactory to your needs and is dependable	%			12.12	67.88	20.00
Hygiene practices improved since implementation of the sanitation Mgmt programs	%	1.2	4.2	8.5	49.1	37
Will the sanitation projects management programs be sustainable	%	2.4	5.5	11.5	63.6	17

Table 9 represents respondents on the sustainability of water projects management programs and there impact of clean water availability to Funyula- Samia rural communities. 25.45% strongly agreed, 53.94 agreed, 9.09% were uncertain, 6.67% disagreed and 4.85% strongly disagreed. From the findings majority of respondents strongly agreed and minority disagree

stating some challenges faced in projects management and clean water supply to the whole community.

When it comes to water quality 35.15% strongly agree, 35.76% agreed, 24.85% were uncertain, 3.03% disagreed and 1.21% strongly disagreed. Majority of the respondents stated that water quality is good in terms of all parameters and minority disagrees hence stating some issue in terms of taste, some boreholes are salty. Hence need to improve on the water quality. The respondents 20% strongly agreed, 67.88% agreed and 12.12% were uncertain. From the findings majority agreed and water availability satisfying there need and very few were uncertain hence stating there are some of their needs not met by water. Hence, the need to improve on water availability and quality to meet the needs of every community member are crucial.

When it comes to if the water projects management program if it will be sustainable 25.45% of the respondents strongly agreed, 53.94% agreed, 9.09% were uncertain,6.67% disagreed, 4.85% strongly disagreed. From the findings agreed that the project will be sustainable depending on the improvement they have seen in management in the recent years, minority still states that projects will not ne sustainable due some challenges still faced in management financial management and repair time. Hence there is need for more to be invested interns of trainings and finances in rural water projects.

Table 9 represents 163 respondents views on if the hygiene practices has improved since implementation of the sanitation management programs.Respondents 37% strongly agreed, 49.1% agreed, 8.5% were uncertain, 4.2% disagreed and 1.2% strongly agreed. From the findings majority agreed that there hygiene practices have improved in there community and minority still have issues with hygiene practices due to few sanitation facilities, lack of training of hygiene practices hence there is need for more investment for whole community to access well maintain sanitation facilities to improve there hygiene practices to prevent outbreak deadline diseases.

Table 9 also represents if sanitation facilities management programs will be sustainable and if they will impacts on the hygiene practices. Respondents 17% strongly agree, 63.6%agree, 11.5% were uncertain, 5.5% disagreed, 2.4% strongly disagreed. From the findings majority agreed and minority disagreed. Hence sustainability of the sanitation facilities is not 100%

some respondent states that in future the sanitation facilities may stop be useful hence there is need for more investment in management.

4.6. Correlation of factors that determine projects management programs

The regression analysis reveals a strong positive relationship between donor financing and the sustainability of water project management programs. The correlation coefficient (R) of 0.894 indicates a high degree of association between these two variables. This suggests that as donor financing increases, the sustainability of water project management programs tends to increase as well. The adjusted R Square of 0.796 suggests that the model accounts for a substantial portion of the variability in the sustainability of these programs, even after adjusting for the number of predictors in the model. Overall, these findings suggest that donor financing significantly influences the sustainability of water project management programs. The p-value associated with the regression model is 0.002, which is below the typical significance threshold of 0.05. This indicates that the relationship between donor financing and the sustainability of water project management programs is statistically significant.

Table 10. Relationship between various factors with water project management programs sustainability

Relation between various factors with WASH	R	R^2	Adj. R^2	Std. Error	p-value
Donor financing vs water project Mgmt program sustainability	0.894	0.800	0.796	0.730	0.002
Training on Mgmt vs water project Mgmt programs program sustainability	0.602	0.362	0.359	0.842	0.01
Training of technical experts vs water project Mgmt programs sustainability	0.753	0.567	0.564	0.941	0.001
Continuous monitoring vs water project Mgmt programs sustainability	0.906	0.810	0.804	0.873	0.008
Community involvement in implementation vs water project Mgmt programs sustainability	0.875	0.766	0.762	0.910	0.006

Community capacity building on Hygiene practices vs sanitation projects Mgmt programs sustainability	0.679	0.46	0.457	0.904	0.001
Training on hygiene practices vs sanitation projects Mgmt program sustainability	0.80	0.64	0.637	1.138	0.001
Behavioural change in hygiene practices vs sanitation projects Mgmt program sustainability	0.70	0.49	0.486	1.027	0.001
Continuous monitoring of sanitation facilities vs Sanitation projects Mgmt programs sustainability	0.90	0.81	0.807	0.894	0.001

In other words, there is strong evidence to suggest that donor financing influences the sustainability of these programs. With such a low p-value, we can confidently reject the null hypothesis, which posits that there is no relationship between donor financing and sustainability. Therefore, the data suggest that there is indeed a meaningful relationship between these two variables, with donor financing playing a significant role in determining the sustainability of water project management programs.

The regression results reveal a moderate positive relationship between training on management and the sustainability of water project management programs. The correlation coefficient (R) of 0.602 suggests a moderate degree of association between these two variables, indicating that as training on management increases, the sustainability of water project management programs tends to increase as well. The adjusted R Square of 0.359 indicates that approximately 36% of the variability in the sustainability of these programs can be explained by the variation in training on management. The p-value associated with the regression model is less than 0.001, indicating a highly significant relationship between training on management and the sustainability of water project management programs. This suggests strong evidence to support the idea that training on management has a meaningful impact on the sustainability of these programs.

The regression analysis highlights a notable positive relationship between the training of technical experts and the sustainability of water project management programs. With a correlation coefficient (R) of 0.753, there's a moderate-to-strong association between these variables, suggesting that an increase in the training of technical experts corresponds to a rise in

the sustainability of water project management programs. This finding is reinforced by the adjusted R Square of 0.564, indicating that approximately 56% of the variability in sustainability can be attributed to the variability in technical expert training. The ANOVA results demonstrate a highly significant relationship between the training of technical experts and the sustainability of water project management programs ($F = 564.73$, $p < 0.001$). This indicates that the regression model explains a significant amount of the variability in program sustainability. Consequently, it can be inferred that the training of technical experts significantly impacts the sustainability of water project management programs.

The regression analysis indicates a strong positive relationship between continuous monitoring and the sustainability of water project management programs. The correlation coefficient (R) of 0.906 suggests a high degree of association between these variables, implying that as continuous monitoring increases, the sustainability of water project management programs tends to increase as well. The adjusted R Square of 0.804 suggests that approximately 80% of the variability in sustainability can be explained by the variation in continuous monitoring. This highlights the significant contribution of continuous monitoring to the sustainability of water project management programs. The relatively low standard error of the estimate (0.873) suggests that the model has a good fit in predicting the sustainability of these programs based on continuous monitoring. Overall, these findings underscore the importance of continuous monitoring in ensuring the long-term sustainability of water project management initiatives. The ANOVA results reveal a significant relationship between continuous monitoring and the sustainability of water project management programs ($p = 0.008$). This indicates that the regression model as a whole offers meaningful insights into the variability of program sustainability. Therefore, continuous monitoring emerges as a significant factor influencing the sustainability of water project management programs.

The regression analysis suggests a strong positive relationship between community involvement in implementation and the sustainability of water project management programs. With a correlation coefficient (R) of 0.875, there's a high degree of association between these variables, indicating that as community involvement increases, the sustainability of water project management programs tends to increase as well. The adjusted R Square of 0.762 suggests that approximately 76% of the variability in sustainability can be explained by the variation in community involvement in implementation. This underscores the significant contribution of

community involvement to the sustainability of water project management programs. The ANOVA results indicate a statistically significant relationship between community involvement in implementation and the sustainability of water project management programs ($p = 0.006$). This suggests that the regression model as a whole provides valuable insights into the variability of program sustainability. Therefore, community involvement in implementation emerges as a significant factor influencing the sustainability of water project management programs.

The regression analysis suggests a moderate positive relationship between community capacity building on hygiene practices and sanitation project management programs' sustainability. The correlation coefficient (R) of 0.679 indicates a moderate degree of association between these variables, suggesting that as community capacity building on hygiene practices increases, the sustainability of sanitation project management programs tends to increase as well. The adjusted R Square of 0.457 suggests that approximately 46% of the variability in sustainability can be explained by the variation in community capacity building on hygiene practices. This highlights the significant contribution of community capacity building to the sustainability of sanitation project management programs. The ANOVA results reveal a highly significant relationship between community capacity building on hygiene practices and sanitation project management programs' sustainability ($p = 0.001$). This suggests that the regression model provides valuable insights into the variability of program sustainability. Therefore, community capacity building on hygiene practices emerges as a significant factor influencing the sustainability of sanitation project management programs.

The regression analysis indicates a strong positive relationship between monitoring of sanitation facilities and sanitation projects management programs' sustainability. With a correlation coefficient (R) of 0.90, there's a high degree of association between these variables, suggesting that as monitoring of sanitation facilities increases, the sustainability of sanitation projects management programs tends to increase as well. The adjusted R Square of 0.807 suggests that approximately 81% of the variability in sustainability can be explained by the variation in monitoring of sanitation facilities. This underscores the significant contribution of monitoring activities to the sustainability of sanitation projects management programs. The ANOVA results demonstrate a highly significant relationship between monitoring of sanitation

facilities and the sustainability of sanitation projects management programs ($p < 0.001$). This indicates that the regression model provides valuable insights into the variability of program sustainability. Therefore, monitoring of sanitation facilities emerges as a significant factor influencing the sustainability of sanitation projects management programs.

The regression analysis suggests a moderately strong positive relationship between unspecified programs sustainability and the predictors used in the model. The correlation coefficient (R) of 0.80 indicates a substantial degree of association between the variables, implying that as the predictors increase, the sustainability of the programs tends to increase as well. The adjusted R Square of 0.637 indicates that approximately 64% of the variability in sustainability can be explained by the predictors in the model, after accounting for the number of predictors used. The standard error of the estimate is 1.138, which represents the average distance between the observed values and the predicted values by the model. Overall, these findings suggest that the predictors included in the model have a significant impact on the sustainability of the programs, explaining a considerable portion of the variability observed.The ANOVA results demonstrate a highly significant relationship between the predictors and the sustainability of the programs ($p < 0.001$). This indicates that the regression model provides valuable insights into the variability of program sustainability. Therefore, the predictors used in the model emerge as significant factors influencing the sustainability of the programs.

The regression analysis suggests a moderate positive relationship between behavior change and sanitation projects management programs' sustainability. With a correlation coefficient (R) of 0.70, there's a moderate degree of association between these variables, indicating that as behavior change increases, the sustainability of sanitation projects management programs tends to increase as well. The adjusted R Square of 0.486 suggests that approximately 49% of the variability in sustainability can be explained by the variation in behavior change. This underscores the significant contribution of behavior change to the sustainability of sanitation projects management programs.The ANOVA results demonstrate a highly significant relationship between behavior change and sanitation projects management programs' sustainability ($p < 0.001$). This indicates that the regression model provides valuable insights into the variability of program sustainability. Therefore, behavior change emerges as a significant factor influencing the sustainability of sanitation projects management programs.

CHAPTER 5: CONCLUSION AND RECOMMENDATION

5.1. CONCLUSION

The study's results allow for the following inferences: Long-term sustainability of water sanitation and hygiene projects in Funyula sub-County was influenced by trainings on leadership, management skills, technical expertise, training on hygiene practices, behavioural change communication, community capacity building and involvement, financing from donors, and continuous monitoring and evaluation and lately integrated institutional management of projects. From the study result states that there is uncertainty and some disagree about establishment and adequate implementation. There is a gap and more effort and investments that need to be put in by both community, management leaders , government official and donors to ensure management programs of rural projects to reduce the issues of projects stopping functionality after withdrawal of donors because some projects like Ojibo has been reported to stop functioning for about 10years and above donors came in to revive it again and Onana after failed to be sustainable county government had to take over the management.In conclusion, while each of these factors contributes to the long-term sustainability of WASH projects in Funyula sub-County, challenges still exist. Overcoming these challenges requires ongoing commitment, innovation, and collaboration among stakeholders. By addressing limitations, building on successes, and embracing a holistic approach to sustainability, WASH projects can continue to make a positive impact on the health and well-being of rural communities in Funyula sub-County.

5.2 RECOMMENDATIONS

Based on the findings, the study suggests a number of possible next steps. To begin, all members of the community should participate in the process of deciding upon and organizing water and sanitation infrastructure. It is essential that all community initiatives have full buy-in from all relevant parties at every stage of development and that decision-making authority be devolved to the lowest suitable level. This can be achieved by implementing participatory management approaches at both the organizational and beneficiary levels in order to achieve maximum local participation and ensure that these initiatives broadly match the requirements of beneficiaries in order for them to be sustainable enough.

On technical expertise, the study recommends that the management of projects to hire and retains adequately trained and experienced personnel to manage the Water, sanitation and hygiene projects that they implement. In addition, the management should train the project managers and staff on a regular basis to ensure that they acquire relevant skills and knowledge related to Water, sanitation and hygiene projects. The management of projects should also educate and empower the local community on the importance of sustaining the projects. This can be done through public barazas and advocacy among the opinion leaders in the community.

Further, the study recommends that the management to source for adequate funding to water, sanitation and hygiene projects. This will ensure that the right quality of equipment, employees and technologies are procured to ensure project sustainability. In addition, the management should ensure the funds are used according to budget and that there is no wastage. Also, the study recommends that the management of World Vision deploys the right technology such as computers, mobile phones and machines to collect, analyze and disseminate data and information in real time to the stakeholders. This will help to identify problems on time and take corrective measure.

Training hygiene practices should be continuous exercise from the highest level of management to the lowest individual level. This brings about sharing new and improved innovation, creating awareness on hygiene practices which in the long run will contribute to behavioural change in

the community. Management of sanitation facilities will be improved and hence improving sustainability of the project.

Integrated management with stakeholders involves establishing community-based institutions with transparent governance structures, fostering collaboration with government agencies, NGOs, and the private sector, empowering local communities through participatory decision-making, and building the capacity of stakeholders at all levels. By engaging diverse stakeholders, coordinating efforts, and strengthening institutional capacities, WASH projects can achieve long-term sustainability and effectively improve the health and well-being of rural populations. Establish robust monitoring and evaluation systems to track the progress, outcomes, and impacts of rural community WASH projects over time. Involve community members in data collection, analysis, and decision-making processes to ensure their active participation and ownership of project monitoring activities. Use monitoring data to identify successes, challenges, and areas for improvement, and adapt project strategies accordingly to enhance sustainability and effectiveness.

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APPENDICES

Appendix I: QUESTIONNAIRES FOR THE COMMUNITY PROJECT MEMBER

Section A: Biodata information

(To be answered by a person above 18 years in a household, preferably a household head) a.Gender Male [ ] Female [ ]

b. What is your age? 20 - 30yrs[ ] 30 - 50yrs [ ] 50yrs and above [ ]

c. Marital status: Single [ ] Married [ ] Divorced [ ] Separated [ ] Widowed [ ]

d. How many people are there in your household?

0- 5 6- 10 10- 15 15 and above

Village _____ Sub location_____

Are you a resident of the …….. Village Yes [ ] No [ ]

If yes, how long have you lived here?

0-7 years [ ] 8-14 years [ ] 15-21 years [ ] 21 years and above [ ]

What is the highest level of education you have completed?

None [] Lower primary school [ ] Upper primary school level [ ] Secondary school level [ ] Tertiary education [ ] Degree and above [ ]

What is your occupation?

Agriculture [ ] Business service [ ] Technical Labor [ ] Other professionals[ ]

What is the approximate monthly (Kshs) income of your household before taxation?

Below 2000 [ ] 2001-5000 [ ] 5001-10000 [ ] 10001-20000 [ ] 20001-30000 [ ] 30001 and above [ ]

Section B. Water availability, quality, distance and use

What type of water source do you use?

Spring water [ ] Borehole water [ ] Shallow well [ ] Pipe water [ ] Others [ ]

How many years have you depended on this water source

1-2years [ ] 2- 4 years [ ] 5 and above [ ]

How much do your household consume daily?

0- 200L [ ] 200L - 400L [ ] 400- 600L [ ] 600L and above [ ]

How would you rate the quality of the water you currently use in terms of taste, colour and smell?

Excellent [ ] Good [ ] Fair [ ] Poor [ ]

What is the primary use of water in your household?

Drinking [ ] cooking [ ] hygiene[ ] livestock and agriculture [ ]

Do you treat water before drinking? Yes [ ] No [ ]

How often do you have access to safe and clean water in your household?

Everyday[ ] after few days of the week[ ] after 1week -2week [ ] others [ ]

How far is the water source from your household

0- 30min [ ] 30- 60min [ ] 60mins and above [ ]

Section C: Sanitation and hygiene practices

What type of sanitation facilities does your household currently have?

Flush toilet[ ] Pit latrine[ ] Open defecation[ ] Others (specify)[ ]

How many households depend on the one toilet?

1 household[ ] 2- 3households[ ] 4household [ ]

How long does the toilets take to be emptied or maintained?

0- 5yrs[ ] 6- 10yrs[ ] 10years and above[ ]

Is water for hand washing available Yes [ ] No [ ]
Is soap or ash for hand washing available Yes [ ] No [ ]
d. When do you wash your hands

After toilet[ ] before eating [ ] after after eating[ ]

How frequently are sanitation facilities washed and maintained?

Daily [ ] 2- 5days[ ] 6 days and above[ ]

Have you received any training on hygiene practices? Yes [ ] No [ ]

Have you adopted any new hygiene practices as a result of training Yes [ ] No [ ]

Has the implementation of the water and sanitation project improved the availability of safe water in your community? Yes [ ] No [ ]

How has the water and sanitation project positively impacted your daily life?

No	Item	impact
1.	Social	
2.	Economic	
3.	Health	
	Others……..	

What are the challenges faced at household level towards achieving good water supply,sanitation and hygiene practices?

Lack of enough water points and sanitation facilities[ ]

Breakdown of the facilities[ ]

Lack of maintenance and repair[ ]

Lack of finance to operate and maintain [ ]

Committee leaders have no well structure for managing facilities[ ]

Were you involved in the planning or implementation of the water and sanitation project?

Yes [ ] No [ ]

APPENDIX 2.QUESTIONNAIRES FOR THE COMMITTEE PROJECT LEADERS

Section A: Biodata and Project identification information

Name of the project ……

Name of Committee……..

How long has the committee been involved in overseeing the project……

What is the role and composition of the committee in the project?

….……
Project Planning and Implementation:
Were committee members involved in the planning and design of the water and sanitation projects?
Yes [ ] No [ ]

If yes, what was the role pf the committee

…….……
How do you ensure that the project implementation adheres to the approved plans and timelines?
c. What challenges, if any, have you encountered during the implementation, and how have you addressed them?
d. How do you coordinate with other stakeholders involved in the projects

Section B: Project Management and Implementation

How is the water and sanitation project managed in terms of leadership structure and decision-making processes?

Hierarchical [ ] Collaborative [ ] Other (please specify)

What are the major responsibilities of the committee in project implementation?……
How do you ensure community participation and engagement in project activities?

Describe the monitoring and evaluation processes in place for assessing project progress……

Resource Management:
a. How do you manage the financial resources allocated to the water and sanitation projects?
Are there any mechanisms in place to ensure transparency and accountability in financial management?

How do you handle the procurement and maintenance of project materials and equipments

Who is responsible in setting the water charges……..

Explain your participation in setting the water charges ……..…..

Do you feel satisfied with the management and operation of water services in the village? Yes[ ] No[ ]
If No, explain why you are not satisfied……..

How frequent does the water project break down?

Every two weeks [ ] Two weeks-one month [ ] 1-2 Months [ ] 3-6 Months [ ]

What is the average cost of operation and maintenance of this water project per quarter?

Below 5000 Kshs [ ] 5001-20000 Kshs [ ] 20001-50000 [ ] > 50000 Kshs [ ]

Are there trained experts in the area who can service the water project?

Yes [ ] No [ ]

How was the idea about water project generated and how is the project managed?

[] The idea came from the community members [ ]

[] The idea came from the government [ ]

[] The idea came from the NGOs [ ]

[] I am not aware[ ]

What are programs that are conducted in the community to ensure proper management and sustainability of the water and sanitation projects?

….……

Section C: Challenges and Solutions

What challenges have you encountered in managing and implementing the water and sanitation projects?……

How have you addressed or mitigated these challenges?

…….
What support, if any, have you received from external organizations or government bodies in project implementation?……...

Section D: Community Impact

In your opinion, how has the project impacted safe water availability in the community?……
Have there been any noticeable changes in hygienic practices within the community as a result of the project?……

How do you measure the success of the project in terms of its impact on the community?……
How do you involve the local community in the decision-making processes related to the projects?

What strategies or initiatives have you implemented to encourage community participation and ownership?

How do you address any conflicts or disagreements that may arise within the community during project implementation?

Monitoring and Evaluation:
How do you monitor the progress and performance of the water and sanitation projects?

What indicators or metrics are used to assess the impact and effectiveness of the projects?

How often do you conduct evaluations or assessments, and how do you use the findings to improve project management?

Capacity Building and Training:
Are there any capacity building initiatives or training programs provided to committee members?

How do you ensure that committee members have the necessary skills and knowledge to fulfill their roles effectively?

Have there been any challenges in terms of skills or capacity gaps, and how have you addressed them?

Section E: Sustainability and Future Plans

What programs are in place to ensure the sustainability of the water and sanitation projects?……

Are there plans for expanding or replicating the project in other areas?

……

How do you involve the community in the long-term maintenance and sustainability of project outcomes?……..

How resilient are the water and sanitation facilities to the impacts of climate change?

Highly resilient [ ]Moderately resilient [ ] Not resilient at all [ ] Not sure [ ]

Have there been any noticeable changes in water availability or sanitation challenges due to climate change?

Yes [ ] No [ ]Not sure [ ]

Have there been any challenges related to religious beliefs affecting the usage or acceptance of sanitation facilities?

Yes [ ] No [ ] Not sure [ ]

In what ways can religious and cultural considerations be better integrated into the program?

……

Section F: Collaboration and Partnerships

How do you collaborate with other committees, organizations, or agencies working on water and sanitation projects in the region?

Are there any opportunities for knowledge sharing, learning, or joint initiatives with external partners?

How do you leverage partnerships to enhance the sustainability and impact of the projects?

Section G: Recommendations

Based on your experience, what recommendations do you have for improving the management and impact of water and sanitation projects in rural areas?

……

Are there any lessons learned that could be applied to similar projects in other regions?

……

Section H: Community Participation

a. Were you involved in the planning or implementation of the water and sanitation project? Yes [ ] No [ ]

b. If yes, how do you feel your involvement has contributed to the success of the project?

……

c. If no, how would you like to be more involved in future project activities?

……

Section I: Sustainability

a. Are there any measures in place to ensure the long-term sustainability of the water and sanitation project at household level?……

b. How confident are you that the project will continue to provide safe water and improved sanitation in the future?…….

b. What are the main challenges you still face regarding water and sanitation in your community?……

a. Do you have any suggestions or recommendations to improve the water and sanitation project or its management?

…….

Has the implementation of the water and sanitation project improved the availability of safe water in your community? Yes [ ] No [ ]

If yes, how has the availability of safe water improved?

d. If no, what are the challenges you still face in accessing safe water?

…….

c. If yes, please specify the new hygiene practices you have adopted.

…….

d. If no, what are the barriers preventing you from adopting new hygiene practices?

……/

Have the sanitation facilities improved since the implementation of the project? Yes[ ] No [ ]

If no Are there specific health issues related to sanitation that concern your community? ……Are there any cultural/ religious or social factors affecting sanitation practices in your community? Yes [ ] No [ ] If yes, what are they? ……

APPENDIX 3: INTERVIEW QUESTIONS FOR THE OFFICIALS.

Section A: General Information

Name of Official/Project Manager……

Position/Role in the Project……..

Name of the Projects you manage……..……

Duration of Involvement in the Water and Sanitation Projects…….

Section B: Project Background

What is the live span water and sanitation project since implementation?

……

What were the main objectives of these projects during the implementation stag

Has these projects attained the objective that was intended to achieve.

…..……

Who are the stakeholders in the projects and what is their contribution in the projects……

What is your the role in the management, overseeing and coordinating project activities……

What are the programs in place to ensure sustainability of the water and sanitation projects to ensure continuous water access and improve hygiene of the local community……

How was the project planned and designed to ensure it is sustainability? Were community needs and preferences taken into account?……

Section C: Budgeting and Funding

Does the projects receive the funding the management programs to ensure sustainability of the projects……..

Have there been any challenges related to the funding? If yes, please elaborate……

How is financial accountability maintained throughout the project management?

Section D: Monitoring and Evaluation

Explain the monitoring and evaluation mechanisms in place to assess project progress and impact……

How often are monitoring and evaluation activities conducted?

What key performance indicators (KPIs) are used to measure the success of the projects?

Have any adjustments or improvements been made to the project based on monitoring and evaluation findings?

Section E: Community Engagement and Participation

Describe the strategies employed to engage and involve the local community in project activities.

How is feedback from the community collected and integrated into project decision-making and improved management of the project.

Have there been any challenges in community engagement, and how were they addressed?

Section F: Project Outcomes and Impact

In your view, how has the project contributed to safe water availability in Funyula- Samia Sub-County?……..

What measurable impacts on hygienic practices have been observed as a result of the projects?

How do you assess the overall success and effectiveness of the water and sanitation projects?

Section G: Sustainability and Future Plans

What measures are in place to ensure the sustainability management programs of the project outcomes in the long term?……

Are there plans for scaling up or replicating successful aspects of the projects in other areas?

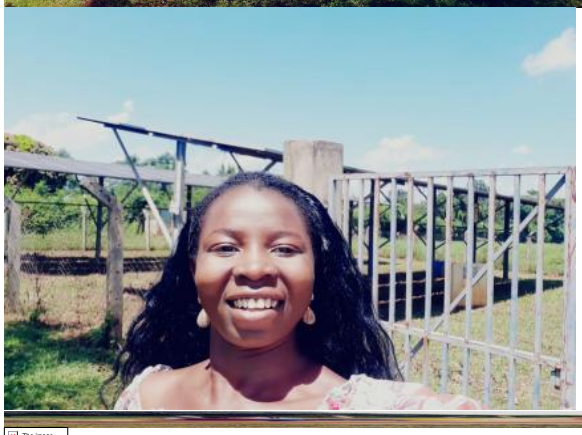
How do you foresee the future of the water and sanitation projects in the region?

Section H: Collaboration and Partnerships

Describe the collaboration with local authorities, NGOs, and other stakeholders in project implementation.

Are there opportunities for increased collaboration or partnerships to enhance project outcomes?

Section I: Lessons Learned and Recommendations
Based on your experience with this project, what are the main lessons learned in managing sustainable water and sanitation projects in rural areas?

…….
What recommendations do you have for improving the management of future projects in the region?

APPENDIX 4: SHOWING OF WATER PROJECTS ONANA, OJIBO AND BUDUONG'