

**FACTORS INFLUENCING SUSTAINABILITY OF
COMMUNITY MANAGED RURAL WATER SUPPLY
SYSTEMS: A CASE OF LOWER YATTA SUB COUNTY,
KITUI COUNTY, KENYA**

BY

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DECLARATION

This research project report is my original work and has not been presented to any award in any other university.

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DEDICATION

To my beloved family members, Alex, Mercy and Ivy, spiritual brothers and sisters for their support even during challenging times.

ACKNOWLEDGEMENT

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LIST OF ABBREVIATIONS

JMP: Joint Monitoring Program

ASAL: Arid and Semi-Arid Lands

COM: Community Ownership and Management

FGD: Focus Group Discussion

FY: Fiscal Year

JMP: Joint monitoring program

GOK: Government of Kenya

PPP: public private partnership

AMCOW: African Ministers Council on Water

MDG: Millennium Development Goals

NGO: Non-Governmental Organization

NWP: National Water Policy

UN: United Nations

UNDP: United Nations Development Programme

USAID: United States International Development

VLOM: Village Level Operation and Maintenance

WASH: Water, Sanitation, and Hygiene

WHO: World Health Organization

WSP: Water and Sanitation Programme

COK: Constitution of Kenya

KWAHO: Kenya Water for Health Organization

O & M: Operation and Maintenance

PM: Project Manager

UNICEF: United Nations Children Education Fund

TA-Technical assistance

NWP-National Water Policy

RBV-Resource Based View

RDT-Resource Dependence Theory

RBT-Resource Based Theory

ABSTRACT

Water is a right to human beings. It has been a concern to the whole world to provide all people with adequate and safe water. International, national government, NGOs, private sectors and religious sectors have earnestly supported water projects with large sums of money. Irrespective of the efforts made, water has remained a bigger challenge to the whole world. More than a billion people in developing World are vulnerable to access a reliable source of water. The world countries have purposed in halving the proportion without access to safe water. The aspect of sustainability of the water projects has been a challenge. Community members have been so ignorant to participate in water supply systems and keep it working after the external help is stopped. The purpose of this study was to investigate the factors influencing sustainability of community managed rural water supply system in Lower-Yatta Sub-County so that appropriate measurements could be recommended for the sustainability. The study objectives were guided by four potential factors selected covering institutional management, financial influence, technological factors and stakeholder participation. The study used descriptive survey research design. The targeted population was 500 respondents. The data was collected using questionnaires were administered to 35 respondents which were in closed form and interview was administered to individuals. It was studied in terms of: type of management, Role of management structure, training of management group, capacity building among the management committee group and the number of members in the management committee. Management committee was represented by CBO was stated by 2 (5.7%), Private individual was stated by 8(22.9%), Religious group 9(25.7%), NGO 6(17.1%), Management committee and Government agency 3(8.6%). This indicates that for the sustainability of water supply systems to be achieved, there must be management committee that manages water supply systems. The study recommends that, training of community members concerning the community managed rural water supply systems should stabilize the sustainability of water and also the national and the county government should develop policy documents, strategy guidelines, and standards that can be beneficial in dealing with problems that influence community from accessing adequate and clean water.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

There is an estimate of more than 2.5 billion people in the developing world countries that are in dire need of clean water but they are unable to get a daily access to clean source of water. 36 percent of the world's population lack improved sanitation and are living without access to safe water. This is according to the world's health organization (WHO) and United Nations Children's Fund (UNICEF, 2013). The UN General Assembly, in 2010, recognized water and sanitation as a human right thus making efforts of fulfilling those rights. With this in mind, the United Nations Millennium Development Goals (MDGs) aims at halving the proportion of people without sustainable access to safe drinking water and basic sanitation by the year 2015 (WHO, 2010). According to Deneke and Habtamu (March 2008), sustainability of community managed rural water supply scheme is the key factor in meeting the Millennium Development Goals (MDGs). Target 4 of the Millennium Development Goals (MDGs) requires that all drinking water supply, sanitation, and hygiene services be delivered in a progressive, affordable, accountable, financial and environmental sustainable manner (WHO/UNICEF, 2013).

According to Pruss-Ustun, A., Bos, R., et al. (2008), noted that most of the diseases worldwide are brought about by the use of unsafe water, lack of sanitation and hygiene and these diseases claim about 3.6 million lives every year (UNICEF 2013) . Water is also connected with 80% of all sicknesses and diseases worldwide through inadequate sanitation, polluted water or unavailability of water (WHO, 2007), at any given time, it has been estimated that half of the world's hospital beds are occupied with patients suffering from water-related diseases (UNDP, 2006). According to Graciana and Sizwe (2012), noted that in Sub –Saharan region about 30% of the rural water supply do not function at any time so, people are in great problem in accessing safe water and sanitation. According to Harvey (2006), showed that access to safe, sufficient, and affordable water in rural Africa will not increase unless sustainable financing strategies are developed to ensure that sustainability of existing water services are put in front line. According to the WHO/UNICEF Joint Monitoring Program, Report 2012, only 52 per cent of the population living in rural Kenya

has access to improved drinking water sources as compared to 82 per cent of the urban population in 2010.

Access to safe water is a basic human need necessary for both the well-being and social economic development of populations living in rural Kenya (Rukunga, G., Kioko, T. et al, 2006). According to the draft National Water Policy (NWP) 2012, “most of the rural water services systems are still not sustainable because of poor operation by communities leading to breakdown of facilities and low access rate, poor water quality and increased disputes”(NWP 2012, P.10). Differences in access to safe water are even more severe in the ASAL areas where there are few points of water (NWP 2012). To emphasize the importance of access to safe water, the Bill of Rights under article 43 of the Constitution of Kenya (COK) 2010 states that, access to safe water and safe sanitation is a right. According to the constitution of Kenya (2010), it states that every citizen has a right to clean and safe water and in adequate quantities all the time. The Policy Objectives of the draft further include “progressively achieving universal rights to water supply and sanitation for all by vision 2030 in the rural and urban areas” (NWP 2012, p. 12). The study investigated factors that influence the sustainability of community operated and managed water supplies in Kenya and more specifically Lower Yatta sub- county, Kitui County.

The Draft National Water Policy (NWP) (2013) requires the National water strategy to put efforts that all people are covered by the formal water supply system irrespective of their financial status such that the poor citizens are able to pay tariffs they can afford. The policy also notes that the rural water supply is characterized by the following point sources (hand pumps, wells, springs and boreholes) and small scale piped systems with little know how of technology and as a result there is complication of stocking of spare parts and lack of repair for the systems that break down. It also notes that the operation of water rural service systems were not sustainable because the operations were not up to standard and they did not repair the systems when they broke down, there is also poor water quality and increased disputes concerning water. The problem worsens in Arid and Semi- Arid Lands (ASAL) areas where by the supply of water systems are scarce.

In December 2015, a report from the ministry of water from Kenya was released stating that 61 per cent of the population in 27 counties in Kenya lack access to clean water. Sustainability of rural water supplies depends on a wide range of factors. The greatest problem was the lack of community participation in all levels of the project, most importantly, decision-making. The other causes for failure of community managed water supply systems include; ineffective management systems, inappropriate policy or legislation, lack of institutional support, unsustainable financing mechanisms, and lack of technical backstopping (Niyi, G., & Felix, O., 2007). This study investigated out the extent of stakeholders' participation in the sustainability of community managed rural water supply systems. The Rural communities had strong virtues in relations with each other and they felt happy to share water facilities with their neighbors, which they value in their lives (Gebrehiwot, 2006).

Effective Operations and Maintenance of rural water supply systems is critical element for the sustainability .Community managed rural water supply systems fail because of lack of finance, lack of frequent support (Binder,2008).When sufficient budget for rural water supply is done, sustainability will be better and proper Operation & maintenance.

1.2 Statement of the Problem

Access to clean safe water and sanitation is a serious issue and key concern to the governments, Non-governmental and private sectors thus making them to invests large sums of money (Gibrehiwot, 2006). Reaching all people in rural areas with clean water is the major efforts the government and non-governmental organizations are making. About 75% of the Kenyan populations live in the rural areas where access to safe water is about 40% (United Nations Millennium Goals Indicators 2000 - 2008). Given the challenges in water resources in Kenya, a lot of pressure is exerted on water as a national economic resource. Allocation, sustainability and accessibility of water resources are considered challenges that can be overcome by establishing and implementing proper strategies. Nevertheless, it appears that the water supply systems are yet to attain the required levels of sustainability. The government of Kenya is committed to the on-going water sector reforms, especially the requirement that water supply systems need to achieve both technical and financial viability.

This viability is essentially and ideally expected to enhance sustainability of water supply systems. However, just like in other developing countries, in Kenya a huge proportion of the population does not have access to safe and dependable water. This implies that the water resources have not been adequately sustained. The issue of water supply systems' sustainability is most important to the population that resides close to the water supplies. Thus, the solution to the problem of water supply systems sustainability will be of great benefits to the livelihoods of many rural people. Many researchers have tried to investigate the factors that influence sustainability of community managed rural water supply systems but no concrete solution has been found.

Despite, the efforts made by government and other non-governmental organizations in ensuring access to clean drinking water for all, no successful study has been conducted locally or internationally to establish factors influencing sustainability of Community managed rural water supply systems. Through the problems faced in getting clean water, the researcher found it wise to carry out this study that discussed on the various factors influencing sustainability of Community managed rural water supply systems and come up with possible solutions for helping the community to get access to clean water in Lower – Yatta Sub County, Kitui County. This study was achieved through investigations on how, institutional management, technological factors, financial factors and stakeholders' participation influenced sustainability of community managed rural water supply system in Lower Yatta Sub-County, Kitui County, Kenya.

1.3 Purpose of study

The purpose of this study was to explore the factors influencing sustainability of community managed rural water systems in Lower-Yatta Sub-County, Kitui county Kenya.

1.4 Research Objectives

1. To establish how institutional management skills influence the sustainability of community managed rural water supply systems in Lower –Yatta, Sub County.
2. To determine how financial factors influence sustainability of community managed rural water systems in Lower -Yatta, Sub County.

3. To establish how technological factors influence sustainability of the community managed rural water systems in Lower-Yatta, Sub County.
4. To establish to what extent stakeholders participation influence sustainability of the community managed rural water supply in Lower- Yatta Sub-county.

1.5 Research Questions

This study sought to answer the following research questions.

1. To what extent does institutional management influence sustainability of community managed rural water supply systems in Lower Yatta Sub- County?
2. To what extent does financial factors influence the sustainability of the community managed rural water systems in Lower Yatta Sub County?
3. How do the technological factors influence the sustainability of the community managed rural water systems in Lower Yatta Sub- County?
4. To what extent does stakeholders participation influence sustainability of the community managed rural water supply in Lower Yatta Sub-county?

1.6 Significance of the Study

The study findings may be very vital in identifying what causes the failure of water sustainability after government, private and non-governmental organizations support the water systems in the community level and are able to deal with the problems amicably. To the national and the county government, the findings may be useful in development of policy documents, strategy guidelines, and standards that can be beneficial in dealing with problems that bar community from accessing adequate and clean water. To the private sectors, the information may be important in ensuring the accessibility of spare parts to the rural community water supply system and the engagement in the Public Private Partnership (PPP) model. The communities, implementing partners, Donors and International NGOs to address the sustainability challenges, may utilize the lesson learnt from this study and plan for the better ways of implementing the sustainable community managed water systems. The findings of this study may be beneficial in achieving the Kenya vision 2030 and the Millennium Development Goals (MDGs).

1.7 Basic Assumption of the Study

The study assumed that;

1. The respondents were representative of the target population that was served by community water supply.
2. The community was conversant with the factors that influence sustainability of community managed rural water supply systems.
3. The community was cooperative and honest in giving the required information.

1.8 Limitation of the study

The study limitations were lack of time, finance constrains, the generalization due to the cultural, social-economic type of water supply system,. Caution in interpretation was advised because personality measures are susceptible to measurement error. Due to the self-report nature of data, responses on the survey were not accurately conveyed in the project implementation. The study was affected by environmental conditions that affected the study differently. The study was affected by poor road networks, which made the area inaccessible and slowed the smooth flow of the data collection. The shortcomings were overcome by working for extra hours, assuring the respondents with confidentiality, and got extra money.

1.9 Delimitation of the study

In achieving the study's objectives, it was limited by the scope area where by the generalization could not be applied in other areas the study was required to take place only in Lower-Yatta, Sub County. The study focused on four factors that influence sustainability of community managed water supply systems. The targeted population was 500 respondents from the water points. The study was focused on a sample of 100 households in Lower-Yatta Sub-County. However, the results may be generalized in other counties in Kenya.

1.10 Definitions of significant terms used in the study

A number of key words and terms were used in these reports, which were defined in this study as follows:

Sustainability: The continuing ability of a project to meet the needs of its community and embraces the concept of doing this beyond the time of donor agency involvement (adopted from Brinkerhoff and Goldsmith, 1992).

Community managed water supply systems: Refers to a water supply system operated and maintained by community-established structures.

Stakeholders' participation: Refers to individuals, families, or communities assuming responsibility for their own welfare and develop a capacity to contribute to their own and the community's development.

Institutional factor: Community established structures responsible for management of water supply systems such as community organization, private –sector entities, NGOs and religious groups.

Financial factors: The financing process that is raising and maintaining adequate funds for water supply systems, tariff setting system, mode of payments, management of funds for purchasing spare parts.

Management skills: refers to using expertise in coordinating the efforts of people to accomplish desired goals and objectives using available resources efficiently and effectively. It comprises planning, organizing, staffing, directing, and controlling an organization or effort for accomplishing a goal.

Technological factors: refers to the making, modification, usage, and knowledge of tools, machines, techniques, crafts, systems, and methods of organization, in order to solve a problem, improve a pre-existing solution to a problem, achieve a goal, handle an applied input/output relation or perform a specific function.

Technology Selection – Method of water abstraction used by a water supply system. It may be solar powered system, hand pump operated system or a diesel-powered system etc.

Community participation–A cross-section of the community participate in the development process of a project. A broad community support for the implementation of the project. Community participation must continue indefinitely.

Focus group discussions (FGDs), key informant interviews and knowledge, attitude and practice (KAP) survey: Additional information, or information to supplement the documentation review and considered necessary to obtain a deeper understanding of the issues, was collected through interviews and discussions conducted with those considered the main stakeholders.

1.11 Organization of the Study

This research project was organized into five chapters:

Chapter one: comprises of the introduction, background of the study, statement of the problem, purpose of the study, research objectives, research questions, significance, basic assumptions, limitations, delimitation, and definition of significant terms used in the study and the organization of the study.

Chapter two describes the literature review and was sub-divided into the following sections. The introduction, description of themes of all the objectives, theoretical and the conceptual frameworks and discusses the relationship between the variables. The section concluded by explaining the gaps in the literature review and a summary of the literature review.

Chapter three: contained the following under research methodology:-Introduction, research design, target population, sample size determination, and sampling procedure. It also described the research instruments, validity, and reliability, data collection procedure, ethical considerations, and operational definition of the variable.

Chapter four: presents data analysis, interpretation, presentation of data collected and discussion findings. The data was analyzed, interpreted, and presented using frequency distribution multivariate analysis.

Chapter five: gives the summary of findings, conclusions, recommendations, and suggestions for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter consists of the introduction, description of the factors influencing sustainability of the community managed rural water supply systems according to the objectives of the study:-influence in institutional management, financial factors, technical skills and stakeholders participation on factors on sustainability of community managed rural supply systems.

2.2. Influence of Institutional management skills on sustainability of community managed rural water supply systems

A water supply system is a service and any service requires ongoing management. Institutional management of projects involves increasing the alignment of development projects with host communities priorities and coordinating aid efforts at all levels (local, national, and international) to increase ownership and efficient delivery of services. It is therefore offering leadership to achieve certain laid objectives. According to McRae (2004), good management ensures that sufficient local resources and capacity exist to continue the project in the absence of outside resources.

Community managed rural water supply systems are complex (Weinberg, 2008) and require related institutional management skills. A project manager has to manifest not only project management related skills but also technical and expertise as required by the project (Harvey and Reed, 2006). Project management activities includes: defining project scope, gathering and managing resources , relevant training issues within a project, advising about technical architecture, identifying specific and general project management practices and escalation procedures, estimating water supply systems and budget, ascertaining and managing risks within water supply management and preparing risk mitigation. The institutional management involves planning, organizing, staffing, directing, and controlling, and a manager is someone who performs these functions. Project managers have to influence all that they interact with so that project sustainability can be achieved. Therefore, they need not only to possess good management skill but also leadership skills as well. Within project

teams, as individuals' progress from technical roles to more managerial roles, these skills come into play, and help in effective water supply. Examples of institutional managements are: National Agencies, Regional Agencies Community Organizations.

National Agencies as an institutional management provide leadership, policy, and direction to the sector. Strong leadership is needed to emphasize the essential role that water supply system plays in the welfare of the country and to promote support for the sector in the executive and legislative branches of government. A clear policy is needed which addresses key issues confronting the sector. Issues including: service levels, billing rates, management responsibility, technologies, private-sector roles, and O&M procedures must be spelt out to provide guidance and uniformity. Effective management of the various activities and processes carried out by national agencies is of very importance. For example, providing regulatory direction and logistical assistance for importing spare parts is crucial for continued operation of WS&S equipment. An adequate staff and operating budget are required.

Regional Agencies are closer and more accessible to the populations to be served, regional agencies are able to devise work plans that address the realities of the local situation in a better way. The agent also acts as a trainer who reinforces messages related to hygiene and as a monitor who watches out for problems that need attention. To function effectively, the agent, whose importance for sustainability cannot be overstated, must be provided with transportation and educational materials.

Community Organizations, Musonda (2004) carried a study and found that all water supply facilities except one had a management system put in place for their water supply facilities. This included a water committee and an Area Pump Minder (APM) who lives either in the community or in a nearby community. Respondents no longer consider the management system for the water supply facility effective since Water Service Funds (WSFs) has become dysfunctional. Availability of alternative sources of water has a negative impact on community participation as the number of community members who refuse to contribute user fees increases in the rain season when alternative sources of water have a lot of water. Community organizations may not fit the classic definition of "institutions" but are,

nonetheless, treated as such in this study since they display the following institutional characteristics: operate under a set of rules, either formal or informal, have a mandate to carry out a specified range of activities, represent an identifiable population, and control certain resources to carry out activities. Rukunga, G. & Kioko, T. et al (2006) noted that Kenya's national water policy promotes community operation and maintenance of water supply systems. The roles of community-managed organizations have become more significant.

2.3. Influence on Financial factors on sustainability of community managed rural water supply systems.

The financing process involves raising and maintaining adequate funds for water supply systems facilities and activities that are clearly of critical importance to sustainability. The major theme of the World is to provide all people with safe, sufficient, and affordable water but this will be like a dream unless sustainable financing strategies are adopted. There is a strong need for international donors and National government to develop long term financing plans. Insufficient financing is a major factor in poor maintenance, which was cited as a reason for the project failure. Rukunga, G. Kioko, T. et al (2006) noted that the communities raise money for maintaining water supply systems by charging for water at the point of delivery. Sometimes the community members raise the money when required for the repairs of water supply systems, Capital costs of equipment, labor, and material costs associated with initial project activities, including all construction activity. Recurrent costs are those associated with operation, maintenance, repair, and replacement of system components, and any ongoing health education or community extension activities related to the project. Communities must understand that they are supposed to bear the repair costs of services through user charges, household fees, or taxes imposed by a government agency or by a community management organization. In this regard, it is important that a balance exist between a community's desire for WS &S services and its ability to pay for them.

According to Amarasinghe (2009) noted that availability of credit from development banks or private sources may be a determining factor when major breakdowns occur or system components need replacing. In cases where government agencies are responsible for

operation and maintenance, they must be allocated the required funds. Too often, user fees are sent to national headquarters or the national treasury, and allocations are not enough to cover expenses. Rukunga, G. Kioko, T. et al (2006) noted that in Kenya, rural tariffs for water are generally lower than those in urban areas. This enables the community in the rural areas get water in affordable cost. Most of the users claimed that the tariff was too expensive to afford and propose a reduction in cost. People find it better to use unprotected springs for free than to pay much for one jerry can of water, which they could not afford because they are farmers and do not have another source of income.

The high cost of water owes to the high cost of O&M of the water supply systems. The amount of money for 25-liter jerry can is very expensive around the urban areas. Women groups select their tap attendant to collect money after selling the water. The meter reading must match with the amount of the money they collect. Sometimes the money collected is little compared to the meter reading. In addition to training tap attendants on revenue collection, there should be regular follow-up and supervision by the people from the Ministry of Water to check on the performance of water meters and to check whether the water attendants are selling the water based on the reading on the water meter.

Musonda (2004) gave major reasons behind mismanagement of scheme financial resources include: lack of follow-up from community, absence of legal status, lack of a sense of ownership among the community members, and lack of sufficient training on financial management. According to the BoWR strategic plan, full cost recovery of O&M costs are required to ensure the sustainability of rural water supply schemes (BoWR, 2007). Owing to the absence of properly handled and documented financial reports, it was difficult to view the financial flow of most of the institutions.

The major expenditures will include-Salary for tap attendants, scheme guards and operators, Fuel, oil and grease, Per Diem and transportation, Minor maintenance and spare parts and Expendable materials. Serious audit of the financial and material resources should be done continuously. This was achieved through cooperating with experts to audit and monitor the financial and physical resources of the committees (BoWR, 2002).

2.4. Influence of Technological factors on sustainability of community managed rural water supply systems.

According to Admassu, M., & Kumie, A. (2002), appropriate technology is the foundation of sustainability in the water supply system. Simple technologies that can be maintained, financed, and operated by poor rural communities should be selected. Wrong choice of technology will lead to failure of water supply system Brikke, F. & Bredero, and M. (2003). The choice of technology for improved water supplies depend on socio-economic, political and environmental conditions. In most cases, the previous researches show that technology selection is highly done by the government office staff members. Very few members of the communities were involved in selecting technology, local leaders, and NGO staff members respectively are for functional scheme.

Amerasinghe (2009) noted that continuous training is required for better technical skills and leadership skills. Regular monitoring is very vital because it keeps the water supply system functioning and it should be done by responsible government authorities on maintenance of facilities, ensuring that the water quality testing is done. Musonda (2004), noted that the communities were unable to meet the cost of the spare parts when the water supply system breaks down and also if the Area Pump Minder (APM) does not live within communities, lack of tools for carrying out repairs, lack of spare parts, lack of technical skills to handle major repairs were considered as factors that have made the arrangements to be put in place for repairing water supply facilities not effective.

A technology will be sustainable to the extent that it is appropriate as judged by its suitability, responsiveness, acceptability, servicing needs, standards, and cost (Lockwood, 2004). Suitability of the technology must be able to provide adequate supplies of potable water or isolate waste materials from targeted beneficiaries if improving health is the planned objective to be achieved. Technologies must be chosen which provide an appropriate level of service for meeting consumer needs now and in the future. The technology must be adaptable and durable, using readily available materials and allowing simple repairs and maintenance by local mechanics. Spare parts generally should be available from within the country to avoid expenditure of foreign exchange or lengthy delays in repairs

before the spare parts are bought. Servicing requirements should be simple and inexpensive so that the community could enjoy sustainability of the water supply systems. According to Brikke, F.& Bredero, M.(2003), noted that the choice of technology affects people's willingness to pay as well as the prospect for workable O&M arrangements and for continued use of the system. Full life-cycle accounting of the technology is needed to determine total costs and establish a revenue stream that will avoid unanticipated deficits.

Information technology can significantly change the way projects interact with stakeholders. Technological innovation has enormous influence on community managed rural water supply systems (Nohria and Gulati, 2010). Technological innovation should also be an important factor influencing the improvement of performance and therefore ensuring water supply systems sustainability. Sustainability driven by technology depends largely on the effective management of the innovation process, and managers should continue to identify, develop, protect, and allocate resources and capabilities in order to gain a sustainable competitive advantage (Amit and Schoemaker, 1993). WSP (2002) noted that technical sustainability depends upon the members who maintain their level of interest from the construction stage through the operation and maintenance stage. Community members should be trained thoroughly to operate, maintain, and repair the machines so that they may enjoy the full services given by the water supply systems.

2.5 Influence of stakeholders' participation on sustainability of community managed rural water supply systems.

Community participation refers to an active process whereby beneficiaries influence the direction and execution of development projects rather than merely receive a share of project benefits. The community participates in the community water supply and therefore saves the projects resources, which can later be channeled to produce more benefits to the project. As noted by Chappel, (2005), through their participation, the community shares project costs in form of money or labor during the project's implementation or operational stages. This save the project's money and can therefore contribute to ensure financial sustainability. According to Oakley and Marsden (2007), stakeholders' support brings together individuals,

families, or communities who assume responsibility for their own welfare and develop a capacity to contribute to their own and the community's development.

Armitage (2003), indicated that citizens' participation as a process by which citizens act in response to public concerns, voice their opinions about decisions that affect them, and take responsibility for changes to their community, their support, he pointed out it as the key for the sustainability of a community project. Pran, M. and Wendy, M. (2005), suggest that stakeholders support may also be a response to the traditional sense of powerlessness felt by the general public when it comes to influencing government decisions by their support. Community ensures the success of a project through collective efforts to increase and exercise control over resources and institutions on the part of groups and movements of those excluded from control.

Involvement of the communities is crucial for the sustainability of rural water supply systems. They are involved in owning and managing their schemes, protecting their water point, cost recovery for operation and maintenance, choosing the type of technology and buying spare parts. Building a partnership with the communities that should lead towards improving the people's problem solving capacities improves the expectation that the sustainability to be achieved. Communities' better participation in hand dug wells is much better than in developed spring because of the difference in approach used by stakeholders for community mobilization and communities thinking about developed spring. Stakeholders willingness-to-pay in cash, materials, labor, and idea can be taken as a useful indicator of the demand for improved and sustained water services (Bhandari and Grant, 2007; Mbata, 2006). If households are willing to contribute cash and labor useful for the management of water sources, then the service that they obtain from a source is valued and it is a means of promoting its sustainability. The stakeholders were sensitized to understand that, the water benefits them more than the government, private sectors and NGOs and they should handle it like their own property and take the necessary measures to keep it going and serving them.

2.6 Theoretical Framework

The study was based on community management model that is also referred as Village Level Operation and Maintenance (VLOM). It is a model that empowers and encourages the community to own their project. It helps in shifting the responsibility for ongoing Operation and maintenance thus bringing sustainability of services from the facility provider to the community, which is the beneficiary. According to Harvey and Reed 2004, sensitization is designed to instill a sense of ownership and responsibility. In the model, the government is enabler and responsible for regulation, facilitation and monitoring of sector stakeholders.

The government provides a conducive environment to the stakeholders so that they may operate their water supply services without a problem. It provides training, information provision and technical support. The CBOs are responsible for the management and financing Operations and maintenance while the private sector is responsible for implementation. Community management models require dynamic management and leadership at all levels (Harvey and Reed, 2004). This model encourages the stakeholders to take the responsibility of the water supply systems after the external donors or the government pulls out and maintains it leading to sustainability and making sure that after breakdown repair is done and providing security to avoid vandalism.

2.7. Conceptual Framework

Conceptual framework is a structural narrative description of the relationship between the variables forming the concepts of the study on sustainability. The independent variables interact with moderating, intervening and extraneous variables and the output/outcome is the dependent variable. In this study, the framework below is an illustration of possible underlying factors that influence the sustainability for community managed rural water supply systems beyond donor support.

Conceptual Framework on factors influencing sustainability of rural community rural water water supply systems

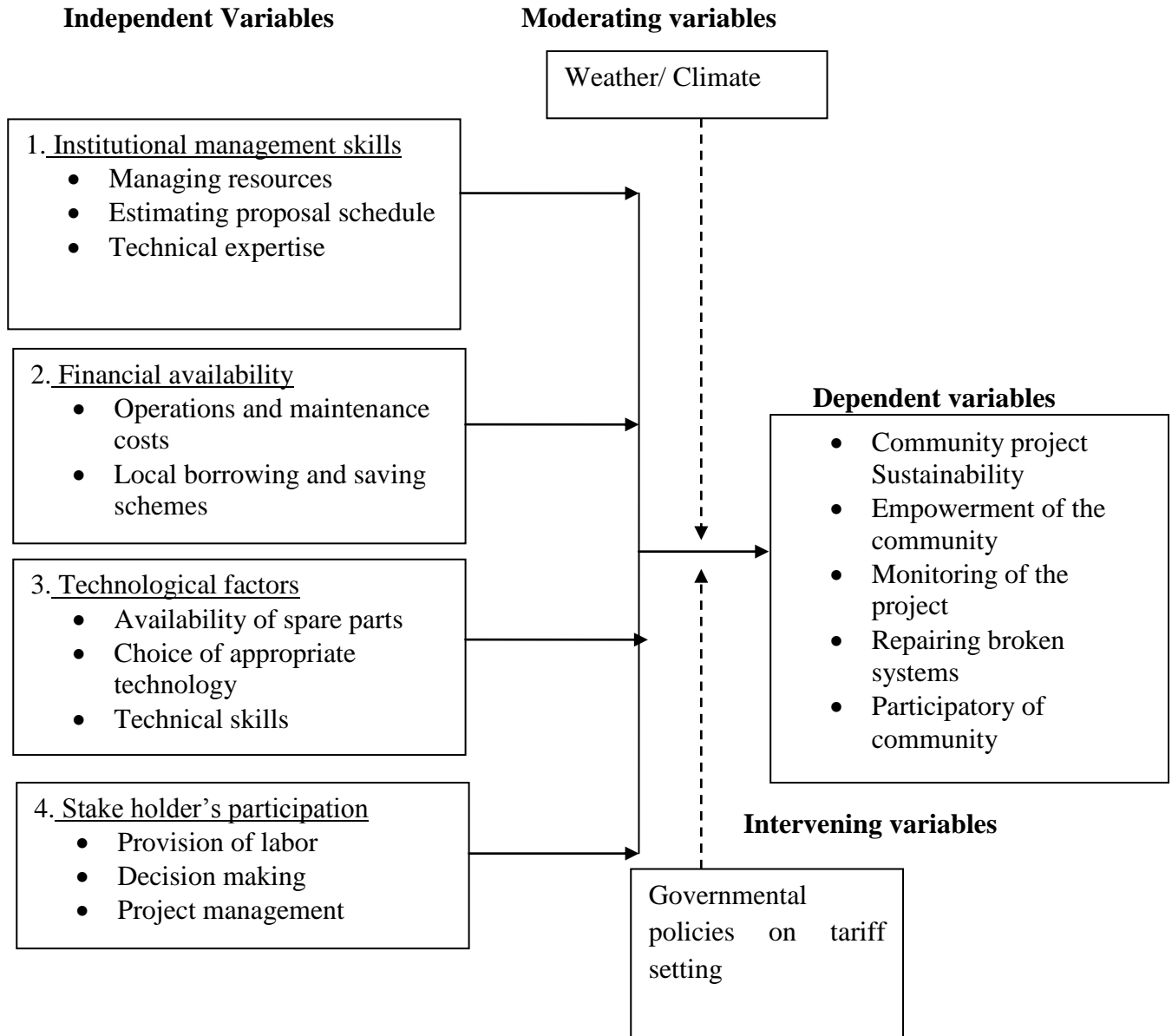


Figure 1. Conceptual frameworks.

2.8. Summary

This chapter has discussed in details the key factors that influence sustainability of the community managed rural water supply systems. It has therefore highlighted that sustainability is the resource use and lifestyles, which do not damage resources or society. Communities in the world seek to achieve sustainability in their life and improve it. Sustainability requires approaches while adding a longer-term perspective. To achieve sustainability, efforts were applied. Other efforts ran into drain for lack of proper management, resources, and commitment of the management and all stakeholders. This point out a clear continuity in effort to attain sustainability in community rural water supply systems. The current study established the influence of institutional management skills, financial factors, technological skills, and stakeholders' participation.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section deals with the methodology that was used in the research and contains issues of research design, target population, sample size and sampling procedures ,description of data collection instruments, methods of determining the validity and reliability of research instruments, data collection procedures, ethical considerations and the operational definitions of variables. It concludes with a section with the expected outputs.

3.2 Research design

Orodho (2003) defines research design as the scheme outline or plan that is used to generate answers to research-to-research problems. This study used descriptive survey to investigate the factors influencing sustainability of community managed rural water supply systems. A descriptive study attempts to describe or define a subject, often by creating a profile of a group of problems, people, or events, through the collection of data and tabulation of the frequencies on research variables or their interaction as indicated by Cooper and Schindler (2003). A descriptive research design aims at generating knowledge that may be used to describe a profile of what is being studied Munyoki and Mulwa (2012). Mugenda and Mugenda (2003) noted that the first step in descriptive studies is to define the questions that are to be answered .The researcher collected information about institutional, financial, and technological and stakeholders' participation factors. It determines and explains the way things are (Mugenda and Mugenda, 2003).

Survey design enables researchers to make accurate assessment, inferences, and relationships of phenomenon, events, and issues (Kasomo, 2006).Descriptive study was used because it could be carried when there is limited time and it is cheap to carry out study using this design.

3.3 Target Population

The target population was 500 members drawn from the three sub-Locations in Lower Yatta Sub County: Kwa-Vonza, Wayani and Kyusyani. The study participants were household

heads or any member of the family, 3 committee members per community water supply systems were involved in the operations and maintenance and management of the community water projects.

3.4. Sample Size and Sampling procedures

This section describes the sample size determination and the sampling procedure that was used to select the subject for the study. According to Korathi (2004), a sample is a definite design for obtaining sample from a given population. There are different types of sampling designs based on either restricted or unrestricted sample. The researcher formulates a procedure of selecting the subjects or cases to be included in the sample upon deciding on the sample size Mugenda and Mugenda (2003). Purposive sampling was used to select Lower - Yatta ,Sub County. The researcher used 20% to get 100 members. Piloting was done to 10 members and there was a remainder of 90 members. Simple random sampling was used to select 10 members from the 100 since the first 10 members were used in the piloting.

3.5. Data Collection Procedure

Data collection was done in a systematic manner. A research permit was collected from the National Commission of Science, Technology and Innovations was made. An introductory letter was obtained from the University and notification was made to the County Department of water with the intention to conduct a research. The letter obtained by the researcher was to introduce her to members. The researcher explained the general purpose of the study to the respondents. The interviews were carried at the agreed time and venue with the respondents. The questionnaires were given and collected and the questions were given to the Focused Group Discussions to collect the desired information.

3.6 Data Collection Instruments

The study collected both qualitative and quantitative data. The study used questionnaires, Informant key Interviews and Focused Group Discussions to collect data. Structured questionnaire with closed- ended questions were used to collect information from households. A drop and pick method where the questionnaires were dropped in the morning

and collected in the afternoon. Informant key Interviews guides with structured questions were used to gather information.

Qualitative researchers relied on in-depth interviewing whereby they were more like conversation. The researcher used all tactics to get the required answers .Focused Group Discussions according to Martin S. (2007), were used to gather information in form of opinions from different people in a selected group of people on the questions prepared. The Focused Group Discussion was used to collect qualitative data, which is very vital in collecting data. A group comprised 10 people.

3.7.Validity and Reliability of Research Instruments.

This section describes how validity and reliability of the research instruments were used in data collection.

3.7.1 Validity of Research Instrument

According to Mugenda and Mugenda (2003) validity refers to how accurate the data obtained in the study represents variables in the study. This accuracy and meaningfulness of inferences were based on the research results. According to Bridget and Lewin (2005), validity is the degree by which the sample of test items represents the content the test is designed to measure. Validity is a measure of the extent to which an instrument measures what the researcher intends to measure Munyoki and Mulwa (2012).Content validity of the research instruments was determined by experts in research methodology and looked at the specific objectives covered by the study .Validation of the research instrument was important to this study, as it ensured that the study collected relevant information to answer the research questions. The researcher pre-tested the research instruments with 10 households from Kwa Vonza in order to standardize the research instrument and address issue of any ambiguity.

3.7.2 Reliability of the instrument

According to Munyoki and Mulwa (2012), Reliability refers to the consistency of measurement and is frequently assessed using the test– retest reliability method. Reliability was increased by including many similar items on a measure, by testing a diverse sample of

individuals and by using uniform testing procedures. Reliability gives the internal consistency of data collected. This ensured that the data had certain internal consistent pattern. Kimberlin, C.L., and Winterstin, A.G. (2008), explained that pre-testing an instrument allows for the identification of such sources of errors. The questionnaires were administered on a random sample of 10 households .The participants were not included in the actual study sample. To establish the reliability of the instruments, the researcher used test administered to the respondents and the results obtained were analysed. The results obtained in the first and the second administration were the same so the instruments was reliable.

3.8 Data Analysis

The researcher collected data that was processed, coded, tabulated and analyzed to facilitate answering the research questions. Data was analyzed using Statistical Package for Social Science (SPSS) software program. The results of the survey were presented using tables, charts, percentages, and frequencies. It was further analyzed using Regression Table

3.9 Ethical Consideration

The researcher explained the purpose of the study to the respondents and assured them of confidentiality of their responses and identities. The researcher adhered to appropriate behavior in relation to the right of the respondents. Voluntary and informed consent of the respondents was sort before being interviewed. The researcher then sought for the necessary authorization from relevant authorities in Government and ensured respondents adequately understood the research they were participating. Openness and honesty in reporting research objectives, methods, and results were imperatives in research. The researcher was careful not to mix views or policies of her organization on the findings. All material references were acknowledged. All information collected was treated with highest level of confidentiality.

3.10 Operational Definitions of the Variables

To achieve the objectives of the study concerning the investigation of factors influencing sustainability of community managed rural water supply systems in Lower Yatta Sub County, Kitui County which were, the influence on the institutional management skills, financial, technological skills and stakeholders participation factors on sustainability of

community managed rural water supply systems. Data was collected using questionnaires, key informant interviews and Focused Groups Discussions. The operationalization of the study variables was illustrated below in table 3.1

Table 3.1 Operationalization of the study Variables

Objectives	Independent variables	Dependent variables	Indicators	Measurements	Level of scale	Tools of Analysis
To establish institutional management influence to sustainability of community managed rural water supply systems	Influence of institutional management	Sustainability of community managed rural water supply systems	-Highest qualification and training -Managerial skills /experience	-Level of education/training -Level of experience skills and knowledge	-Internal - Nominal -Ordinal	Descriptive Analysis -Frequency distribution - Percentages -Multiple Regression Analysis
To establish influence of financial factor on sustainability of community managed rural water supply systems	Influences on financial factors	Sustainability of community managed rural water supply systems	-Financial resources availed -O&M costs -Water tariffs	-Sources of finances -Regular O&M reports	-Interval -Ordinal Nominal	Descriptive statistics Frequency distributions Percentages Multiple Regression Analysis
To establish technological skills on	Influence of technological skills	Sustainability of community	Availability of spare parts	Duration of delivery of spare	Interval	Descriptive statistics

community managed rural water supply systems		managed rural water supply systems	Technical support provided Technologies available	parts Level of support provided Level of technology adoption	Nominal Ordinal	Frequency distribution Percentages Multiple Regression Analysis
To establish stakeholders participation on community managed rural water supply systems	Influence on stakeholders participation	Sustainability on community managed rural water supply systems	Community ownership of the project Number of stakeholders involved in the project implementation	Level of ownership of project Level of involvement of stakeholders	Interval Nominal Ordinal	Descriptive statistics Frequency distributions Percentages Multiple Regression Analysis

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter contains data analysis, presentation, interpretation and discussions of the study findings and the flow of such sub titles are in order of the study objectives. Findings of the study are presented in frequency distribution tables followed by interpretation of the tables.

4.2 Questionnaires return rate

Out of the targeted population of 500 members drawn from the three sub-Locations in Lower Yatta Sub County: Kwa-Vonza, Wayani and Kyusyani, the researcher used 20% to get 100 members. Finally, the study ended up getting 35 respondents; this represented 35% of the anticipated sample.

4.3 Socio-demographic characteristics of the respondent

The study sought to establish respondents' gender, age, level of education, occupation and monthly income. The data was analyzed and presented using frequency distribution table.

4.3.1 Respondents distribution by gender

The study targeted both male and female respondents. The response rate broken down by gender was 11(31.4%) males interviewed against 24(68.6%) females as indicated in Table 4.1

Table 4.1 Distribution of respondents by gender

Responses	Frequency	Percentages
Male	11	31.4
Female	24	68.6
Total	35	100.0

The respondents were not fairly distributed with males being 11(31.4%) while female being 24(68.6%) but it was good because both participated. This indicates that women are the

majority who participated well in the sustainability of community managed rural water supply systems.

4.3.2 Respondents distribution by age

The study-targeted respondents in age groups in four classes and achieved the following response .The data sought to establish the distribution of the respondents by age as represented in Table 4.2

Table 4.2 Distribution of respondents by age

Responses	Frequency	Percentages
18 years & below	5	14.3
26-35	10	28.6
36-45	12	34.3
45 and above	8	22.9
Total	35	100.1

Majority of the respondents were between the age of 36-45 years with 34.3 percent, 26-35(28.6 %) ,above 45 years had 22.9% and last 18 years had 14.3%. This shows that water supply issues are a concern of the productive age of the community. The productive age was more concerned in ensuring that the sustainability of water supply is obtained.

4.3.3 Respondents distribution of the respondents by highest level of education

The study sought to establish the distribution of the respondents by highest education

Table 4.3. Respondents distribution by highest level of education

Responses	Frequency	Percentages
Never	4	11.4
Primary	8	22.9
Secondary	15	42.9
Tertiary	5	14.3
University	3	8.6
Total	35	100.0

In terms of highest level of education, majority were not learned had only basic secondary education, 15(42.9%). Some four (11.4%) respondents had no formal education and equally some 3(8.6%) had university level of education. This indicates that the level of education is very important as people are more enlightened on the importance of sustaining water supply systems. It is the work of the work of the management team to train people who are below secondary education level so that they may understand the benefits of sustaining water supply.

4.3.4 Respondents distribution by occupation

The study sought to establish the distribution of the respondents by occupation.

Table 4.4: Distribution of Respondents by occupation

Responses	Frequency	Percentages
Farmers	11	31.4
Business	15	42.9
Teacher	4	11.4
Civil servant	5	14.3
Total	35	100.0

The study indicated that, business and farmers were the main occupations for the respondents, 15(42.9%) and 11(31.4%) respectively, 5 (14.3%) of the respondents were civil servants and 4(11.4%) were teachers. This implies that informal employment is the major source of livelihood that is likely to influence the purchasing power of the spare parts and pay for any other costs concerning the water supply systems.

4.3.5 Respondents distribution by monthly income

The study sought to establish distribution respondents by monthly income and responses were indicated in the table below.

Table 4.5: Distribution of respondents by monthly income

Responses	Frequency	Percentages
Less than 1,000	8	22.9
1,000-5,000	3	8.6
5,000-10,000	14	40.0
Above 10,000	10	28.6
Total	35	100.1

Monthly income in the area was low with 14(40.0%) earning between 5,000-10,000 Kenya shillings. Only 10(28.6%) were earning above Ksh.10,000, 8(22.9%) were earning less than Ksh.1,000 and 3(8.6%) were earning between Ksh.5,000-10,000. This study indicated that majority of the respondents earn little monthly income which affected their ability to pay for the costs of water. The access to safe and clean water will be very difficult because of their merger monthly income. The government, NGOs and private sectors should support the community to get cheaper and free water to supplement the water they have.

4.4 Institutional factors influencing sustainability of community managed rural water systems in Lower-Yatta Sub-County, Kitui County Kenya

The researcher question (i) sought for the answer on the influence of institutional management factors on sustainability of community managed rural water supply systems. To answer this question, the researcher collected the following data from the respondents:

4.4.1 Types of Management Group managing water supply systems

The study sought to establish the type of management groups managing the water supply. The results are shown in Table 4.6

Table 4.6 Types of management group

Responses	Frequency	Percentages
CBO	2	5.7
Private individual	8	22.9
Religious group	9	25.7
NGO	6	17.1
Management committee	3	8.6
Government Agency	3	8.6
No response	4	11.4
Total	35	100.0

There existed many types of management groups across the area: 2(5.7%) which indicated that the water source was managed by CBO, 8(22.9%) indicated that water projects were managed by Private individuals, 9(25.7%) indicated that the water projects was managed by Religious groups, 6(17.1%) indicate that water project was managed by NGO, 3(8.6%) indicate that the water projects was managed by Management committee and Government agency and at least four respondents did not respond. For the water to be sustainable, it is clear that when water supply is supported, sustainability of water supply will be achieved.

4.4.2 Role of Management Group

The study sought to establish the roles of the management structure in water supply. The results are shown in Table 4.7

Table 4.7 Role of management structure

Responses	Frequency	Percentages
Collect water use fee	22	62.9
Repair of water supply	6	17.1
Oversee use of water system	7	20.0
Total	35	100.0

The major role of management structure was to collect fees paid from water supplying as stated by 22(62.9%). Other roles were repair the water supply when broken down and overseeing the use of the water system as stated by 6(17.1%) and 7(20.0%) respectively. This indicates that management of water supply systems was the responsibility of management groups. It played a great role because without them, the sustainability of the water cannot be achieved. To make them more effective, the management group should be well trained on the modern technology, be taken to frequent seminars so that they may perform their duties effectively.

4.4.3 Training on management to management group

The study sought to know whether management group received any training in water supply. The results are shown in Table 4.8

Table 4.8 Training on management to management group

Responses	Frequency	Percentages
Yes	23	65.7
No	12	34.3
Total	35	100.0

The study found that the management group received training in water supply as mentioned by 23(65.7%) of the respondents while only 12(34.3%) indicated otherwise. This indicates that most of management group was well trained and could offer training to the stakeholders. When people get knowledge of operating water supply systems, the sustainability will be achieved thus benefiting the community.

4.4.4 Adequate capacity to manage water supply systems

The study sought to know whether group has the adequate capacity to manage the water supply system. The results are shown in Table 4.9

Table 4.9 Adequate capacity to manage water supply systems

Responses	Frequencies	Percent
Yes	16	45.7
No	16	45.7
No response	3	8.6
Total	35	100.0

Equally, respondents indicated that group had or did not have adequate capacity to manage the water supply systems 16(45.7%) while some 3 (8.6%) did not respond to this. The number that had adequate capacity was quite enough to manage water supply systems. That number could handle any challenge concerning the supply of water systems thus attaining the sustainability of community managed rural water systems.

4.4.5 Ensuring that the water supply system was managed effectively

The study sought to establish remedies to ensure that the water supply system is managed effectively. The results are shown in Table 4.10

Table 4.10 Ensuring that the water supply system was managed effectively

Responses	Frequency	Percentages
Train the committee	17	48.6
Privatize water supply	4	11.4
Water users pay for water	14	40.0
Total	35	100.0

Training committee was key in ensuring effective water supply system 17(48.6%). This was closely followed by Making the water users pay for the water collected 14(40.0%). However, privatization of water supply system was mentioned by 4 (5.7%). This indicates that training the committee, privatizing water supply and charging for water services, was a catalyst to effectiveness.

4.4.6 Involvement of more committee members would boost sustainability of water supply systems

The study sought to know whether involvement of more committee members would boost sustainability of water supply system. The results are shown in Table 4.11

Table 4.11 Involvement of more committee members would boost sustainability of water supply system

Responses	Frequency	Percentages
Yes	25	71.4
No	7	20.0
No response	3	8.6
Total	35	100.0

In order to boost sustainability of water supply systems, involvement of more committee members was suggested by 25(71.4%) of the respondents. Only few respondents 7(20.0%) did not see the importance of increasing the number of committee members while 3(8.6%) did not respond .This indicates that more involvement of committee members boosted sustainability of water supply systems.

The first objective of the study was to establish how institutional management skills influence sustainability of community managed rural water supply systems. From the analyzed data, it was noted that institutional managements are greatly involved in managing water supply systems .89.6% of the different institutions were involved in managing the water projects. In the literature, it was noted that the government stipulates that rural water supply services should be community based because it manages only 8.6% and the rest is left in the hands of the community to manage, operate, and maintain their chosen technology (UNICEF, 2012).

4.5 Financial factors influencing sustainability of community managed rural water systems in Lower-Yatta Sub-County, Kitui county Kenya

The research question (ii) sought for the answer on the influence of financial factors on sustainability of community managed rural water supply systems. The researcher solicited the following information from the respondents:

4.5.1 Payment for water services

The study sought to establish whether household pay for the water service. The results are shown in Table 4.12.

Table 4.12 Payment for the water service

Responses	Frequency	Percentages
Yes	25	71.4
No	10	28.6
Total	35	100.0

Most of employees pay for water services, this was mentioned by 25(71.4%). However, 10(28.6%) indicated households were not paying for water service. Paying for water services means that the stakeholders were getting clean and safe water for use thus reducing water related diseases. The other percentage that was not paying for the water means that they were getting water from unprotected sources of water just to satisfy their needs while not minding about their health. This led them to use more money in treating water related diseases like typhoid. The researcher suggested that the government should support the poor to get clean and safe water at affordable prices.

4.5.2 Frequency of payment of water services

The study sought to establish how often the payments are affected. The results are shown in Table 4.13

Table 4.13 Frequency of payments of water service

Responses	Frequency	Percentages
Daily	25	71.4
No response	10	28.6
Total	35	100.0

Most of respondents 25(71.4%) were stating that payments of water services were being done on daily bases, only 10(28.6%) gave no response. The respondents claimed that paying for water services on daily basis was affordable because they could buy water for the day as they do to food but could not afford buying water in plenty due to their economic status, which was very low.

4.5.3 Rate per 20 litres jerrican

The study sought to establish cost of 20 litres of water. The results are shown in Table 4.14.

Table 4.14 cost of 20 litres of water daily

Responses	Frequency	Percentages
Ksh. 1-2	4	11.4
Ksh.10-30	31	88.6
Total	35	100.0

The study found that, those paying water on daily bases were paying between 1 to 2 Kshs. This was stated by 4(11.4%) and a range of Ksh.10-30 was indicated by 31(88.6%). This implies that water tariffs are very high for the community to afford. The community did not get adequate water due to the high charges made for the water services. Charges for the water should be moderated so that the community could afford it.

4.5.4 Monthly payment rates

The study sought to find the monthly payment. The results are shown below in the Table

Table 4.15 Monthly payment rates

Responses	Frequency	Percentages
Below 100	7	20
Above ksh.100	28	80
Total	35	100.0

The respondents paying on monthly bases were paying between Kshs 100. This was stated by 7(20.0%) and above Ksh.100 is represented by 28(80%).High percentage was paying more money monthly because water is used in plenty and using less means that one fails to do some of the activities. Water should be made affordable to all people because it is essential to human beings.

4.5.5 Other reasons for not paying water services

The study sought to establish other reasons for not paying water services. The results are shown in Table 4.16

Table 4.16 Other reasons for not paying water services

Responses	Frequencies	Percent
Water is free	4	11.4
Very poor to pay	10	28.6
No response	21	60.0
Total	35	100.0

Twenty-one respondents did not give any response as to why they were not paying water. Other reasons for not paying water were very poor to pay 10(28.6%) and water being free four (11.4%).The government and other stakeholders should support people at all level to get access to safe and adequate water all the time.

4.5.6 Collection of water services payments

The study sought to establish collects payments of water services. The results are shown in Table 4.17

Table 4.17 Collection of water services payments

Responses	Frequency	Percentages
Management group	17	48.6
Individual	1	2.9
Caretaker	13	37.1
No response	4	11.4
Total	35	100.0

Management group and caretakers were the main collectors of water services payments as were mentioned by 17(48.6%) and 13(37.1%) respectively. Only one respondent regarded individual as one who collects water service payments. For the water supply, systems to run effectively there should be a competent group to collect fees collected from the water so that any breakage can be repaired immediately or the water services to be paid well.

The second objective of the study was to establish how financial factors influencing sustainability of community managed rural water supply systems. From the analyzed data, majority of the respondents indicated that 31(88.6%) they get water at a very high price between Ksh.10-30 per a 20 litre jerrican .From the data collected ,this shows that water tariffs is very high compared to the monthly salary of below Ksh.10,000 that most of the community members earn. The government and the other support group should support water supply systems by giving donations and also making water affordable for all people so that they can access clean ,safe and adequate water.

4.6 Technological factors influencing sustainability of community manage rural water systems in Lower-Yatta Sub-County, Kitui county Kenya

The research question (iii) sought for the answer on the influence of technology on sustainability of community managed rural water supply systems. To answer this question the researcher solicited the following information:

4.6.1 Main water source for your household

The study sought to establish the main water source for the households. The results are shown in Table 4.18.

Table 4.18 Main water source for your household

Responses	Frequency	Percentages
River	5	14.3
Pipeline extension	18	51.4
Shallow wells /boreholes	12	34.3
Total	35	100.0

Most of respondents were treating pipeline extension 18(51.4%) as their main source of water. Shallow wells were also a main source of water as mentioned by 12(34.3%) of the respondents. Very few respondents 5(14.3%) treated rivers as their main source of water. Pipeline extension seemed to be the one preferred by many stakeholders so it should be made available so that people can use it. It is more reliable than the other sources of water.

4.6.2 Functionality of water source

The study sought to establish the functionality of water source for the households. The results are shown in Table 4.19

Table 4.19 Functionality of water source

Responses	Frequencies	Percentages
Functional	28	80.0
Non Functional	7	20.0
Total	35.0	100.0

At least 28(80.0%) said the water supply systems were functional while only seven (20.0%) were saying the water supply systems were not functional. Most of the water sources are functional due to the support efforts made by the government, NGOs, religious groups and private organizations. The training of the management groups have also helped a lot in making the water services functional.

4.6.3 Reasons for non-functionality of water source

The study sought to establish the reason for non-functionality of water source for the households. The results are shown in Table 4.20.

Table 4.20 Reasons for non-functionality of water source

Responses	Frequency	Percentages
Lack of technical support	6	17.1
Lack of spare parts	22	62.9
Lack of funds to buy spare parts	7	20.0
Total	35	100.0

Most of the respondents 22(692.9%) gave the reason of lack of spare parts, 7(20.0%) said it was due to lack of funds to purchase spare parts and 6(17.1%) said it came about due to lack of technical support. This indicates that, lack of spare parts was the major reason for non-functionality. Local and cheap spare parts should be used so that the water services can remain functional and serve people well.

4.6.4 Technical training of Management Committee

The study sought to establish whether group had been trained on O&M of the water supply systems. The results are shown in Table 4.21

Table 4.21 Technical training of Management Committee

Responses	Frequency	Percentages
Yes	7	20.0
No	5	14.3
Don't know	23	65.7
Total	35	100.0

Seven respondents said that management group had been trained on O&M of the water supply systems, 5(14.3%) rejected the fact about training on O&M of the water supply systems. Quite a number of respondents 23(65.7%) were not aware about such training. This implies that majority of respondents did not know whether management committee was trained or not. Training should be done effectively to the management group so that they can handle any technical problems that may arise.

4.6.5 Accessibility of spare parts

The study sought to establish whether management group committee has the access to spare parts. The results are shown in Table 4.22.

Table 4.22 Accessibility of spare parts

Responses	Frequency	Percentages
Yes	4	11.4
No	9	25.7
Don't know	22	62.9
Total	35	100.0

The access to spare parts of broken water supply system was very low, only 4 (11.4%) had the access. The rest did not access or did not know. Spare parts should be made accessible so that people do not suffer when the water systems break.

4.6.6 Affordability of spare parts

The study sought to establish affordability of spare parts. The results are shown in Table 4.23

Table 4.23 Affordability of spare parts

Responses	Frequency	Percentages
No	8	22.9
Don't know	27	77.1
Total	35	100.0

All the respondents considered the spare parts unaffordable. There were 27(77.1%) respondents stating that were not aware. For the water service systems to be sustainable, spare parts should be made affordable and also alternative improvisation should be used to keep water supply systems working.

4.6.7 Training of artisans

The study sought to establish whether the artisans are trained. The results are shown in Table 4.24.

Table 4.24 Training of artisans

Responses	Frequency	Percentages
Yes	6	17.1
No	20	57.1
Don't know	9	25.7
Total	35	100.0

20(57.1%) respondents said that artisan were not trained, only 6 (17.1%) had undergone training, 9(25.7%) respondents indicated that they did not know. For the sustainability of the water service systems to be achieved, artisans must be trained so that they can repair any breakage and keep the water supply systems working.

4.6.8 Repairs done on the water supply systems when broken

The study sought to establish whether repairs were done on the water supply systems when broken. The results are shown in Table 4.25

Table 4.25 Repairs done on the water supply systems when broken

Responses	Frequency	Percentages
Yes	7	20.0
No	5	14.3
Don't know	23	65.7
Total	35	100.0

The study established that repairs of broken systems were being done since this was mentioned by 7(20.0%) and that only 5(14.3%) of the respondents indicated no. A number of respondents declined to answer this question, i.e. 23(65.7%) stating. Don't know. Broken systems should be repaired so that the stakeholders may continue being served with water that is essential to the human beings.

4.6.9 Other key supporters of artisan training

The study sought to establish who else supports in artisans training. The results are shown in Table 4.26.

Table 4.26 Other key supporters of artisan training

Responses	Frequency	Percentages
Government department	6	17.1
NGO	13	37.1
Individual support	10	28.6
Private sector	6	17.1
Total	35	100.0

The major supporter of artisan training were the NGOs 13(37.1%), the second major support was from individuals 10(28.6%). Lastly, the other two supporters were Government department and Private sector with six (17.1%).It was noted that every support was very important because whatever they did helped people in accessing safe and clean water.

The third objective of the study was to investigate how technology influences sustainability of community managed rural water supply systems. From the analyzed data, 51.4% indicated that they depended on pipeline extension while 34.3% depended on shallow wells/boreholes and 14.3% depended on rivers as their main source of water. The literature noted that simple technologies are used, which can be operated, maintained, and financed by rural communities. Modern technology is very vital in making water sustainable to the community members. Without the knowledge of technology, it would be difficult to run machines that are used in water supply systems.

4.7 Influence of Stakeholders’ participation on sustainability of the community managed rural water supply systems in Lower-Yatta Sub-County, Kitui county Kenya

The research question (iv) sought for the answer on the extent to which the level of stakeholders participation influences the sustainability of community managed rural water supply systems. To answer this question, the researcher collected the following information from respondents.

4.7.1 Participation in existing community water supply systems

The study sought to establish whether respondent has ever participation and the sustainability of the rural community managed rural water supply systems rural community based water projects. The results are shown in Table 4.27.

Table 4.27 Participation in existing community water supply systems

Responses	Frequency	Percentages
Yes	10	28.6
No	25	71.4
Total	35	100.0

10(28.6%) indicated that they participated and the majority of the respondents 25(71.4%) did not participate. This implies that some respondents had known how of water supply systems.

4.7.2 Area of participation in community water supply system

The study sought to establish the areas in which the stakeholders were involved in participation for the sustainability of the rural community managed rural water supply systems. The results are shown in Table 4.28

Table 4.28 Area of participation in community water supply system

Responses	Frequency	Percentages
Contributed materials	5	14.3
Management committee	6	17.1
Not participated	24	68.6
Total	35	100.0

In table 4.27, 5(14.3%) respondents indicated that stakeholders participated in contributing the materials for sustainability of the rural community managed rural water supply systems. A higher number of respondents 24(68.6%) indicated that they did not participate in sustainability of the rural community managed rural water supply systems. Six respondents participated as the management committee, which was comparatively a small percentage of 17.1%.

4.7.3 The extent to which stakeholders participation positively enhance sustainability of the community managed rural water supply systems

The study sought to know the extent to which stakeholders' participation positively enhance sustainability of the community managed rural water supply systems. The results are shown in Table 4.29

Table 4.29 The extent to which stakeholders participation positively enhance sustainability of the community managed rural water supply systems

Responses	Frequency	Percentages
To a very low extent	0	0.0
To a low extent	9	25.7
To a moderate extent	13	37.1
To a great extent	13	37.1
To a very great extent	0	0.0
Total	35	100.0

In terms of rating the extent to which stakeholders participation positively enhance sustainability of the community managed rural water supply systems, 9 (25.7%) said to a low extent, 13 (37.1%) said to a moderate extent, 13 (37.1%) said to a great extent. This indicated that the stakeholders participated very well in the sustainability of the water supply systems .Stakeholders participation is the main key to sustainability.

4.7.4 Benefits of community participation in community managed rural water supply systems

The respondents were requested to indicate the benefits that the community would get after participation in the community water projects.

Table 4.30 Benefits of community participation in community managed rural water supply systems

Responses	Frequency	Percentages
Timely repairs	8	22.9
Continuity of project	13	37.1
Strong ownership of projects	10	28.6
Security	4	11.4
Total	35	100.0

Table 4.29 indicated how the community benefited after their participation in the community project 8(22.9%) showed that repair were done immediately 13 (37.1%) showed that the projects continued ,10(28.6%) indicated that there was strong ownership of the project and 4(11.4%) indicated that there was good security for their projects. This proved that, stakeholders' participation is very vital in ensuring the sustainability of the community water supply systems. Stakeholders should be trained thoroughly so that they may handle any problem that comes about concerning water supply systems.

The fourth objective of the study was to establish how stakeholders' participation influences sustainability in the community managed water supply in Lower Yatta Sub County. From the analyzed data, 31.4% indicated that they participated towards sustainability of water supply systems. Majority of community indicated that they depended on community managed water supply systems as their main source of water. The literature noted that participation of stakeholders in the community's projects leads to sustainability because they are fully involved. Irrespective of support given, sustainability cannot be achieved without stakeholders' participation. They should be sensitized on the benefits of the sustainable water supply systems. Training would be of help to them.

4.8 Regression analysis

This section presents regression analysis of data in order to determine data variables that were significant or not significant and which influence or not influence sustainability of community managed rural water supply systems in Lower Yatta Sub-County using coefficient F-value through logic regression Analysis as presented below.

4.8.1 Relationship between institutional management skills and sustainability of community managed rural water supply systems

The study sought to establish the relationship between institutional management skills and sustainability of community managed rural water supply systems. The study computed a model as shown in the table 4.31 below.

Table 4.31 Relationship between institutional management skills and sustainability of community managed rural water supply systems

Variable	Coefficient	Significance	F- value
β_1	0.854	0.001	0.85
Constant	1.231	0.004	
R ² value = 0.78		Adjusted R ² value =0.82	

Source: Researcher 2016.

The following regression model was computed from the results. The model of the form;

$$Y = 1.231 + 0.854 X_1$$

This means that for a unit change in institutional management skills, sustainability of community managed rural water supply systems will improve by 85.4%. It indicated that the presence of the management committee, training, the roles they play are very influential to the entire community. More seminars will bring more benefits thus improving sustainability of the community managed rural water supply systems.

4.8.2 Relationship between financial factors and sustainability of community managed rural water supply systems

The study sought to establish the relationship between financial factors and sustainability of community managed rural water supply systems. The study computed a model as shown in the table 4.32 below.

Table 4.32 Relationship between financial factors and sustainability of community managed rural water supply systems

Variable	Coefficient	Significance	F- value
β_2	0.812	0.002	0.45
Constant	1.231	0.004	
R ² value = 0.78		Adjusted R ² value =0.82	

Source: Researcher 2016.

The following regression model was computed from the results. The model of the form;

$$Y = 1.231 + 0.812 X_2$$

This means for a unit change in financial factors, sustainability of community managed rural water supply systems will improve by 81.2%. It was clear that for any project to succeed ,more and constant financing is required. The sustainability of community managed rural water supply systems was achieved because they were supported with money and also the stakeholders participated very well.

4.8.3 Relationship between technological factors and sustainability of the community managed rural water systems

The study sought to establish the relationship between technological factors and sustainability of the community managed rural water systems. The study computed a model as shown in the table 4.33 below.

Table 4.33 Relationship between technological factors and sustainability of the community managed rural water systems

Variable	Coefficient	Significance	F- value
B ₃	0.798	0.001	0.56
Constant	1.231	0.004	
R ² value = 0.78		Adjusted R ² value =0.82	

Source: Researcher 2016.

The following regression model was computed from the results. The model of the form;

$$Y = 1.231 + 0.798 X_3$$

This means for a unit change in technology, sustainability of the community managed rural water systems will improve by 79.8%. For any project that requires the use of machines, modern technology should be chosen and thorough training be given to the community members.

4.8.4 Relationship between stakeholders participation and sustainability of the community managed rural water systems

The study sought to establish the relationship between stakeholder's participation and sustainability of the community managed rural water systems. The study computed a model as shown in the table 4.16 below.

Table 4.34 Relationship between stakeholders participation and sustainability of the community managed rural water systems

Variable	Coefficient	Significance	F- value
B ₄	0.352	0.003	0.61
Constant	1.231	0.004	
R ² value = 0.78		Adjusted R ² value =0.82	

Source: Researcher 2016.

The following regression model was computed from the results. The model of the form;

$$Y = 1.231 + 0.352 X_4$$

This means for a unit change in stakeholders participation, sustainability of the community managed rural water supply will improve by 35.2%.

From the analysis, institutional management skills will change a great deal, financial factors, technological factors and stakeholders participation were found to be significant therefore influenced sustainability of community managed rural water supply systems in Lower Yatta Sub County .Though stakeholders participation was low compared to the other stakeholders. Stakeholders need to be sensitized on the benefits of participating in water supply systems because they are the ones who benefit mostly.

CHAPTER FIVE: SUMMARY OF FINDINGS, DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter discusses the summary of the findings, discussions, conclusions and recommendations for the study. It summarizes the results that were obtained from the analyzed questionnaires. It also gives the suggestions for further studies.

5.2 Summary of the findings

The aim of this study was to establish the factors influencing sustainability of community managed rural water supply systems in Lower Yatta Sub County, Kitui County. The study was guided by four potential objectives .The first objective of the study was to establish how Institutional factors influenced sustainability of community manage rural water systems in Lower-Yatta Sub-County, Kitui county. It was studied in terms of: type of management, Role of management structure, training of management group, capacity building among the management committee group and the number of members in the management committee. Management committee was represented by CBO was stated by 2 (5.7%), Private individual was stated by 8(22.9%), Religious group 9(25.7%), NGO 6(17.1%), Management committee and Government agency 3(8.6%). This indicates that for the sustainability of water supply systems to be achieved, there must be management committee that manages water supply systems.

They manage it well by making sure that the broken water supply is repaired immediately after it breaks .The management group performs well after they are trained. The major role of management structure was to collect fees paid from water supplying points as stated by 22(62.9%). Other roles were repair the water supply when broken down and overseeing the use of the water system as stated by 6(17.1%) and 7(20.0%) respectively. Management group received training in water supply as mentioned by 23(65.7%). On capacity building, there was a draw 16(45.7%) on significant impact on water supply systems sustainability in Lower Yatta Sub County.

When the management committee performs their roles well by collecting the fees paid by users, they were able to pay for water services and people were able to get water adequately. Training committee ensured effective water supply system 17(48.6%). This was closely followed by Making the water users pay for the water collected 14(40.0%). However, privatization of water supply system was mentioned by 4(5.7%). Results from multiple regression analysis established that the relationship between institutional management skills and sustainability of community managed rural water supply systems was 0.854 significantly influenced the sustainability of community managed rural water in Lower Yatta Sub County. This confirms the Lockwood, H., & Bakalian in 2004 work on training; Sustainability is more achieved when community members participate fully in water supply system and also when they are involved in the planning, designing, implementation, operation and maintenance.

The second objective was to determine how financial factors influence sustainability on community managed rural water supply systems in Lower Yatta Sub County, Kitui County. The study found that, those paying water on daily bases were paying between Ksh.1 - 2. This was stated by 31 (88.6%). The respondents paying on weekly bases were paying between Kshs.10 to 30. This was stated by 28 (80.0%). All of these costs are largely dependent on technology choice, but project location, labor, costs, and administrative costs have an impact. Complete life cycle of accounting methods should be used to determine the total costs involved. According to the monthly income of the respondents, it was noted that the water price was high for some of them to afford. However, 10(28.6%) indicated households were not paying for water service. Most of respondents 25(71.4%) were stating that payments of water services were being done on daily bases, only 10(28.6%) gave no response. Results from regression analysis indicated that the relationship between the financial factors and the sustainability of community managed rural community water supply system was 0.812. This significantly influenced the sustainability of community managed rural water supply systems. Payment for the water services should be made affordable so that every community can afford water and overcome problems that are brought about by the water crisis.

The third objective was to establish the influence of technological factors on sustainability of community managed rural water supply systems. Most of respondents were treating pipeline extension 18(51.4%) as their main source of water. Shallow wells were also a main source of water as mentioned by 12(34.3%) of the respondents. Very few respondents 5(14.3%) treated rivers as their main source of water. These households come from an arid zone of Kitui County and there are no permanent rivers traversing the area hence most of them depend on pipe extension of water services.

At least 28(80.0%) said the water supply systems were functional while only seven (20.0%) were saying the water supply systems were not functional. The stakeholders' of the area have put water supply services in front line in their development framework. This has continually provided support to these water supply services. Reasons for non-functionality of water source were lack of spare parts 22(62.9%), 7(20.0%) said it was due to lack of funds to purchase spare parts and 6(17.1%) said it came about due to lack of technical support. This indicates that, lack of spare parts was the major reason for non-functionality. Seven respondents said that management group had been trained on O&M of the water supply systems, 5(14.3%) rejected the fact about training on O&M of the water supply systems. Quite a number of respondents 23(65.7%) were not aware about such training.

The access to spare parts of broken parts of water supply system was very low, only four (11.4%) had the access. Also the respondents considered the spare parts unaffordable. There were 27(77.1%) respondents stating that were not aware. Twenty respondents said that artisan were not trained, only six (17.1%) had undergone training, nine respondents indicated that they did not know. The study established that repairs of broken systems were being done since this was mentioned by six (17.1%) and that only 2 (5.1%) of the respondents indicated otherwise. The major supporter of artisan training were the NGOs.

The results of regression analysis indicated that the relationship of technological factors and the sustainability of community managed rural water supply systems is 0.798, which influenced the sustainability of water supply systems. The government and other helping

agencies should give support in providing for the spare parts. The management committee should also use locally available spare parts and use the modern technology.

The fourth objective was to establish to which extend the stakeholders' participation influence sustainability of community managed rural water supply systems. 10(28.6%) indicated that they had participated and the majority of the respondents 25(71.4%) did not participate. This implied that some respondents had known how of water supply systems.

Participated in and sustained rural community managed rural water supply systems. Five (14.3%) respondents indicated that other partners' participated in the sustainability of the rural community managed rural water supply systems. A higher number of respondents 24(68.6%) indicated that there were other partners participating in sustainability of the rural community managed rural water supply systems. This confirms the following literature. In the last three decades, literature in the water supply sector has shown that sustainability of rural water supply structures has become positively associated with small-scale initiatives, which maintain public participation (Davis and Liyer, 2002). Involving the community in the planning, implementation, operation, protection, and maintenance of water supply systems meaningfully is the key to sustainability. Community members' contributions might take the form of money, labor, material, equipment, or participation in project-related decision-making and meetings. The results in the regression analysis indicated the relationship between the stakeholders participation and the sustainability of community managed rural water supply systems as 0.352 this did not significantly influence the sustainability of community water supply systems in Lower Yatta Sub County. It is very true that stakeholder's participation is the major key to sustainability. This is because when they are empowered they participate fully in contributing money, labour, materials, and skills.

5.3 Discussion

To ensure effective community managed rural water supply systems achieve sustainability, both institutional factors, financial factors, technological factors and stakeholders participation must make important contributions to the success of the water supply systems. Community participation must be given the priority .However financial factors have a big

impact on the sustainability of the community managed rural water supply systems and therefore need proper handling where by the management committee are trained on how to manage the money for the water supply systems. Without government intervention, the sustainability of water supply systems will be difficult to be achieved because they play a very important role of supporting the water projects, regulating laws concerning water, and training of the artisans as well as the community members.

5.4 Conclusion

The study made the following conclusion regarding the topic of the study: “factors influencing sustainability of community managed rural water in lower Yatta Sub- County”.

- i. Institutional factors influence the sustainability of community managed rural water supply systems in Lower Yatta Sub County. This is because some of areas found to influence sustainability of community managed rural water were: type of management group, management structure has a role and training of managers.
- ii. Financial factors influence the sustainability of community managed rural water supply systems in Lower Yatta Sub County. This was proven by the need to provide funds for purchasing, maintaining, and expanding the water supply systems in the area.
- iii. Technological factors influence the sustainability of community managed rural water supply systems in Lower Yatta Sub County. The study established the need to train managers on O&M, provision of affordable spare parts and availability of the spares. The artisan ought to be well trained.
- iv. Stakeholder’s participation influence the sustainability of community managed rural water supply systems in Lower Yatta Sub County. The community was well involved .The stakeholders claimed for not being consulted whenever improvements were being done.

The study concluded that sustainability of community managed rural water supply could be made effective by: involving stakeholders to participate fully, training of community management committee frequently on the current matters concerning water supply systems and developing strategic plans for financing the water supply systems

5.5 Recommendations

In order to improve on sustainability of community managed rural water in lower Yatta-Kitui County. The following recommendations were made;

- i. The management group needs to be trained well and occasionally in order to be up-to-date with emerging challenges in water supply services in the area.
- ii. The government and other providers of funds should increase the amounts of funds channeled towards purchasing the water supply systems and managing the existing ones. The funds are also important in purchasing spares.
- iii. The management group should find a way of increasing access to spare parts and cheaper supplies. This will reduce the cost of operations. The management group will arrive at this through undergoing the Operations and Management training.
- iv. The community should be incorporated in these rural water supply systems. Involvement of community makes the operation of the management easy especially when collecting the water payments.

5.6 Suggestions for further Research.

The researcher is suggesting for further studies to be carried on sustainability of modern technological improvement that would lead to sustainable management of community managed rural water supply systems. Further on the stakeholders participation that will improve sustainability of water projects.

REFERENCES

- Admassu, M., Kumie, A., & Fantahun, (2002) *Identifying key characteristics of technical project leadership. Leadership & Organization Development Journal* 20 (5) 250-267.
- Admassu, M., Kumie, A., & Fantahun, M. (2002). *Sustainability of Drinking Water Supply Projects in Rural of North Gondar, Ethiopia. Ethiopian Journal of Health Development.*
- Amit, R. & Schoemaker, P J H. (1993). *Strategic assets and organizational rent, Strategic Management Journal,*
- Aras, G., and Crowther, D. (2008). *Governance and sustainability: An investigation into the relationship between corporate governance and corporate sustainability, Management Decision, 46(3),433 - 448*
- Armitage (2003). *The institutional origins of dynamic capabilities in multinational enterprises, Industrial and Corporate Change, 19(4), 1225-1246.*
- Barney, N.L. (1995). *Select the right IS project manager for success. Personnel Journal* 56 (4).
- Bhandari and Grant, (2007). *Rural Appraisal: Rapid Relaxed, and Participatory. Institute of Development Studies, University of Sussex*
- Binder, (2008). *User Satisfaction and Sustainability of Drinking Water Schemes in Rural Communities of Nepal.*
- Brikke, F.,& Bredero, M.(2003).*Linking technology choice with operation*

- and maintenance In the context of the community water supply and sanitation: Reference Document For planners and project staff. World Health Organization and IRC Water and sanitation Center Geneva, Switzerland.*
- BoWR, 2006. *SNNPR Drinking Water Supply Sector Strategic Plan 1998-2002 (2005/06-09/10). Awassa*
- Camisón H., (2005). *Patent thicket, licensing and innovative performance, Industrial and Corporate Change, 19(3), 899-925.*
- Cooper, D. R., and Schindler, P. S. (2003). *Business Research Methods (8th edn). McGraw-Hill: New York.*
- Deneke, & Habtam, H.,(2012).*The Sustainability of Water Supply Schemes: A case study in Alaba special Woreda Israel.*
- Davis and Liyer, (2002) *Reimagining sustainable cultures: Constitutions, land and art. The Canadian Geographer.*
- Doubleday, Mackenzie, & Dalby (2004). *Indicators for the Water Sector: Examples from Malawi. London, UK. Water Aid.*
- Dunning and Lundan, (2010) *Low-Cost Sanitation, A Survey of Practical Experience Intermediate Technology Publications. London, UK.*
- Gebrehiwot, M. (2006). *An Assessment of Challenges of Sustainable Rural Water Supply: The Case of Ofla Woreda in Tigray Region. Msc Thesis, Regional and Local Development Study (RLDS). A.A.U. Ethiopia.*
- Gok, (2009)*Water Privatization in Kenya, Issue Paper Government Printer Nairobi.*
- Goodman and Leyden, (2001). *Community development: A critical approach. Bristol,*

- Policy Press. UK.*
- Government of Kenya (GOK) `` , *Ministry of Water, and irrigation (2009) .*
- Annual water sector Review (AWSR).Nairobi Kenya.*
- Government of Kenya (2013) *Draft National Water Policy of June 2013.*
- Ministry of Environment, Water, and natural Resources.*
- Graciana, P., & Sizwe, N.,(2012).*Factors affecting sustainability of rural water schemes in Swaziland, physics and Chemistry of the earth, parts A/B/C.*
- Government of Kenya.(2013). *Draft National Water Policy of June 2013.*
- Ministry of Environment, Water And Natural resources.*
- Government of Kenya. (2009). *Ministry of water and irrigation: Annual Water Sector Review. Nairobi*
- Harvey ,P.& Reed, N,and (2004) *Rural Water Supply in Africa: Building Blocks for Hand pump Sustainability, Loughborough University, UK.*
- Harvey, P.A, &.Reed, E.N. (2004). *Rural Water Supply in Africa: Building Blocks for Hand pump sustainably WEDC, Loughborough University, Uk.*
- Harvey, P., & Reed R. (2004). *Rural Water Supply in Africa: Building Blocks for Sustainability: Water, Engineering, and Development Centre (WEDC). Loughborough University UK*
- Harvey, P., & Reed, R. (2007). *Community-managed water supplies in Africa: Sustainable or dispensable? Community Development Journal.*
- Hodgkin J. (1994). *The Sustainability of Donor-Assisted Rural Water Supply*

- Projects. Washington, D.C. United States
- Hoopes, Madsen, and Walker (2003). *Global cost benefit analysis of water supply and sanitation interventions, Journal of Water Health, 5, 481.*
- Harvey ,P.& Reed, N,and (2004) *Rural Water Supply in Africa: Building Blocks for Hand pump Sustainability, Loughborough University, UK.*
- Harvey, P.A, &.Reed, E.N. (2004). *Rural Water Supply in Africa: Building Blocks for Hand pump sustainably WEDC, Loughborough University, Uk.*
- Harvey, P., & Reed R. (2004). *Rural Water Supply in Africa: Building Blocks for Sustainability: Water, Engineering, and Development Centre (WEDC). Loughborough University UK*
- Harvey, P., & Reed, R. (2007). *Community-managed water supplies in Africa: Sustainable or dispensable? Community Development Journal.*
- Hodgkin J. (1994). *The Sustainability of Donor-Assisted Rural Water Supply Projects.*
Washington, D.C. United States
- Hoopes, Madsen, and Walker (2003). *Global cost benefit analysis of water supply and sanitation interventions, Journal of Water Health, 5, 481.*
- Ingle B. (2005). *Ensuring Sustained Beneficial Outcomes for Water and Sanitation Programmes in the Developing World. IRC International Water and Sanitation Centre Occasional Paper Series, Delft, NL.*
- Kimberlin,C.,and Winterstein,A.G. (2008) *Fundamentals of Research: Validity and Reliability of Measurement Instruments used in Research, America Journal of Health-System Pharm,Vol,Dec1,2008.*

- Lockwood,H.(2004) *Scaling Up Community Management of Rural Water Supply.Thematic Overview Paper,IRC:Deft,The Netherlands.*
- Mbata, J. (2006). *Estimating Household Willingness for Water Services in Rural economy: the Case of Kanye in Southern Botswana.* Development of Southern Africa.
- McRae, S. (2004). December. *Gender and Energy for Sustainable Development: A Toolkit and Resource Guide.* New York.
- Mugenda, O.M and Mugenda, A.G (2003) *Research Methods, Quantitative & Qualitative Approaches.* Acts Press: Nairobi.
- Munyoki J.M.,& Mulwa A.S (2012),*Social Science Research: A hand Book (First Edition)*Downtown Printing Works Ltd: Nairobi.
- Niyi Gbadegesin & Felix Olorunfemi (2007) *Assessment of Rural Water Supply Management in Selected Rural Areas of Oyo State, Nigeria.*
- Oakley & Marsden. (2007). *Low-Cost Sanitation, A Survey of Practical Experience* Intermediate Technology Publications. London, UK.
- Okoth, J. A. (2012). *Factors influencing sustainability of community based projects: the case of Arid Lands Resource Management Project II in Ganze constituency, Kilifi County, Kenya.*
- Orodho J.A.(2005),*Techniques of Writing Research Proposals and Reports in Education and Training and Social Sciences.Nairobi:Kanez HP Enterprises.*
- Pruss-Ustun, A., Bos, R., Gore, F., and Bartram, J. (2008). *Safer Water, Better Health:*

- Cost, Benefits, and Sustainability of Interventions to Protect and Promote Health.*
Geneva: World Health Organization.
- Rubenstein & Greisler, (2000) *Indicators for the Water Sector: Examples from Malawi.*
London, UK. Water Aid.
- Rukunga, G., Kioko, T. & Kanyangi, L (2006) *Local Financing Mechanism for water supply in Kenya .WELL Country Note, WELL.*
- Rukunga, G., Kioko,T.& Kanyangi, L (2006) *Operation, and Maintenance of Rural Water services in Kenya ,WELL Country Note, WELL.*
- Swanson & Beath, (2000). *Strategies adopted for sustained water supply and sanitation through community participation in Sri Lanka.*
- The World Bank, June (2009) *post construction support and sustainability in water and sanitation Program-Africa*
- Weinberg, (2008), *Improving Leadership Effectiveness: The Leader Match Concept, 2nd Ed, Wiley, New York, U.S.A*
- WHO. (2010). *Millennium Development Goals (MDGs).*
- WHO/UNICEF. (2008). *Progress on Drinking Water and Sanitation: Special Focus on Sanitation. New York: UNICEF, Geneva: WHO.*
- Williams, M. (2003). *Sustainable development and social sustainability. Hull, QC: Strategic research and Analysis, Department of Canadian Heritage.*
- WSP.(2012).*Sustainable Management of Small Water Supply in Africa:Practitioners' Workshop Report.*

APPENDICES

Appendix I: Letter of transmittal

Eunice M. Mbungo
P.O. Box 194.
Kitui.

Dear Sir/Madam,

RE: TRANSMITTAL LETTER

Hello, my name is Eunice M. Mbungo from the University of Nairobi and I am conducting a research on “**Factors influencing sustainability of Community Managed Rural Water Supply Systems in Lower Yatta Sub-County, Kitui County.**” This study is for academic purpose. You have been selected to participate in this research.

The results of this research will be completely confidential. You need not to indicate your name on the questionnaire. Please feel free to seek for clarification where you do not understand.

Yours faithfully

Eunice M. Mbungo

e). Others

7. What is your monthly income?

a). Less than Ksh 1000

b). Between 1000-5000

c). 5001-10,000

d). Above 10,000

Section B: Institutional factors

8. What type of management group is managing the water supply?

a). CBO

b). Private individual

c). Religious group

d). NGO

e). Management committee

f). Government agency

g).Other

9. What is the role of the management structure in place?

a). Collect water user fee

b). Repair the water supply when broken down

c). Oversee the use of the water system

d) Other roles specify.....

10. Has the management group received any training on management issues?

- a) .Yes
- b). No

11. Does the group has the adequate capacity to manage the water supply system?

- a).Yes
- b).No
- c).Don't know

If no why?.....

12. What needs to be done to ensure that the water supply system is managed effectively?

- a). Train the committee
- b). Privatize the water supply system
- c) .Make the water users pay for the water collected
- d). Keep the money safe in a bank account

13. Does the community management group receive any support from the external support?

- a). Government
- b). NGO
- c). Religious group
- d). Private company
- e). Individual
- f) Other Specify.....

14. Do you think representation of more committee involvement can make water supply system sustainable?

- A). Yes
- b). No
- c).Don't know

If yes explain why.....

Section C: Financial factors

15. Does your household pay for the water service?

- a). Yes
- b). No
- c). Don't

16. If yes in the above question, how are the payments made?

- a).Daily
- b). Weekly
- c). Monthly
- d). Others

17. If payment is in daily basis, how much do you pay per 20 liters container?

- a). Ksh 1-2
- b). Ksh 3-5
- c). Ksh 6-10
- d). Ksh 10 and above

18. If on monthly /weekly basis how much do you pay?

- A). Ksh 10-20

- b). Ksh 20-50
- c). Ksh 51-100
- d). More Ksh 100

19. What are reasons for not paying for the water service?

- a) Water is free
- b) Very poor to pay
- c) Others

Specify.....

20. Who collects the money?

- a) .The management group
- b). Individual
- c). Caretaker
- d). Government
- e). NGO
- f). Religious group
- g).Others Specify.....

Section D: Technological factors

21. Which is the main water source for your household?

- a) River
- b) Pipeline extension
- c) Borehole

- d) Shallow well
- e) Others

22. Is the source of water functional?

- a) Yes
- b) No
- c) I don't know

23. Why is the water source not functional?

- a) No trained artisans
- b) Lack of funds to buy spare parts
- c) No spare parts for repair
- d) No technical support available to conduct repairs

24. Has the management group been trained on O&M of the water supply systems?

- a) Yes
- b) No
- c) I don't know

25. Does the management group committee have the access to spare parts?

- a). Yes
- b). No
- c). I don't know

26. Are the spare parts at affordable price?

- a). Yes

- b). No
- c). I don't know

27. Are there trained artisans?

- a). Yes
- b). No
- c).I don't know

28. Do they carry out the repairs when the water supply systems are broken?

- a). Yes
- b). No
- c). I don't know

29. If the artisans are not able to to do the repairs who support in the repairs?

- a) Government department
- b) NGO
- c) Individual support
- d) Private sector

Section E: Stakeholders' participation

30. Have you ever participated in the initiation/start of the water projects in this area?

- b).Yes
- a).No

If yes, what was your area of participation? –

- a). I was consulted through a meeting

- b). I contributed materials
- c). As a leaders/part of the committee
- d). Others – specify.....

31. Are other partners/stakeholders involved in the water projects in this area?

- a).Yes
- b).No

If yes, name at least two: - - -

32.In your opinion, to what extent has the stakeholders’ participation positively enhanced the sustainability of the rural community managed rural water supply?

- a).To a very low extent
- b).To a low extent
- c). To a moderate extent
- d).To a great extent
- e).To a very great extent

Thank you and be blessed

Appendix III: Focus group discussion guide

This guide has been developed to collect data on factors influencing sustainability of community managed rural water supply systems in Focused Group Discussions with water management committees.

1. What makes the community managed rural water supply system sustainable?.....
2. What are institutional factors affecting the sustainability of community managed rural water supply schemes in Lower Yatta sub-county?.....
3. What management structures are commonly used in the management of rural water supply systems in Lower Yatta Sub County?.....
4. Does the management structures in place have adequate capacity to manage water supplies?.....
5. How does the community participate towards a water supply system?.....
6. Which technical factors affect the sustainability of the water supplies in Lower Yatta sub county, Kitui County?.....
7. What financial factors affect the sustainability of the community managed water supplies?.....
8. How much does the community members pay for the water?.....
9. Who pays for the operation and maintenance?.....
10. Does the management structure in the place understand their roles in the water supply systems?.....
11. Which support does the community management receive from the government?.....

12. Who provides technical support required to effectively repair major repairs?.....
13. Which environmental factors affect sustainability of water supply systems?.....
14. How is water user fees collected help in the water supply system to?
15. Are spare parts available locally?.....
16. Are spare parts for water supply systems affordable?.....
17. How is finance from water supply systems collected and utilized?.....
18. Are the artisans and caretakers of water supply systems trained?.....

Appendix IV: Key informant interview guide

This guide has been developed to collect data from government officials on factors influencing sustainability of community managed rural water supply and management in Lower Yatta Sub County.

1. What management structures are commonly used in the management of rural water supply systems in Lower Yatta Sub County?.....
2. What are sustainability rates of the water supplies in Lower Yatta Sub County?.....
.....
3. Does the management structures have adequate capacity to manage the water supply systems?.....
4. What are institutional factors affecting the sustainability of rural water supply systems?.....
5. What financial factors influence the sustainability of community managed rural water supply systems?.....
6. Is the community able to manage, operate, and maintain the water supply systems?.....
7. Does the management structure understand its roles and responsibilities?.....
.....
8. Who provides the technical support required to repair major repairs effectively?.....
.....
9. Does the management committee collect water user fees from the sale of water?.....
.....
10. How is the finance collected utilized?.....
11. How is the finance managed by the water management committee?.....

.....
12. Are the spare parts found locally?.....

13. Are the spare parts affordable?.....

14. Are the caretakers and artisans trained?.....

15. What policies support the rural water supplies?.....

16. Does the government and other organizations support the management of water supply systems?.....