

**THE ROLE OF WOMEN IN IRRIGATION: A CASE STUDY
OF THE AHERO IRRIGATION SCHEME IN KENYA**

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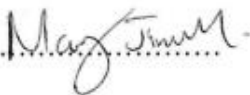
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2020

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Signed.. 

DEDICATION

To

God Almighty, the women in agriculture and

my loved ones

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ABSTRACT

This thesis explores the role of women in irrigated agriculture in the Ahero Irrigation Scheme in Kisumu County in the Western region of Kenya. Irrigated agriculture is seen as one of the major means through which food security may be improved in Kenya. Women face various challenges when it comes to taking up agricultural activities: from insecure access to land, credit, agricultural inputs and lack of proper agricultural training. The aims of this study were to: examine women's roles in irrigated agriculture in the Ahero Irrigation Scheme, ascertain the nature of the contribution that women have made in irrigated agriculture in Ahero Irrigation Scheme, identify and document the challenges that women face in irrigated agriculture in Ahero Irrigation Scheme. The theoretical framework used in the study is 'eco-feminism'. Eco-feminism is derived from understanding women's encounters with nature and their impact on the social system, economy, politics, culture and way of life generally. With this in mind, the study focused on six key themes: women and agriculture, women and land tenure systems, water and irrigation, financial resources and assets, technology education and agricultural politics. A qualitative research approach was used, involving sixty-six participants (both men and women) who were selected through purposive sampling from the Ahero Irrigation scheme. The study collected data through the use of questionnaires and interviews which were distributed within the twelve farming blocks located within the scheme. Sixty-one participants answered questionnaires and five participants took part in interviews. Data analysis (via Microsoft Excel) was conducted using theme-based groupings. The findings of this study acknowledge the important role that women play in irrigated agriculture with regards to rice farming, the challenges that women faced in irrigated agriculture with regards to land ownership, inheritance, financial assistance and agricultural training in Ahero Irrigation Scheme. The study concludes with the need to develop agricultural policies that have bottom-up approaches that meet the needs of farmers, regardless of gender. The development of better access to financial services, training and farm inputs can assist farmers within the scheme to improve the production of their crops. Lastly, there is the need to change social and cultural aspects that hinder women from inheriting land from their husbands due to land policies that have heavy cultural influences.

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LIST OF ABBREVIATIONS

| | |
|--------|---|
| AWM | Agriculture Water Management |
| BOA | Bank of Agriculture |
| CPRs | Common Property Resources |
| CLA | Community Land Act |
| FADAMA | National Fadama Development Office |
| FAO | Food and Agricultural Organisation |
| GBM | Green Belt Movement |
| IFRI | International Forestry Resources and Institutions |
| KCC | Kenya Co-operative Creameries |
| KCUSR | Kisumu County Urban Sustainability Review |
| KMC | Kenya Meat Commission |
| KSHS | Kenya Shillings |
| LAPO | Lift above Poverty Organisation |
| MCA | Member of County Assembly |
| MP | Member of Parliament |
| NA | Not Applicable |
| NARC | National Rainbow Coalition |
| NCPB | National Cereals and Produce Board |
| NCWK | National Council of Women of Kenya |
| NGO | Non-Governmental Organisation |

| | |
|------|-------------------------------|
| NIB | National Irrigation Board |
| O&M | Operations and Maintenance |
| SDG | Sustainable Development Goals |
| SMTP | Second Medium Term Plan |
| SSA | Sub Saharan Africa |
| WEF | Water, Energy and Food |
| WUA | Water Users Association |

CHAPTER I

INTRODUCTION

1.0 Introduction

Agricultural development in sub-Saharan Africa (SSA) remains high on the global development agenda. Having predominantly agriculture-based economies, the agricultural sector's role in the development and transformation of the African subcontinent's economies deserves much attention in view of existing challenges regarding food insecurity and widespread poverty. Despite encouraging economic growth and transformation that has brought millions out of extreme poverty and into food security during the past fifteen years, high levels of poverty and food insecurity continue to plague the continent. With more than 40 per cent of its population, approximately 415 million, living in extreme poverty and approximately a fourth being undernourished, the sub-Saharan Africa region faces enormous challenges (Djurfeldt et al., 2018:17).

Djurfeldt et al. (2018) add that several transformational trends are currently affecting the countries of sub-Saharan Africa and will contribute to shaping the development of their agricultural sectors in the coming decades. These trends include demographic change, rapid urbanization and a shift in the labour force from farming to non-farm jobs. These broad trends are expected to bring changes that will affect the whole sub-continent, both positively and negatively.

According to Shitu (2018: 814-815)

there is a need to look from within so as to extend solutions to the challenges limiting agricultural potential. This is because over 60% of Africans live in rural areas and rely on agriculture for their livelihoods. Furthermore, women in Africa make up at least half of the agricultural labour force.

As asserted by Shimeles (2018:2)

they represent 47% of the labour force, they are prominently small-scale farmers because the patriarchy system has discriminated against them. In addition, customary laws and rules governing ownership and transfer of land rights are generally unfavourable to women in sub-Saharan Africa, conferring title and inheritance rights upon male family members. Women also face limited access to finance, modern inputs knowledge and skills of modern agricultural practices.

According to Shimeles (2018) without these disadvantages, women can be as industrious as men, not only in agriculture but in every sector. According to Dancer (2018:13), “It is important that we note that gender is one of the most significant dimensions of social difference in African agriculture”. This is because it is used to construct social power relations and influence asset accumulation and livelihood opportunities, both inside and outside the household. In addition, gender differentiation can be seen in employment conditions, job opportunities, actualization and feminization of the workforce, as well as in leadership in labour organizations and local administrative institutions.

As asserted by (Doss, 2018: 36)

Development literature is abounding with claims about the benefits of targeting agricultural investments to women, especially in sub-Saharan Africa. These claims take many forms, but in general it is argued that increasing women’s agricultural productivity is key to increasing overall agricultural productivity, empowering women and reducing poverty. In general, the arguments for targeting women can be grouped into two main strands.

One strand focuses on the productive potential of women farmers. Doss (2018) assertion is that women are heavily involved in agricultural production in the developing world and especially in Africa and that they have been left out of many development efforts. Thus, there are very high returns to targeting current investments to women. This is because these returns would increase the aggregate agricultural production leading to higher incomes for women.

Furthermore, according to (Doss, 2018:36)

The second strand asserts that women represent an important class of beneficiaries of agricultural development efforts and that their needs have frequently been neglected by programmes that focus on productivity increments. Because many poor women are farmers, and many poor farmers are women, there are reasons to direct agricultural development towards this group. The importance of women as beneficiaries is increased by the instrumental roles of women with respect to child health, nutrition and education. Improving the well-being of women and offering them expanded opportunities will increase their own welfare and have the potential to create positive effects on the next generation.

This chapter discusses the role of irrigated agriculture and its impact on farming, introduce the statement of the problem, with regards to this study, outline the study's specific research problems and objectives, discuss the rationale behind the undertaking of this study, as well as the six key themes the study seeks to highlight with regards to women in irrigated agriculture, this being: land tenure systems, water and irrigation, financial resources and assets, technology and education, and last but not least agricultural politics. The chapter will then conclude with an overview of the eight chapters within this study, and with a summary of the chapter. In the next section we explore how these discussions link the theoretical framework and literature review.

1.1 Relevance of Theoretical Framework and Literature

Tan (2017) asserts that eco-feminism forms a connection between women and nature and asserts that the system of patriarchy has oppressed both (i.e., women and nature). Eco-feminism successfully combines the philosophy of feminism and environmentalism. It is for this reason that eco-feminism was chosen as the framework for this study. This is because women in agriculture work with nature (including land and water) in order to provide food for their families. Hence, the connection between feminist thought and ecological concerns. This connection is important to highlight the relationship women have with nature. In addition, eco-feminism showcases how this relationship unfolds within social and ecological landscapes.

Feminist environmentalists, on the other hand, argue that eco-feminism ignores the social construction of gender and nature. Moreover, women do not have an exclusive relationship with nature, and in Africa women and men perform different duties and activities. Thus Nkonya (2008) argued that all the activities are combined and valued as contributions to the well-being of the household. In the Ahero irrigation scheme, this notion is significant. However, data from this study contravenes this as women do 80% of the work and men do the remaining 20%, with the men reaping the benefits of the women's work. Sachs (2013) asserted that men and women's relationships with the environment must be understood in connection with their material reality of the division of labour, property and power.

Doss et al. (2018) discuss a widely held misperception that women are intrinsically better stewards of the environment. They assert that like the other myths, there is some truth to women being better stewards of the environment. This is because it is mostly women who are greatly affected by natural resource depletion and therefore have more incentives to conserve resources.

Eco-feminism has brought attention to the links between development and gender by highlighting the fact that violence against women and nature are both built into the process of development Khanduja (2017). Khanduja asserts that the understanding of eco-feminism resonates especially well in the works of Shiva and Mies (2014) who sought to highlight the relevance of an alternative to capitalist patriarchy which has worsened the conditions for women and nature in the wake of globalization. Shiva and Mies are explicitly anti-war and anti-capitalist because both war and capitalism are seen as patriarchal structures.

Gaebel (2018:5) argued

that it is women who play the larger role in agriculture, animal husbandry, and in the provision of fodder and soil rejuvenation in Third World countries. That it is these women who are put out of work and out of a home when land in developing nations is lost to industrial agriculture and other products of neo-liberal globalization. It is only by protecting the land from exploitation of globalization can their work be recognized as important and legitimate as they have subsisted off the land for generations.

The following sections will therefore seek to discuss the role of irrigated agriculture and its impact on farming, and the six key themes the study seeks to highlight with regards to women in irrigated agriculture, namely, land tenure systems, water and irrigation, financial resources and assets, technology and education, and agricultural politics.

1.1.1 Agriculture and Irrigation

According to Unver (2018:62), “irrigated agriculture significantly contributes towards generating rural employment and maintaining rural livelihoods”. Furthermore, the benefits of irrigation are seen in higher production, higher yields, less reliance on weather conditions, lower risk and increased farming activities year-round. Unver (2018), however, notes that landless farmers benefit less in the short term. As time goes by, the enhanced productivity from increased cultivated areas provides adequate access to water and alternatively creates job opportunities for them. The challenge facing Africa, according to Shimeles (2018) is the dependence of farmers on rain-fed agriculture and the low use of irrigation. This is in addition, to the lack of investment and infrastructure support in the irrigated sector.

Harrison (2018:1) further noted that “a current renewal of interest in irrigation in sub-Saharan Africa combines support for ‘public–private partnerships’ with an increased attention to the activities of small-scale private irrigators. This is because the ‘public’ is frequently seen as failing”.

Harrison (2018:3) argues that

‘public–private partnerships’ promotion and development in the irrigation subsector is challenging as compared to other sectors. This is because there are often times where there is strong socio-political resistance to projects, because of socio-economics of rural areas and the feeling of public ownership of water services.

Harrison asserts that this has been noted in various contexts. For example, the World Bank favours the privatization of water. The needs for such requests (privatization of water) have been met with strong protests. However, these requests are generally perceived as barriers which can be easily overcome, rather than as flaws in the approaches set forth.

Bahta et al. (2015:3) argue that one of the most serious obstacles to increasing agricultural productivity in Africa is women's limited access to land tenure and credit. Also, Nkhoma and Kayira (2015:81) claim that "the development of irrigation farming in Malawi has provided a context for the resurgence of gender and power contestations over land and water uses in the Lake Chilwa basin in Malawi".

They assert that there has been a change of tributes. This has meant that women, who are mostly poor, can hardly access plots for irrigation. Furthermore, it has given men exclusive advantages over women. This is because "matrilineage leaders have developed economic interests over land and water that is used for irrigation, which has contributed towards the marginalization of women from irrigation, especially those who are outside the irrigation schemes" (Nkhoma and Kayira, 2015: 81). Bahta et al. (2015) assert that this has led to capitalist development favouring men over women and that there is a need for a clear consensus on the role that women play in irrigated agriculture; more so when sustainable grounds for development are created.

1.1.2 Statement of the Problem

According to You et al. (2014:34), "Kenya is home to more than 33 million people. It is rich in natural resources and yet poor and food insecure. In addition, 80% of the impoverished live in rural areas where 30% of households are food insecure". You (2014) goes on to state that Kenya needs to desperately find an effective solution to boost its vital agricultural sector so as to keep pace with its growing population. The Overseas Development Institute's Report on Gender, Agriculture and Water Insecurity informs us that "the agricultural sector is essential in reducing poverty and achieving sustainable development goals" (2016:8).

According to Johansson (2016:14) "gender' is explicitly mentioned in water policies in the contexts concerning countries' domestic water developments. However, when women are viewed as irrigators, fishers, or farmers, they are less recognized". Zwarteveen (1997) showed how women were not incorporated in irrigation policies. Furthermore, irrigation management is closely connected to land rights, which many women in developing countries have difficulty in accessing based on traditions.

Lefore (2017:1) asserts that

researchers in the 1980s and 1990s documented women's contribution to water in domestic and agricultural contexts and that, while this was ongoing, little attention was paid to gender issues in irrigation schemes. The limited research on gender reinforced men's control of land and reduced women's input. This is because corresponding benefits of irrigation with regards to income and produce were not received by them. This therefore, highlighted the underrepresentation of women in irrigated land ownership and scheme management and resulted in the women withdrawing their labour from the irrigation schemes, resulting in lower scheme productivity levels.

Ensuring gender equity in irrigation is important because the level of agricultural productivity of women can be the same as that of men when they have access to the same quality and quantity of agricultural inputs, potentially increasing women's yields by 20-30% above current levels (Lefore, 2017). Agricultural Water Management (AWM) is one of those inputs that can increase agricultural productivity for both women and men, thereby contributing to food security and improving livelihoods. It is therefore important that most governments prioritize the development of new irrigation schemes over the rehabilitation of old ones. At the same time, both governments and development partners should acknowledge the centrality of gender in agricultural development goals. This is because achieving gender equity in the irrigation sector has become an important development goal.

However, Meinzen-Dick et al. (2014:98) argue that

even with recognition of the importance of women's control over natural capital, with regard to land and water, there is no straightforward path to strengthening women's rights to these assets. Statutory laws are only one (though albeit important) source of rights that many women fail to use, owing to a lack of legal knowledge and poor legal implementation.

On the matter of the level of education amongst farmers, Hart and Aliber noted that "the low levels of education attained by female farmers are a cause for great concern. This is because education is crucial to enable end users adopt and make optimal use of new technologies" (2015:4). They argued that education levels of farmers will need to be boosted, especially as farmers engage in more sophisticated input and output markets.

According to Fabiyi and Akande (2015) it is important that government leaders address the issues affecting agricultural productivity. This is because agriculture is seen as playing a critical role in fighting poverty and food insecurity in Africa.

Fabiyi and Akande (2015: 237) argue that

in most developing countries, agriculture is one of the major pillars of the economy. Encouraging agriculture-based innovative ventures will help the advancement of women in rural areas. It is therefore necessary to empower rural women through agricultural policies that assist them take care of their needs and alleviate poverty

This research seeks to study women's role in irrigated agriculture with the Ahero irrigation scheme in Kenya as a case study. Below are the research questions and objectives the study will seek answer:

1.1.3 Research Aims and Objectives

This study seeks to:

1. Examine women's roles in irrigated agriculture in the Ahero Irrigation Scheme in Kenya
2. Ascertain the nature of the contribution women made in irrigated agriculture in Ahero Irrigation Scheme in Kenya
3. Identify and document the challenges women faced in irrigated agriculture in Ahero Irrigation Scheme in Kenya.

1.1.4 Specific Research Problems and Objectives

The specific research problems and objectives are to:

1. Examine women's roles in irrigated agriculture in the Ahero Irrigation Scheme
 - a) Do women in the Ahero Irrigation Scheme understand their agricultural roles within the scheme?
 - b) Why is the gender gap in irrigated agriculture prevalent among farmers in Ahero Irrigation Scheme?
2. Ascertain the contribution women made in irrigated agriculture in the Ahero Irrigation Scheme

- a) How does the Ahero Irrigation Scheme acknowledge the contributions of its women farmers?
 - b) What is the crop productivity levels on farms that women farmers managed?
- 3. Identify and document the challenges women faced in irrigated agriculture in the Ahero Irrigation Scheme
 - a) How do cultural barriers hamper access to land and water resources?
 - b) How does the lack of access to credit facilities and financial resources hinder agricultural production?
 - c) How does the lack of education and training impact irrigated agricultural production?
- 4. Ascertain the importance, value and contribution of women in irrigated agriculture within the Ahero Irrigation Scheme
 - a) Why do women require to actively contribute to irrigated agriculture in Kenya and how can they be provided for, in their current (2019) context?
 - b) How effective are the current (2019) gender policies in addressing issues in land and water resource management?
 - c) Is the National Irrigation Board aware of the role women farmers played in irrigation schemes?

1.1.5 Rationale for the Study

According to Nakawuka et al. (2017:1),

twenty percent of the total land cultivated worldwide receives irrigation water to produce about 40% of the world's food. It is interesting to note that sub-Saharan Africa has just 4% of this figure, the lowest percentage of irrigated land to the total area cultivated globally. In addition, it has the highest depth of food deficit, that is the highest amount of energy needed for people who are undernourished to attain the average dietary requirements. When comparing irrigation in sub-Saharan Africa with that in Asia, 41% of the cultivated area in Asia was under irrigation in the Year 2000, which is tenfold that of the irrigated area found in sub-Saharan Africa.

The above quotation informs us that sustainable irrigated agriculture expansion in sub-Saharan Africa presents opportunities to reproduce conditions that lead to production gains that have been witnessed in Asia over the last 50 years. It is important to note that irrigation, mechanized agriculture, the use of improved seeds, and farm inputs such as fertilizers and pesticides significantly contributed to the Green Revolution in the 1960s in Asia (Nakawuka et. al., 2017).

According to Van Rooyen (2017:805)

irrigation scheme development requires huge engineering investments in constructing storage or diversion infrastructures that are associated with canals. In addition, irrigation demands the human capacity and institutional arrangements to manage the water, ensure equitable distribution, collect water payments, carry out repairs to maintain the scheme and manage disputes. For these reasons, irrigation cannot be a subsistence activity.

This is because the linkages to input and output markets and the ability to secure sound technical information, credit and other services are critical. Moreover, irrigation development displaces some farmers and imports new farmers, leading to social and political tensions over land tenure.

Van Rooyen (2017) argued that development initiatives encouraging the adoption of technology can improve water productivity in irrigation schemes. However, they must operate within complex institutional landscapes. This is because agricultural development in sub-Saharan Africa is underestimated with regards to the crucial role of institutional settings, and hence overestimated with regards to the value of technological investment. It therefore appears that gaining control over water comes at such great cost, both financial and institutional, that many irrigation schemes are often referred to as socio-economic failures. Thus, considering all of the above, irrigation systems need to be viewed as complex systems with many actors at various levels, scales and subsystems. This is because these actors need to interact and share knowledge in coordinated ways so as to be fully functional.

Nakawuka et al., (2017:3) contends that

since the 1970s, irrigation in Kenya has expanded through private large-scale farmers and small-scale farmers, some of whom are working in government or non-governmental supported schemes producing coffee, flowers and other high value crops. It has been observed that individual farmer initiatives and non-governmental organizations (NGOs) support has increased over the past decades, and that Kenya has experienced a significant increase, primarily through surface water irrigation of horticultural, floricultural and rice crops.

According, to Makini et al.(2017:8)

Ahero Rice Irrigation Scheme is part of the Kenya National Irrigation Board's Western Regional project and is situated on the eastern margin of the Winam Gulf of Lake Victoria, 20 km east of Kisumu City. The scheme covers 878 hectares divided into 12 irrigation blocks ranging from 31 to 115 ha with a total of 533 farming households and each allocated 1.6 ha of paddy-field. The scheme is supplied with water for irrigation from River Nyando, where rice is planted in two seasons annually. These seasons often coincide with the local rainfall patterns; one crop is harvested in July and the other in January.

Muema (2018:1) contends that the continuous flooding method of water application used in rice farming in Ahero, West Kano, Bunyala and Mwea utilizes a lot of water, thus making rice production during drought periods to be very low. Thus, the inefficient use of water, and the low productivity of public irrigation schemes in Kenya is a major concern.

Lefore et al. (2019:160) assert that

politically connected individuals who are well resourced will reduce the growth of irrigation. This is because poor farmers are disadvantaged and their control over natural resources is more entrenched.

Furthermore, current economic environments prevent irrigation from reaching the number of people who can benefit both directly and indirectly from equitable access to irrigation. It is therefore important to ensure equitable access to irrigation technologies, practices and complementary inputs that are sustainable so as to intensify production.

Below I outline some of the challenges that need to be addressed so as to improve and guarantee the sustainable expansion of irrigation farming amongst women farmers.

1.2 Land Tenure Systems

According to Djurfeldt et al. (2018: 601)

little attention has been devoted to women's access to agrarian resources; land to be specific because the effects of improved female control over land in sub-Saharan Africa is complicated by the fact that land rights in the region generally favour men.

Djurfeldt et al.(2018) argued that the independence of women over land provides a number of rights-based advantages, for instance, tenure security is not compromised following divorce and enables women not to forfeit agrarian livelihoods which give them greater autonomy and voice within, as well as outside, the household. In addition, efficiency gains from enhancing women's control over land are tied to greater possibilities for securing credit and access to technologies that require capital, for which land can be used as collateral.

Access to productive assets such as land is crucial in avoiding chronic poverty. Furthermore, it is important that we note that critical perspectives on individualizing women's land rights revolve around the practical question of whether reforming customary systems of land tenure is possible. This is because indigenous customary law often retains an advantage over statutory national law because it structurally embodies long-embedded social and cultural norms (Matheson & Ashleigh, 2019). Nakawuka et al. (2017:7) indicates that "access to land and water resources is linked to poverty as the world's poorest are also reported to have the least access to land and water".

1.3 Water and Irrigation

Harrison and Mdee (2017:408) argued that “irrigation in sub-Saharan Africa has had a chequered past and that its future is still uncertain”. They cite a general failure on the part of the continent to learn from the failings of the past. Furthermore, the achievements over the years have not been substantial to make a great impact on the continent. This is because there has been a culture of "build-neglect-rebuild". In addition, it has long been the case that irrigation in sub-Saharan Africa is not acknowledged by those who seek to promote and measure irrigation precisely because it is not part of schemes and projects. They however note that in recent years there has been a revived interest in support to irrigation schemes, including the rehabilitation of earlier failures. This revival has come as a result of 'small-scale', 'community-based' farmers who seem to have a drive to push irrigation further.

Odonkor et al. (2018:141) assert that the

acknowledgement of the interdependence of gender and water has come to be viewed as important in pushing the international development agenda. This is because gender mainstreaming in developing countries has not been easy, due to the broad scope of water resource management. In addition, various variables such as the cost of water, the effect of water on economic performance and the damage caused by water in disasters contribute to the lack of clear strategies when it comes to sourcing of funds, thus making it difficult to push the gender agenda further.

The ultimate goal of water resource management is to provide water security for a country. Water security has been described as the availability of an acceptable quantity and quality of water for health, livelihoods, ecosystems and production, coupled with an acceptable level of water-related risks to people, environments and economies. Water security underpins social and economic development, and includes water governance, public stewardship and the provision of infrastructure necessary for realizing the many services that water can offer. Achieving water security requires an efficient management of financial resources for investment in water infrastructure and development that involves a gender perspective in which the multiple uses of water in different ways by men and women are integrated in policy, planning, implementation, coordination and evaluation.

Odonkoret.al (2018:145) argued that

women are often kept back when it comes to decision making with regards to water. This is because they are yet to be included in the decisionmaking process in the community, regional and national levels. The reason for this is that they are viewed as being custodians of water at the household level and for agricultural use. It is for this reason that they need to be empowered to take effective part in decision making at all levels of water resource management.

1.4 Financial Resources and Assets

Nakawuka et al., (2017:10) informs us that

In Kenya, the financial sector has a wide variety of avenues which can be used by individuals to access credit. However, this is not the case for farmers. The avenues of credit available require collateral, which is not easily available to farmers. In addition, the credit facilities available to farmers are for the purchase of seedlings and fertilizers and not for the purchase of agricultural technologies. Hence, many farmers use their personal savings to purchase irrigation equipment. Agriculture is a risky venture owing to many issues, including pests, diseases and volatile food prices and thus without insurance, to cover one against such incidents, the return on investment may be none, hence this is why some financial institutions are not willing to offer farmers credit.

According to Agbor and Eteng (2018:395) access to

credit facilities in the form of loans or grants given to women farmers in Cross River State in Nigeria is absent, and in most cases is considerably low. Credit facilities such as the ones organized by agencies like LAPO (Lift Above Poverty Organization) or FADAMA (National Fadama Development Office) in the state cannot sustain a high level of women participation in farming. In addition, some of these organizations barely grant a loan or credit facilities above one hundred thousand Naira N100, 000.00 which is the equivalent of (\$300). These funds are insufficient and hardly promote extensive agricultural practices.

This is because the conditions attached to obtaining such loans are stringent; and the inability to repay these loans often result in the carting away of the property of the borrower. Thus, these unfavourable conditions make many women feel reluctant to obtain loans which could have been invested in agricultural food production.

Nakawuka et al, contend that “in addition, low customer numbers make it difficult to offer certain services to customers in rural areas, due to poor record keeping and inadequate customer follow-ups” (2017:9). This is because commercial banks and microfinance institutions do not often venture into rural areas as the costs and risks of doing business in these areas are high. Furthermore, when they are present few agricultural loans are offered compared to loans in other services like trade. In addition, the microfinance institutions created to be of service to women farmers do not solve the problem either as Agbor and Eteng (2018) claimed.

Apart from the stringent conditions attached to obtaining loans, the procedure for procuring such loans is hazardous. Even when the loans are eventually given, the interest rate makes the conditions worse for the women farmers. In some cases, the political class use prebendal politics to determine who the beneficiaries are. Therefore, those who are not directly related to the politicians are most often not the recipients of the loans. This situation serves as a serious challenge to women in agriculture. These stringent conditions associated with accessing credit from the formal sector force rural women farmers to seek credit assistance from the informal sector (e.g., Osusu groups- microfinance groups).

Agbo and Ihemezie’s (2015) study of vegetable farmers’ access to credit in Owerri, Imo state, Nigeria showed that 74.5% of the farmers in the study accessed credit from the informal platform while 25.5 % accessed credit from the established formal sector. Agbor and Eteng (2018) argue that the state has a responsibility to its citizens to ensure that its citizens receive financial services easily. In addition, such loans should not be provided to individuals based on their political connections but rather on the farmers’ abilities to make loan repayments based on their capacities. For Agbor and Eteng, “This will go a long way in encouraging good credit practices that would eventually lead to the purchase of improved varieties and other resources needed to improve agricultural production” (2018:395).

1.5 Technology and Education

“Agricultural technology enhances sustainable production of food and is critical for sustainable food security and economic development of all nations” (Oluwatusin, 2017:72). Oluwatusin asserts that this has made the dynamics of technical change in agriculture an area of intense research since the early part of the Twentieth Century; and that most of these new agricultural technologies are particularly relevant to small-scale farmers in developing countries because they are constrained in many ways, thus making technology a priority for development efforts. He informs us that these farmers, for instance, live and farm in areas where rainfall is inadequate and soils tend to be infertile. In addition, infrastructure and institutions such as irrigation, product markets and credit tend to be poorly developed.

Oluwatusin (2017:72) argues that

In the past years, he argues that many studies have been conducted on innovation and adoption of new technologies in developing countries. Additionally, the process of adoption and the effects of adopting new technologies on small-scale farmers’ productivity and income has been studied by various researchers. However, new agricultural technologies are often adopted slowly and several aspects of adoption remain poorly understood despite being seen as an important route out of poverty and income inequality in most of the developing countries

There exists a significant opportunity to expand Africa’s irrigation potential. This is important because “Irrigation technology has been viewed as the missing link between the current state of agriculture in sub-Saharan Africa and its transition to a developed state” (Macharia & Carpio, 2018:4). Furthermore, the continent needs to ensure adequate food security for its people. It is important that policy makers and governments understand the importance of linking agriculture and water management. This is because in the past these variables have been executed separately. It is only by ensuring adequate investment in agricultural water management and rural infrastructure, and the formulation of appropriate policies, can they be means to break from the vicious cycle of poverty affecting many small-scale African farmers (Macharia & Carpio, 2018).

Mukasa et al. (2017:5) asserted that

agricultural mechanization stands for the application of mechanical technology aimed at enhancing productivity and surpassing human capacity. Most countries that have achieved this feat have done so through heavy investments in mechanized agriculture. Agricultural mechanization is key to enabling farmers to intensify their production, enhance their efficiency, and improve their productivity and quality of life.

This is because the use of machinery enables the farmers to improve their health as they are not engaged in heavy agricultural activity and are less likely to fall sick, thus reducing their costs in health care. Furthermore, family expenditure with regards to education and food can increase, leading to better health, farm production and increased family income (Mukasa et al., 2017).

Macharia & Carpio, (2018:5) assert that

Transforming small-scale agriculture in sub-Saharan Africa requires a change from rain-fed subsistence agriculture to more highly commercial productive agricultural systems. This is because regions that have taken up irrigation have the best poverty reduction impacts on their communities. Furthermore, crop yields in these areas have increased and there is a greater demand for agricultural labour. Furthermore, irrigation impacts different beneficiaries differently.

The impact can vary depending on the technology used, the crop cultivated, and the layout of the distribution system (head enders (farmers near water source) or tail enders (farmers further from water source)). In addition, it is important that the institutional rules governing access to water and use be well laid out to ensure that all beneficiaries work within the system provided (Macharia & Carpio, 2018).

Mukasa et al. (2017:7-11) argues that despite the many efforts by organizations and African governments, the rate of adoption of modern technologies in Africa is still considerably low. This they blame on the low literacy levels that hinder the adoption of new technologies. They advocate that Africa's vibrant youth and women are key in addressing these issues. This is because their participation can boost economic growth and help reduce poverty and food insecurity.

Waiganjo and Waweru (2018:25) argue that it is imperative to educate women with basic agricultural knowledge and skills. This is not only important for Kenya, but is key if the whole of sub-Saharan Africa, would like to achieve the realizations of the 2030 agendas, which seek to improve the quality of life to citizens. Therefore, if well-articulated in schools, agriculture as a subject can be used to prepare a skilled workforce that can improve agricultural productivity. Waiganjo and Waweru (2018) argued that because agriculture is a science, it should be taught using teaching approaches that allow students to acquire not only the knowledge but also the basic agricultural skills that can be applied in farming. According to them this will promote better learning of the subject.

The challenge as always in Africa, is government implementation. The government in Africa plays an important role when it comes to agricultural politics, as they are the ones who have the mandate to act on such matters. The next section discusses the role politics plays and its impact on agriculture

1.6 Agricultural Politics

Barnes (2017:149) asserts that

politics and water resource management are two variables that cannot be avoided or overlooked, when it comes to managing water as a resource. In addition, these two factors are key in understanding how water as a resource is to be managed. This is because the government plays a key role in the development of bureaucratic practices. It is therefore, for this same reason why irrigation, politics and farming have continued to be an area of great scholarly interest.

According to Barnes (2017), this has demonstrated how water infrastructures are embedded in webs of social, political and power relations. Newell et al. (2017:11) argues that by exploring power dynamics in Kenya, one can be made to quickly understand the numerous tradeoffs that come between competing policy goals, climate change and agricultural policies that play out in particular local and national contexts.

According to Recha (2018:17)

reforms within the various parastatals such as the Kenya Co-operative Creameries (KCC) and Kenya Meat Commission (KMC) by the National Rainbow Coalition (NARC) government in 2003 gave hope to producers. However, this was not the case in later years as increased beauractic systems chased farmers away and favoured the private sector. Thus, this gave priority to expand irrigation programmes as articulated in the Second Medium Term Plan (SMTP) of 2013-2017.

Recha (2018) argues that although these policies (SMTP 2013-2017) have covered a wide spectrum of the agriculture and livestock sectors, including food security, they have suffered from a lack of common objectives and coordination among implementing ministries. This is because the agricultural sector has suffered from outdated legal and regulatory frameworks and policies that have served to constrain agricultural development, trade and effective competition. In efforts to address these policies and institutional challenges in the agricultural sector, the government of Kenya has adopted the ‘systems approach’. This approach means that the agricultural sector institutions will be viewed as components whose synergistic functions will lead to the attainment of set objectives.

Newell et al. (2017) therefore argued that it is important to understand the combination of relationships of power that operate among and between institutions active in agriculture. This is because their vertical relationships of power enable one to explain the patterns of governance that can be observed between the different policy players. Furthermore, as Majiwa (2018:3) claimed, the “importance of rice as a crop, remains a political commodity since in most cases the government is a major player in the development of the rice infrastructures such as irrigation facilities, input supplies, credit and market functions.”

Lefore (2019:164) asserts that “irrigation development by small-scale farmers is complex as it involves many contextual challenges.” In order for small-scale farmers to achieve high returns from their irrigated crops deep structural changes that address linkages between domestic and global markets need to be looked into. Furthermore, consultative decision making opportunities need to be put in place in order that political institutions are accountable. The reform of customary governance systems is also very important. In addition, large project designs cannot be adopted for small-scale irrigation farmers. This is because delicate balances need to be sustained so as to maintain agricultural sectors vibrancy and local innovations.

The next section gives an overview of the study and the various chapters that will be discussed in the study.

1.7 Chapter Overview

This thesis consists of eight chapters.

1.7.1. Chapter One: Introduction

This chapter provides a general introduction to the study, highlights the specific research questions the study seeks to investigate, the research approach of the dissertation, and limitations as well as the contributions the study will make in reference to the subject under research.

1.7.2. Chapter Two: Literature Review

This section seeks to present and highlight the current literature on the study that support the reasons why the study is being conducted. It will discuss and cite several key authors in the field, as well as argue for the need of the study.

1.7.3. Chapter Three: Theoretical Framework

This section will seek to highlight eco-feminism theory that was used to ground and guide the study. It will proffer the reasons it was chosen with reference to the study being conducted, the discussions several authors highlighted about the theory and its relevance to this particular study.

1.7.4. Chapter Four: Study Area and Methodology

This section will discuss the qualitative research design that has been used in this study. It will highlight the methods the researcher used to gather and analyze the data, highlight the limitations of the study and record the ethical procedures sanctioned for the research.

1.7.5. Chapter Five, Six, and Seven: Data Analysis and Interpretation

These sections seek to present the data collected from the research site. It will present the data in different pictograms, figures and tables. To help data reading to be easily understandable, the chapters will discuss and interpret the findings of the data that had been gathered. Appendix A and Appendix B consist of administrative documentation, and approval was sought from the relevant authorities to gain access to the data. Appendix C, D, E and F are the consent forms, questionnaires and interview questions used to gather data for the study.

1.7.6. Chapter Eight: Conclusion

This section discusses the research themes of the study in summary and the relevance of the theoretical framework to the findings of the study. In addition, this chapter summarizes the conclusions of the study and offers recommendations emanating from the research.

1.8. Conclusion

This chapter introduced the research topic and discussed the rationale for the study. It unpacked the importance of women's roles in irrigated agriculture within the Ahero Irrigation Scheme and the need for government as well as non-governmental institutions to support women farmers, especially in the irrigation sector in Kenya.

1.9. Summary

This chapter gives a general introduction of the study and the various areas the study seeks to cover in the subsequent chapters. The chapter gives an overview of the state of agriculture in Africa, and the impact of the agricultural sector on its people, the land and in terms of an economic focus. There is then a focus on women in general in agriculture within the African continent and the impact they have on the agricultural sector within the various roles they play in the social and economic systems in Africa. The subsections within the chapter also discuss irrigation as a means of increasing agricultural output and ensuring sufficient food production in a world where water is becoming scarce and climate change is having a great impact on the land.

The chapter also discusses irrigation schemes and the various challenges they face with regard to management, the natural resources that are used within the different irrigation schemes in the world, and how these challenges have been addressed. There is also a focus on the role women play in irrigated agriculture.

The chapter also highlighted the challenges Kenya faced in meeting its food production and the impact of the 'gender gap' within the irrigation sector in Kenya. In addition, it explains the challenges women faced in irrigation and the impacts of these challenges on agricultural output.

The rationale for the study as well as the major points of discussion are addressed within the study. A brief introduction of the study site is also given. It is important to note that there are many challenges that irrigated agriculture faces, and that this study focuses on six of these key themes. These include land tenure systems, water and irrigation, financial resources and assets, technology and education, and lastly agricultural politics. Finally the chapter provides brief introductions to each of the six key themes. The chapter concludes with an overview of the subsequent chapters in this research. The next chapter will focus on the literature review and provide greater detail on the six key themes of the study and their relevance to women's roles in irrigated agriculture.

CHAPTER II

LITERATURE REVIEW

2.0. Introduction

The CGIAR Research Programme on Water, Land and Ecosystems (WLE) envisions:

“A world in which agriculture thrives within vibrant ecosystems, and where communities have higher incomes, improved food security and the ability to continually improve their lives.”

(International Water Management Institute, 2014:9)

Agricultural technology and innovations have made great strides over the past 50 years (1960-2010). However, feeding 9-billion people in 2050 and beyond will require the intensification of agricultural production by as much as 40% while also maintaining ecosystems and planetary integrity. Limited arable land and water for irrigation poses great challenges for humanity in reaching this goal. Therefore, many people must understand that we need to move beyond the business-as-usual scenario (International Water Management Institute, 2014).

Mateo-Sagasta et al. (2018:16) indicate that “there are currently 7.6 billion people on earth with more than fifty percent of the world’s population concentrated in India, China, the United States of America and Europe.” According to them, the world’s population is projected to reach 9.8 billion people by 2050. This growth forecast will take place mainly in the developing countries of Asia and Africa. Thus, this will necessitate an increase in farming and irrigation all over the world (Wazed et al., 2018).

Irrigation is becoming an important trigger for agricultural growth in sub-Saharan Africa with both women and men adopting small-scale private irrigation in ever large numbers. This trend in farm-led agricultural growth promises to enhance women’s productivity and well-being (Nicol et al. 2015). This is because irrigation is a major factor in agricultural intensification. Furthermore, irrigation projects have helped to increase food security around the world, particularly in developing countries (Mateo-Sagasta et al., 2018).

In many societies, men and women have different distinct roles in agriculture and food production. These roles have been influenced by social and economic contexts. Women are increasingly taking on greater and more varied responsibilities in farming, especially in the field of irrigation, managing labour and procuring inputs (CGIAR Research Programme on Water, 2018). However, according to the International Water Management Institute (2014) data clearly show that the agriculture sector is underperforming in Africa. This is, in part, because women lack equal access to resources and opportunities. Furthermore, a gender gap intensifies poverty and malnutrition. In fact, in many countries, women's access to land, water, financial capital, equipment, markets and technical knowledge is very limited.

In Kenya, for example, women make up between 42% and 65% of the agricultural labour force according (Diirro et al., 2018). They argued that despite women's important role in the agricultural sector, there was a lack of empirical evidence that showed that they lagged behind men. They noted that gender inequalities continued to persist in respect of and access to, productive resources such as land, livestock, labour, education, extension and financial services, and technology. In addition, they posited that cultural norms and traditions restricted women's ability to inherit land and contributed to the widening gaps of farmland owned between men and women. In view of this, it is therefore important to understand the challenges that women faced and how best they can be addressed to improve women's roles in irrigated agriculture.

2.0.1 Women and Irrigated Agriculture

Gender equity in irrigation is important if agricultural production levels are to remain high in irrigated farms. This is because empirical evidence of gender differences in farm productivity shows that women do not have the same access to resources as men. In addition, if women are accorded the same opportunities as men they are more than likely to increase their yields by 20%-30%. Productivity gaps exist in favour of male headed households, with gaps in the region of 4%-40%. Household economic surveys usually interview the 'head of household' which often leads to a male biased perspective and thus one misses the complexity of intra-household relations (CGIAR Research Programme on Water, 2018).

The CGIAR Research Programme on Water (2018) asserts that many studies have shown that well intended reforms aimed at providing women with more opportunities often fall short because the contextual social dynamics have not been well understood. This is because well-meaning development programmes often fail to engage with the structural barriers that women faced in accessing irrigation and other farm resources. It is therefore important that we understand the challenges women faced in the irrigated sector and how best they can be addressed. However, before discussing this, it is necessary to present a brief history of the irrigation sector and the role it has played in agriculture in Kenya.

2.0.2 History of Irrigation in Kenya

According to Kisang and Yator (2017:108)

irrigation has been in Kenya for over 400 years, and has existed for many years along the River Tana, Keiyo, Marakwet, West Pokot and Baringo regions. Furthermore, rice irrigation activities have existed along the river valleys around Kipini, Malindi, Shimoni and Vanga, since the early 19th Century when slaves were used to construct rice schemes. In addition, Asian workers building the Kenya-Uganda railway also started some irrigation activities around Makindu and Kibwezi.

Muema et al. (2018:2) indicate that “irrigation schemes in Kenya can be categorized into small-scale schemes, large-scale private/commercial irrigation schemes and public schemes. Large farms occupy 40 percent, while small-scale irrigation schemes account for 42 percent, and the remaining 18 percent belong to government managed schemes.” They noted that the main irrigated crops grown within these schemes were rice, vegetables, coffee, fruits, sugar cane, cotton, maize and horticulture. Kisang and Yator (2017) indicate that the Kenyan government established the National Irrigation Board in 1966 to manage and run its irrigation schemes. In addition, according to Kisang and Yator (2017), the irrigation board was also given the mandate to open new schemes and thus create employment opportunities for detainees, and the resettlement of landless people. Furthermore, they engaged with the farmers through tenancy agreements. This was however seen as a downside as the management of the schemes decided what crops were to be grown.

Atera et al. (2018:66) assert that “78% of the total area under rice cultivation in Kenya is in irrigable ecosystems which are managed by the National Irrigation Board (NIB). The schemes under this care include Mwea, Bura, Hola, Perkera, West Kano, Bunyala and Ahero”. Rice production in Kenya dates back to 1907, when Europeans introduced it along the coast. Rice is perceived as a rural cash crop for the rural population, and has been seen to be appreciating in value over the years (Atera et al., 2018). In view of this let us have a brief history of the study site, to better understand its history.

2.0.3 Ahero Irrigation Scheme

According to the NIB (2018) website the Ahero Irrigation Scheme is located in the Kano plains between the Nandi Escarpment and Nyabondo Plateau in Kisumu County, Muhoroni sub-County in Kenya. The scheme started as a pilot project to explore the feasibility of irrigation in the Kano Plains. Construction of the scheme started in 1966 and the operations of the scheme began in 1969. It has a gazetted area of 4,176 acres, with 2,586.5 acres under irrigation. The scheme has 570 farm holders, 2,000 farmers and 20,000 dependents. The source of its irrigation water is River Nyando. The scheme uses basin irrigation, with rice the main crop in the scheme. The varieties of rice are 90% Sindano (IR-2793 & ITA 310), 5% aromatic, (Basmat-370) and 5% hybrid (ArizeTej Gold & Arize 6444 Gold). Other crops like soya beans watermelon, maize, tomatoes, sorghum and cowpeas are also grown within the scheme.

Mugambi et al. (2017) assert that the irrigation subsector is currently facing many challenges, a notion that Muema et al. (2018: 2) supported: “Irrigated agriculture is faced with challenges such as inefficient water use, low returns on investment, management and poor operation”. Mugambi et al. (2017) noted that these challenges included low rates of irrigation infrastructural developments, inadequate funding for development and investment in both the public and the private sectors, as well as poorly developed marketing channels within the irrigated commodity value chain. In addition, they asserted that policy, legal and regulatory frameworks have not been reviewed to reflect the emerging operational and socio-economic realities.

Irrigation scheme development, according to Van Rooyen et al. (2017), requires huge engineering investment in constructing storage, diversion infrastructure and the associated canals. In addition, irrigation demands the human capacity and institutional arrangements to manage the water, ensure equitable distribution, collect water payments, carry out repairs to maintain the scheme, and manage disputes. It is for these reasons that irrigation cannot be a subsistence activity. Furthermore, the linkages to input and output markets and the ability to secure sound technical information, credit and other services are critical. Moreover, irrigation development displaces some farmers and imports new farmers, leading to social and political tensions over land tenure.

We now explore some of these challenges related to the role of women in irrigated agriculture.

2.0.4 Women and Land Tenure Systems

Lokonon (2017) asserts that land constitutes an important capital (natural capital) for people who draw their livelihoods from agriculture. According to Galiè et al. (2015: 1), “productive resources such as water, land, livestock and crops are essential to the livelihoods of most rural families, particularly in the Global South.” Among these resources, land is clearly the most valuable asset in most rural household portfolios as it is the foundation for agricultural production (Meinzen-Dick et al., 2017).

Galiè et al. (2015) assert that poor rural women often do not have the same level of ownership rights as their male counterparts. This is because ownership rights are believed to increase women’s household decision making and empowerment, which in turn increases their household efficiency in agricultural productivity as well as individual equity. They argue that laws and customs that negatively affect women’s access to, and control over, resources hamper women’s economic advancement, particularly in sub-Saharan Africa and Latin America. To them, unless an explicit gender equity lens is adopted in law, general economic improvement will not strengthen women’s property rights; rather, it will erode them and have poor women being disadvantaged. This is because women tend to own less land, whether solely or jointly than men (Meinzen-Dick et al., 2017).

The history of irrigation schemes is a history of male privilege. The consistent promotion of the 'male household' with 'women as housewives' underpins the rights for newly irrigable land and water; as these rights are vested in the male elite and other male owners. Men have been entitled to exploit both the domestic and productive labour of their female kin. Furthermore, this divide and rule notion bribed the local men into a new order that came at the expense of their female kin and all other women and many poorer men (Van Koppen:2017).

To understand "the debate about individual and communal land rights and how these rights affect secure tenure and gender relations, it is important to explain the concept of property, land tenure, and secure tenure" (Obeng-Odoom,2012:162). Obeng-Odoom argues that property is seen as a broad term denoting tangible things, relationships, or rights to the use and ownership of those things. It is when 'property' is qualified by 'real' as in 'real property' or 'landed property' that it becomes narrowly focused on land and the rights embodied therein. He notes that property rights are therefore land rights.

Galiè et al. (2015) argue that property is often associated with socially acknowledged and supported claims or rights that are based in law, customs and conventions. Galiè et al. emphasize the need to distinguish between 'property' (ownership) and 'access'. They argue that the former entails the 'the right to benefit from things' and the latter 'the ability to derive benefits from things', while 'access' has more to do with 'bundles of powers' (*property with bundles of rights*) and entails complex social relations that might change over time and space. This is because local definitions are seen to affect asset distribution on the household.

Dancer (2017) argues that spouses have shared rights in jointly acquired matrimonial property. However, with regards to land that is passed from one generation to the next in large families, this changes as the land is regarded as family or clan land. This therefore ties the land to certain gendered and intergenerational limits, and reduces the power of an individual concerning allocation and disposition. Dancer gives the example of the agricultural regions of Kilimanjaro, Arusha and Kagera, where demand for land has been high and that customary connection to family land is strong and is based on patrilineal principles. Dancer notes that ties to land in these areas are changing due to socio-economic changes such as education, employment and rapid urbanization which have generated markets for the sale and lease of land.

Muraoka et al. (2018) supported this notion and assert that the land rental markets have historically been very thin in most of Africa, but this has been changing over the past decade (roughly post-2010). Furthermore, with a few exceptions, land rental markets have been found to be a major way, if not the only way for enabling poor households to access land.

Thus, Ng'uono et al. (2014: 11) argue:

land ownership or access to other productive resources and the organisation of agricultural production are influenced by cultural practices and traditions. For example, rules of land inheritance by lineage, gender or culturally determined characteristics give one core access to land. In some communities land is owned by a tribe or kinship group where each family within the kinship group has the right to use as much land as they need to feed themselves.

Dancer (2017), on the other hand, gives an example of inheritance patterns in Chiwambo village in South Eastern Tanzania, where lineage practices followed the female line, marriage practices were patrilocal and inheritance patterns bilineal. This is because in patrilineal areas, some of the practices were different. Traditionally men inherit land from their clan, while women acquire the land through their husbands. In addition, in both patrilineal and matrilineal systems, in customary land tenures, land inheritance is closely linked to significant life events such as marriage, divorce, separation or the death of a husband or father. Thus, land may therefore be allocated inter-vivos, for example, in the time of death of one's father or at the time of marriage. Daughters on the other hand, may be allocated land for example, if they remain unmarried or if their father had no sons. Widows, if appointed administrators of their spouse's estate, may be granted access subject to the relationship she has with the (man-son or brother of the deceased) appointed to take care of the family and land.

Ng'uono et al. (2014) argued that widows and unmarried women may be denied land and property rights in many of the rural areas. Thus, they must rely upon their fathers or brothers to provide them with a piece of land as members of the family. Makhado and Pelizzo (2016: 33) asserted that "this leaves women struggling for their own subsistence. According to them, it is important that we note that women's access to land is contingent upon their relationship to men and their marital status."

In some cultures, according to Ng'uono et al. (2014: 15),

a man's possessions are inherited not by his wife or even his children, but by his mother's brothers. This thus reduces the woman's incentive to access or develop the farm. In many areas, it is common practice for a man to divide his land between his sons and then exclude his wife even before he dies. In other rural societies, land is not inherited at all when the male farmer dies. The land is taken back to the kinship for reallocation.

The use of customary laws in land allocation is common in Africa. The disconcerting issue with the use of these laws is that they often discriminate against women and therefore prevents them from participating fully in agricultural production (Makhado & Pelizzo, 2016). Furthermore, according to Hausermann et al. (2018), cultural understandings view men as "providers" and thus limit women's wealth accumulation and land access. In addition, according to Ng'uono et al. (2014:9), "despite, the roles of men and women being complementary; social and cultural expectations for women's unpaid household work creates additional pressure on their time, resulting in their low productivity and earnings."

Lawry et al. (2017) asserted that many farmers in developing countries hold customary rights as a highly secure measure in the context of local social arrangements. However, this may not be the case with regards to the legal status in the country's statutory property regimes. Thus, in such situations, land assigned under customary arrangements is most often statutorily categorized as public land, and subject to the stewardship and administration of public agencies. They argued that in some instances where commercial investments have taken place, the customary tenure arrangements that delivered secure tenure rights to generations of farming families have been overridden and farming families have faced displacement.

Boone (2019:388) argues that

in the African context, user-rights securitization strategies gained tremendous momentum in the 1990s, in part as a reaction against the vision of market-led dispossession of small-scale African farmers and pastoralists. That in agricultural areas, the goal of user-rights securitization programmes was to shore-up and protect the land access and user rights of the small farmers now cultivating the land especially women.

Boone (2019) advocates that user-rights securitization will protect the poor from arbitrary dispossession by the government, powerful local elites (including politicians and neo-traditional authorities) and other land-grabbers by reducing costly and disruptive land conflicts with neighbours and extended family members, and strengthening the position of women in such conflicts; and will enhance incentives for investment and agricultural intensification on family farms. Furthermore, clear, formal and state-enforced (legally-enforced) land rights could also help promote rental and leasing markets which would benefit ordinary landholders (and those seeking access to land) and make some kinds of investment and new technology adoption less risky for ordinary farming families.

According to Wily (2018), Kenya's Constitution establishes gender equity as a right. These includes directives that gender discrimination in law, customs and practices related to land and property must be eliminated (CON Art. 60). In addition, the law protects matrimonial property and the interests of spouses in occupation of land of a deceased or spouses/s, which is obligatory (Government of Kenya, CON Art. 68).

The Land Act No. 6 of 2012 provides that compensation when community land or private land is compulsorily acquired is payable to the spouse/s of affected persons as well as to "any person actually occupying the land and the spouse or spouses of such person" (Government of Kenya, LA s. 107). The Community Land Act (CLA) stipulates that there must be "equal treatment of applications for women and men" (Government of Kenya, CLA, s. 14 (4) (c) (i)). Moreover, women marrying into the community may not be excluded as members, and their rights to land remain unless they divorce and remarry elsewhere (Government of Kenya, CLA s. 30 (5)). The above indicates that there are sufficient grounds for women to appeal against injustices involving the community land committee's land dealings. However, a great challenge is that that no provision is made for a minimum number of women to be members of that committee, or that women must constitute no less than one-third of the community members to achieve a quorum at assemblies of members. Moreover, the law does not prevent women being allocated land independently from men. In Kenya, this has been catered for in article 27 and article 60 of the Kenyan constitution (2010).

In contrast to what has been happening in Kenya, Dancer (2017:12) contends that “Rwanda has been the exception in its approach to inheritance law reform” largely due to the country’s post genocide context. This is because an important theme of Rwanda’s 2003 Constitution was a state commitment to conform to the principle of equality for all Rwandans (Article 9), with discrimination of whatever kind, including sex, being prohibited and punishable by law (Article 11). In addition, equal rights of inheritance have already been recognized in the Matrimonial Regimes, Liberalities and Succession Law of 1999 wherein all legitimate children under civil law shall inherit equally without any discrimination between male children and female children (Article 50). This law is furthermore reinforced by the Organic Land Law, enacted in 2005, which prohibits discrimination based on sex or origin and enshrines the equal rights of husband and wife over land (Article 4) (Dancer,2017).

Doss et al. (2015) asserted that given the importance of women’s land rights in attaining various development objectives, the lack of evidence regarding the extent of women’s land ownership is surprising. In addition, claims that are not substantiated by data or credible sources are problematic for several reasons. They noted that data may have been available for a few case studies but not available for a national representation. They assert that a single statistic necessarily masks differences that may be both global, regional and within countries, and may have myriad considerations and challenges. They suggest that these matters need to be addressed.

Chigbu (2019) argues that the efforts being put into securing tenure rights of women (by way of policy interventions) tend to assume women belong to a homogenous group; hence policies do not address the reality that exists in women’s land tenure experiences. The challenge is that the characteristics of women’s land challenges have, in almost all cases, been homogenized. Although all women share the same problems and opportunities across the developing world this “homogenization” of women or the habit of “homogenizing” women has led to misplacement of policy priorities concerned with improving tenure security for women in sub-Saharan Africa.

The role of women in household management may be a factor of women's disempowerment in some communities within sub-Saharan Africa because it places them in a dependency relation to men who are breadwinners. However, this might not be the case in sub-Saharan communities where women are mostly the breadwinners - thereby ensuring that household care by women is empowering, rather than disempowering. It is therefore important to consider "differences" rather than only "commonalities" when tackling development challenges that relate to cultures, gender and people (Chigbu: 2019).

Doss et al. (2015) argued that there needs to be a clear conceptualization of property ownership among women. Ownership must be clearly defined. Although deeds clearly identify an owner (or owners), in many places in Africa and throughout the world individuals may have only partial ownership rights. For example, a person may have the right to farm a parcel of land and bequeath it to her children but not sell it without permission from her kinship group. Second, the single statistics that are used seem to imply that individuals own land. Without further qualification, however, it is not clear how land that is owned jointly is classified.

According to Chigbu (2019:9)

women's land tenure is differentiated by the kind of land they own and its use. This is because women whose land tenure is acquired from their family or traditional authority is deemed more secure with regards to tenure as compared to women who have secured land on the (vernacular) land market.

In particular, it would be important to note how land that is owned by couples is included in these studies. It is also unclear how communal land and land that clans, tribes, institutions, or government actors, rather than by individuals, is included in these same studies. Finally, any claim about the share of land that women owned needs to be made in comparison with that men owned.

The implication seems to be that if women own “...only 2%” of the land, men must own the remaining 98%. However, individuals need to know what percentage of the total land is actually owned. The “2%” statistic would resonate differently if men owned only 4% of land (Doss et al., 2015:404).”

Kamade and Bahati (2019:62) claim that “individually and jointly held titles are potentially an imperative tool to enhance women’s bargaining power within households. They give Pakistan as an example, where land ownership has had a significant impact on women’s empowerment and agricultural productivity.” They therefore recommend that governments develop programmes and policies that are focused on enhancing women’s productive roles. This is because such programmes will strengthen the property rights of rural women.

According to the World Bank (2017), secure property rights constitute an essential ingredient for economic development. As a consequence, policy makers need to focus on measures that strengthen these rights. This is because additional gains may be made from remedying the distributional inequality in property rights between men and women. It therefore becomes important to explore how land ownership affects other natural resources and how this relationship affects women in irrigated agriculture.

2.0.5 Water and Irrigation

According to Djurfeldt et al. (2018a), gender inequalities with regard to water access vary strongly across many different regions in Africa. They posit that few studies exist that quantify gender differentials in water access and the use of irrigation. They further note that there is a large scholarship which details the legal, cultural and practical aspects of women’s relative limited access to water. However, there are only two studies related to the gendered use of water in sub-Saharan Africa. One covers the access to piped water in Limpopo and the other the distance to the main irrigation channel among forty-five farmers in Benin. Both studies found that women (either women farmers or female headed households) were disadvantaged in their access to water. A notion that Sinyolo et al. (2018:130) supported asserts that “few studies have investigated the gender inequalities in water access among small-scale irrigators and its impact on household welfare.”

Women's control of water resources for drinking and irrigation is limited because societal values define men as the guardians of property and as heads of households. Men therefore make decisions for women regarding water resources in the public sphere. In addition, other factors such as ethnicity and socio-economic status influence women's access to water. Anecdotal evidence highlighted potential water access challenges among women, reporting that the gender and social position of women in communities has limited their access to irrigation water (Sinyolo et al., 2018). Notwithstanding this, control over natural resources is limited for the majority of women worldwide. This limited participation of women in decision-making has the potential to result in the failure of government policies and programs (Le, 2018).

According to Mitra and Rao (2019), women hardly have a role or voice in formal management and governance systems, especially at the community level and in the setting up of modern irrigation systems. This is because men dominate the decision-making processes relating to water allocation, even though they do not bear the responsibility of procuring water for food preparation and household production. It is therefore important that the interconnections between women and the social institutions and scales of decision-making be in the form of informal networks and structures rather than formal ones. Thus, women's access to water for agricultural purposes should be improved, especially in view of their important role in food production. Ensuring women's access to adequate water supply is important for addressing dimensions of agricultural production, poverty and gender inequities. Le (2018) asserts that water scarcity results in negative impacts on rural women and girls than on men.

Women and girls are found to be burdened more through the collection of fresh water, which is attributed to gendered domestic roles. Furthermore, decision making with regard to accessing water resources is determined by one's access to land ownership. Mitra and Rao (2019) claim that access to water for irrigation is usually aligned with landownership.

In a pioneering study of land rights in India, Agarwal (1992) showed that women were denied access to a range of social and economic opportunities. This is because they were primarily available to formal (mostly male) holders of land. Several field-based studies in Anthropology and Economics confirmed that women were efficient irrigators and productive farmers (Mishra, 2018). However, in most canal irrigation systems water was allocated to the official landowners, usually men. Land ownership patterns directly preclude many women from water rights (Mishra). According to Van Koppen (2017:9) land and water are intrinsically linked.” Van Koppen asserted that this underlines the importance of linking efforts to improve women’s land rights with improving women’s water infrastructure rights. Naturally, available water resources are location specific, and access to streams and other water sources requires a rite of passage over other riparian strips, which can be denied to women, as reported in Kenya.

Kernecker et al. (2017:2) asserted that “women are often excluded from the management and planning decisions regarding water resources. They often must develop their own strategies for dealing with water.” They cite the example of Gambia where the arrival of pump irrigation made rice go from being a traditional women’s crop to a men’s crop, and where men started to control both the farming and the revenues regarding the crop.

This example highlights how rural development that focuses on water resources specifically affects women, and their relationship to natural resources. They showcase how women’s adaptation to social networks and their use of landscape knowledge, ecosystems and natural resources contribute to their adaptation to limited water access in rural regions and landscapes.

Parker et al. (2016:6) affirmed that “it is important to acknowledge the complex dynamics between men and women within households and on the farm. The distribution of work resources and the control across the homestead is fluid, and subject to constant renegotiation and flux.” In addition, these dynamics compound women’s vulnerability to domestic and agricultural water insecurity (Sarkar et al., 2018).

Johansson (2016:14) argues that “the inclusion of women, in many water projects appears only on the surface. Women are either briefly mentioned in water management descriptions or only given power on paper; and that even in some cases women are represented by their husbands or brothers in water committees.”Johansson (2016) contends that women are less recognized when they are viewed as irrigators, fishers or farmers.

According to Van Koppen (2016:5)

access to water implicitly refers to water in the right quantity and quality, at the right moment and in the right place. In short water available for use. To use water and derive the benefits from it, people need water in the appropriate quantity, in the appropriate quality and at the appropriate site.

Thus, they access water by either ‘moving to the water’, for example, through permanent settlement patterns, or long-term pastoralist transhumance, or seasonal flood recession farming, or by moving water to the site of use.

Due to the importance of water as a resource, it is imperative that it is managed sustainably (Agwata et al. 2014). Thus, they call for integrated water resource management practices which can coordinate the development and management of water related resources that seek to maximize the social and economic welfare in an equitable manner, to sustain ecosystems and to bring together the technical, ecological, social and political spheres. Thus, an integrated approach that includes the participation of all stakeholders, including local communities and women is important. Quansah et al. (2019) view participation as being a very important ingredient for achieving desired results.

This is because the involvement and views of women regarding natural resource management, especially in rural communities, are important on key issues regarding water and its management. It therefore becomes important to understand how the management of natural resources is key when acquiring other assets and the impact this acquisition has on women.

2.0.6 Financial Resources and Assets

Wulandari et al. (2017: 1) argue that

the availability of finance is important for sustaining the production of agricultural commodities. Moreover, the availability of finance contributes to increased income productivity improvements and efficiency. Lack of access to finance is a major problem for the rural poor, especially in developing countries. Financial knowledge is an important aspect for financial decision making. Thus, a lack of financial knowledge, especially among farmers, can explain their low income and slow economic growth.

Ng'weno et al. (2018) contend

that financial services are a core enabler for consumption smoothing, risk mitigation, self-employment, business growth, asset accumulation and wealth creation; and that access to formal banking services can help individuals and households make day-to-day transactions, plan for and pay recurring expenses as well as help finance small businesses, grow assets, and safeguard savings against theft, and manage irregular cash flow as well as mitigate shocks from unforeseen expenses, and improve users' overall welfare.

Akter et al. (2017) assert that women invest as much as 10 times more of their earnings than men on their family's well-being, in areas such as child health, education and nutrition. That is, they spend 90% of their earned income on education, healthcare and housing, on average, compared to 60% that is spent by men. Thus, improving women's livelihood has a well-documented "multiplier effect," due to the fact that women's empowerment has a direct impact on agricultural productivity and household food security.

Kaaria et al. (2016) highlighted that access to land and income can affect women's participation in producer organizations. They give an example of producer organizations that require land for cultivation or cash as membership fees, which women often lack. Furthermore, they noted that a Meinzen-Dick and Zwarteveen's (1998) study in Sri Lanka established that only formal land owners can become members of water user associations. This was because men tended to have legal rights over land, thus making it hard for women to be members as they did not have formal legal rights.

Ng'weno et al. (2018: 21) asserted that

although credit accessibility is universally dismal, women may be worse affected because they are more likely to lack formal land titles which they can offer as collateral; and that they may be hampered by other bureaucratic documentation which demands good literacy.

Rao (2016: 33) argued “that the exclusion of women from formal financial institutions and ‘*chit funds*’ is well documented, and only goes to highlight the difficulties faced by women, when trying to access credit facilities in Kenya.” Rao (2016) viewed this as being a consequence of women lacking property rights, in addition to their limited participation in paid work.

This was because their ability to access credit and insurance instruments depended on them providing proof of repayment via income streams or collateral, which a majority lacked. In addition, this may require them to travel long distances to formal institutions to lodge documents and meet with loan officers. However, Rao noted that this may not be the case all the time, as women’s involvement in informal institutions is greater than men. In Kenya, more than 60% of the employees in informal enterprises are women (2016). Financial inclusion can be truly transformative in terms of women’s productivity, livelihoods and economic empowerment, and requires women’s uptake and continued use of relevant financial products (Ng'weno et al., 2018). Rao (2016) asserts that this may not always be the case as small microfinance institutions provide expensive credit with lower returns on savings which limit members’ abilities to use financial instruments to increase their savings, investment and household incomes.

Rao argues that small entrepreneurs in Kenya extensively used non-interest-bearing savings accounts, even though they had high withdrawal fees - thus indicating the negative rates of return on their informal savings instruments.

Despite an expansion of microfinance agencies targeting women and women’s access to savings, credit remains extremely limited in rural and developing world contexts. This has come about as a result of them not being able to build long lasting linkages to financial institutions that can scale up access to funds and grow independently of non-governmental organizations (Rao,2016). In addition, commercial financial institutions - both public and private - seem to act in ways that further reinforce legal and social biases against women.

Ng'weno et al. (2018:5) assert that

9% gap remains between men's and women's usage of financial services in developing economies. This is because women face financial constraints that prevent them from having access to formal financial services. Paradoxically, even when financially included, women appear to get less benefit than their male counterparts.

The participation of women in financial institutions can increase their ability to use credit and savings vehicles. However, the question of whether they effectively control the allocation and distribution of these funds within the household remains. This is because some studies suggest that group membership of women in microfinance can translate their participation into effective control. According to Rao (2016), when female access to financial assets does not result in increased female ownership of productive assets and increased female streams of income, the gaps between males and females can worsen.

Historically, financial services interventions for small-scale agriculture have tended to focus on loans for working capital to access non-labour inputs (such as seeds, fertilizers and pesticides) with some interventions aimed at longer-term, community-level projects such as irrigation or processing. With overall credit access being low, it's hard to tell whether men and women have different credit needs in agriculture. Furthermore, men are more likely to make decisions about large investments. Thus, it seems likely that men have more demand for larger, longer-term loans for irrigation or mechanization. It is therefore important to note that farming households have a definite demand for working capital loans. However, these working capital loans are mostly met in the informal sector, if at all.

The informal financial sector is an unorganized sector that consists of money lenders, relatives, friends, neighbours, landlords, traders and groups of individuals who operate mainly in the rural setting and who seldom engage in lending money (Gbigbi,2019). These informal financial groups are the major providers of funds for the promotion and development of small-scale farmers in the rural areas. Furthermore, they play a key role in resource mobilization and allocation in developing economies. Gbigbi argues that the major obstacle to effective rural banking relates to the lack of banking facilities.

It is claimed that in most rural areas where banking facilities are deficient, informal credit and savings markets are predominant and that farmers patronize moneylenders for both consumption and investment credit during land preparation and in the planting season. According to Omobitan, Khanal and Honey (2019), when farmers are subjected to all these challenges, it is interesting to analyze the financial choices they make so as to enable them meet their agricultural investments and spending.

Thus, given these circumstances, informal credit sources are unquestionably the most popular source of finance to the rural and urban population because the formal credit sources have scared many food crop farmers due to the encumbrances. The World Bank global finance index report, according to Bizoza (2019:52), shows that

only 22% of women in low-income countries hold bank accounts in rural areas and that commercial banks tend to work only with large farmers who are already well positioned in the value chains. In addition, the World Bank report estimates the gender gap in account ownership to be 9% in developing countries. This implies that women have difficulties in accessing loans or credits as they are not financially resilient, since their level of resilience is dependent on the security of their savings as well as their ability to have loans when needed.

According to Ng'weno et al. (2018), programmes that aim to transform women's productivity in agriculture and micro-enterprise have had limited impact. The reasons for this are complex and not always clear but include the fact that financial services (alone) have little impact on productivity. Women may have less ability to benefit from the additional services (such as training and market access) that make financial services successful. Products are also not adapted to women's small, irregular incomes, close social networks and home responsibilities. Thus, according to them technology offers the opportunity to reach women more cheaply and effectively. Furthermore, it will allow them access to products from the privacy of their mobile phones and provide them with more flexibility around the size and scale of the products.

Inadequate access to productive resources limits women's livelihood options and exacerbates financial strain on women. By improving women's access to productive resources their potential could be unlocked, thereby enhancing their efficiency and productivity. Therefore, the status of women farmers in accessing resources in different regions needs to improve (Sarkar et al.,2018).

Access to affordable financial services, especially credit and insurance, enlarges livelihood opportunities and empowers the poor to take charge of their lives. Such empowerment aids social and political stability. Financial inclusion is considered critical for achieving inclusive growth which itself is required for ensuring overall sustainable growth in a country. Evidence indicates that inclusive financial systems can empower poor households socially through the delivery of banking services at an affordable cost to the vast sections of disadvantaged and low income groups who comprise marginal farmers, landless labourers, lessees, the self-employed, unorganized sector enterprises, urban slum dwellers, migrants, ethnic minorities, socially excluded groups, senior citizens and women (Omojolaibi, Okudo & Shojobi 2019).

In as much as financial management is important for farmers in irrigation, education is key in helping farmers achieve their targets with regards to their return on investment. It therefore becomes important to understand, the impact education and technology has on farmers.

2.0.7 Technology and Education

Women's limited access to agricultural technology is an important factor constraining women's agricultural productivity. Increasing technology adoption among women farmers has emerged as being a key strategy in closing the gendered productivity gap in agriculture and in promoting women's empowerment and advancing their broader welfare outcomes (Lefore et al.,2017a).

According to them by helping poor women farmers use technologies they can produce more, and maximize their returns on limited time, labour, land and capital. Udoh (2016:120) argues that "improved technologies serve no useful purpose except when they are disseminated to farmers and the farmers in turn use them to achieve higher productivity."

A wide range of technologies such as machines and tools, as well as improved plant varieties and animal breeds, fertilizers, pest control measures and innovative management techniques are crucial for maintaining and improving agricultural productivity and reducing drudgery in farming. However, in most cases, new technologies have been introduced taking only men into account. Thus, gender bias and patriarchal attitudes in institutions often reproduce assumptions that men are the only farmers who can cope with new technologies. As a consequence, knowledge, technology and training related to agriculture are generally less available to female farmers (FAO, 2019).

Lefore et al. (2017a:1) assert that “men and women have different preferences and face different types of severities and constraints when it comes to adopting new technologies.” According to them, technology adoption can be understood in three phases: Phase one: Awareness. Phase two: Try-out. Phase three: Continued adoption of Technology (Lefore et al.). Each phase, according to them, presents challenges for women farmers. They note that awareness is limited by women’s access to information and extension services to learn about technology and how to use it. Try-out is limited by access to and control over land, water, labour, inputs and other assets required to make use of technology. In addition, social learning and social capital reduce the perceived risks associated with the adoption and appropriateness of design, including affordability, cultural acceptability and sustainability for women’s specific agricultural tasks and physical requirements.

The last phase (i.e., continued adoption) is threatened by some of the same factors, as well as by the appropriation of the technology by other household members. Thus, many of the constraints that technology seeks to alleviate are the same constraints that hamper adoption in the first place.

According to Lefore et al., (2017a), it was reported that men preferred to irrigate cash crops like tomatoes, while women preferred to irrigate leafy vegetables that could be sold over a longer period of time, and over which they could retain control over income. Furthermore, they noted that women in pump owning households had less of a say over production decisions but used the pump for their own plots. In view of this, they posited that technology adoption should not be viewed as a goal, but rather understanding the differentiated impact technology has within the household and orienting technology promotion activities in order to advance specific development objectives.

Development initiatives encouraging the adoption of technology can improve water productivity and must operate within this complex institutional landscape (Van Rooyen et al. 2017). Agricultural development in sub-Saharan Africa has underestimated the crucial role of this institutional setting, and hence overestimated the value of technological investment. It appears that gaining control over water comes at such a great cost, both financial and institutionally, that many irrigation schemes are often referred to as socio-economic failures. Thus, irrigation systems are complex systems with many actors at various levels, scales and subsystems who interact and share knowledge in a coordinated way to be functional.

Lefore et al. (2017a) assert that women in Ethiopia were less aware of technologies because they were unable to attend informational meetings. In addition, their domestic work prevented their attendance. They also noted that their husbands did not inform them when such meetings were scheduled. It is important that despite the technological advances in irrigation, crop varieties, agroforestry and fertilizers, most technologies do not reach female farmers as they receive no information about them (Sharma & Maheshwari, 2016). Furthermore, most rural farmers are illiterate and poor and do not adopt new technologies because they lack knowledge and cash.

Wheeler et al. (2017:759) present an example in Ghana where it was noted that

water lifting technologies (small motorized pumps) were primarily accessible to better off farmers, and that the main constraint on wider adoption was supply chains, the lack of access to financing, high operating costs, high price risks and a lack of institutional support.

Sharma and Maheshwari (2016) argued that when training opportunities for rural agricultural producers arise, they mostly go to men who already have some formal education. It is therefore important that we expand and enhance the production of agriculture to principal workers (that is women). This is because some women opt out of training programmes because of cultural, religious or family pressures.

The low levels of education that female farmers attained are a cause for great concern (Hart and Aliber,2015). Education is crucial to enable end users adopt and make optimal use of new technologies. They asserted that education levels of farmers will need to be boosted, especially as farmers engage in more sophisticated input and output markets. Sulaiman (2018) argued that education is considered one of the ways in which women can be empowered. He noted that non-formal education is likely to be more available to poor illiterate women in remote farming communities. The adoption of formal means of education is key to strengthening women farmers' knowledge, skills and attitudes to help them cope with their many multifaceted tasks.

Sulaiman (2018:39) posits that

farming skills and related technology remain a man's domain, and that recent analysis of curricula and materials reveals that despite visible guidelines and directions, the status-quo reigns supreme, even though women's participation and contribution in farming and income generation play a significant role for their family's survival.

Namonje-Kapembwa and Chapoto (2016:2) assert that,

if men and women face the same constraints but their rate of adoption of new technologies is different, then it will be imperative to design technologies that best fit the needs of each group. On the other hand, if the difference in the rate of adoption is because men and women face different constraints, then it will be important to address this unequal access. These complementary inputs will thus promote broad based agricultural growth among all small-scale farmers.

Kirui (2019:4) asserts "the importance of education and literacy in enabling farmer's access to information and knowledge regarding production technologies and market opportunities as it allows them to make better decisions." He claims that studies have shown that farmers with just a few years of basic schooling were more likely to adopt and correctly apply agricultural innovations.

Applying basic schooling with regards to technology adoption allows for a better understanding of how gender impacts small-scale technology adoption in households. The distribution of rights to technology shapes whether technology adoption is sustained or not as the anticipated distribution is likely to influence men and women's interest in trying out the new technology.

2.0.8 Politics and Agriculture

According to Mills (2018), Africa's agricultural potential has been squandered as many African states possess agricultural land in abundance. Yet 35 out of 48 sub-Saharan African economies were net food importers by the end of the 2000s. Africa's share of world agricultural exports has halved since the 1970s to under four percent. Furthermore, agriculture was only responsible for one-fifth of the continent's economic output in the 2000s.

Two-thirds of Africans, the majority of whom are women live in rural areas and are dependent on farming for their survival. In addition, according to Mills (2018), it does not take much to work out why productivity is low in the agricultural sector. He views this sector as having been ruined by taxation that is meant to fuel Africa's planned industrialization drive. He asserts that African leaders' bad economic choices contributed to Africa's dismal economic performance.

Africa's Agriculture Status Report 2018 (AGRA,2018:35) investigates "why political will to support agricultural transformation is sub-Saharan Africa has remained limited despite democratization." The Report asserts that the credibility challenge is a problem given that voters have limited possibilities in assessing the performance of politicians. Therefore, they often opt for a candidate from the same ethnic group (a strategy known as 'identity-based voting') or they rely on intermediaries such as local patrons or chiefs.

Poulton and Chinsinga (2018) assert that the political elite in Africa use local party leaders in rural settings to cultivate a culture of loyalty. This strategy of loyalty enhances their control on political agendas since their constituents are not educated. Thus, the absence of political will by leaders hinders the growth of the agricultural sector and only favours the agendas of the politicians leaving farmers fighting for the few resources that may come their way. According to the AGRA report of (2018) investment in small-scale agriculture can only come about when there is political will.

Few African economies have yet established internationally competitive manufacturing industries. Thus, primary sectors such as minerals and agriculture remain the dominant sources of foreign exchange, supplemented by aid revenues and sometimes tourism (Poulton and Chinsinga,2018). “To achieve a successful agricultural transformation, it is not only essential to develop sufficient political will to address the market failures and the governance challenges outlines, but it is also important to sustain political will over time” (AGRA,2018:25). Lack of sustained political will may be the reason why past successes in African agriculture, such as hybrid maize revolution, or the ‘the cassava transformation’ in Western and Southern Africa were often not maintained over time (AGRA).

In many of the African countries in the 1950s and 1960s after independence, the development of agriculture was not considered a priority and was not regarded as an important contributor to economic growth and therefore not pursued (Umbadda & Elgizouli,2018). Instead, development thinking at that time was centred on state-led industrialization and the belief that development and economic growth can be achieved by transforming agrarian-dominated societies into modern industrial countries. Achieving economic growth was considered the main priority rather than alleviating poverty through developing the agricultural sector. It was thought that creating jobs and supporting economic growth would create a trickle-down effect and thus tackle problems of poverty, as well as improving access to health and education. In the 1970s interest in agricultural development increased and focused on tackling rural poverty by improving small-scale agriculture, in particular, community development (Umbadda & Elgizouli). Yet, most integrated rural development projects were hindered by stringent macro-economic policies and were not sustainable, because they did not include programmes or plans to finance social and agricultural services after donor aid was phased out. Thus, while many donors invested large amounts of money into pilot projects to ensure their success, these became too expensive to be replicated or to be maintained on a national or regional level.

Masaki (2018) argues that if anything, there is some evidence that foreign aid deteriorates governance, including bureaucratic quality, the rule of law and state institutions. He claims that international aid assistance can prop up leaders (be they democratic or authoritarian), by providing them with additional sources of finance to distribute patronage, buy political support and consolidate their power.

Hickey et al. (2018) argued that the quality of democracy in contemporary Africa remains very uneven. That political playing fields are used as vehicles for patronage politics rather than for programmatic reform. Hickey et al. posits that many political leaders have no clear ideologies and use their positions in politics to advance their own individual agendas. This is the reason why political survival strategies employ domestic political elites so as to build political allegiance and win electoral support.

Poulton and Chinsinga (2018) argued that most coalitions favour particular policies that promote their own agricultural policies. They give the example of the electoral defeat of President Moi, in Kenya, where a succession of ministers of agriculture all came from the same Kalenjin tribe as Moi (in fact, five, who held the post from 2003 to 2017). They link this to the priority that Kalenjin maize farmers in the Rift Valley have attached to defending their rent streams which Moi had instituted for them, via maize procurement prices and access to subsidized fertilizers. These were administered through the National Cereals and Produce Board (NCPB) head who reported to the Minister of Agriculture. In high-level political bargaining, therefore, the Kalenjin leaders insisted that one of their own should oversee agriculture, even though three of the five were ousted due to corruption scandals and other shortcomings in performance. Their voice was powerful because the Kalenjin is one of the largest ethnic groups in the country, produce most of the marketed maize (the staple food) and demonstrated their willingness to fight when their interests were threatened. Tribal politics, to date, remains a key factor with regards to who controls the agricultural ministry in Kenya.

In Kenya, according to Masaki (2018) the Kalenjin under Daniel arap Moi (1978-2002) and the Kikuyu under Mwai Kibaki (2002-2007) received disproportionate amounts of public funds, including development assistance from foreign donors. Thus political and ethnic dynamics fed into the calculus of the Kenyan government's decisions about the allocation of development projects. Furthermore, in the agricultural sector in Kenya, the government strategically allocated aid finance to its core supporters, especially those who shared the same ethnicity as their presidents. Similarly, fewer projects were allocated to districts where ethnic groups who oppose the ruling party. To understand how political will and efforts can have an impact on a country, we have the example of India.

The Alliance for a Green Revolution in Africa report (2018:37) asserts that the Minister of Agriculture played a key role in implementing policies that made the Green Revolution possible. This is why vision and leadership play an important role in creating political will for agricultural transformation. According to Poulton and Kanyinga, (2014), it is important that governments have strong support from the opposition so as to move their agendas forward and ensure successful implementation of reforms within the agricultural sector.

One set of strategies that can be used to strengthen the political will needed to promote agricultural transformation and that can address the associated governance challenges, according to AGRA (2018), involves targeting government institutions engaged in agricultural policy making and implementation. According to AGRA, this strategy may be labelled 'top-down' or 'supply-side' strategy. This is because it targets the political and administrative institutions that are responsible for the formulation and implementation of agricultural policies and programmes. Furthermore, these institutions include parliamentary committees in charge of agriculture, agricultural ministries and their departments as well as agencies and organizations in charge of agricultural research and extension, regulation and agricultural infrastructure provision. However, Tunde, Oluwole and Akinbamijo (2018) argue that top-down approaches are typically research-led and often start with the formulation of visions of future production systems. Furthermore, universities and research institutes are still stuck in what they call 'mode one science', in which they conduct research and the findings passed on to extension agents for onward transmission to farmers for adoption.

According to Tunde, Oluwole and Akinbami (2018) the definition of a bottom-up approach is identified as those interventions that originate from users and citizens who take possession (sometimes independently) and modify spaces giving them new quality functions that are agricultural or social and enhance participation and social inclusion. This is because farmers are active and understand the impact of their own practices, and are both sources and users of knowledge and information in agriculture. These strategies, as argued by AGRA, (2018) can then be labelled ‘bottom-up’ or ‘demand side’ strategies as can be seen in Figure 1 below.

This is because different actors can be involved in applying these strategies, at the national, farmers’ organizations and the non-governmental organizations scales.

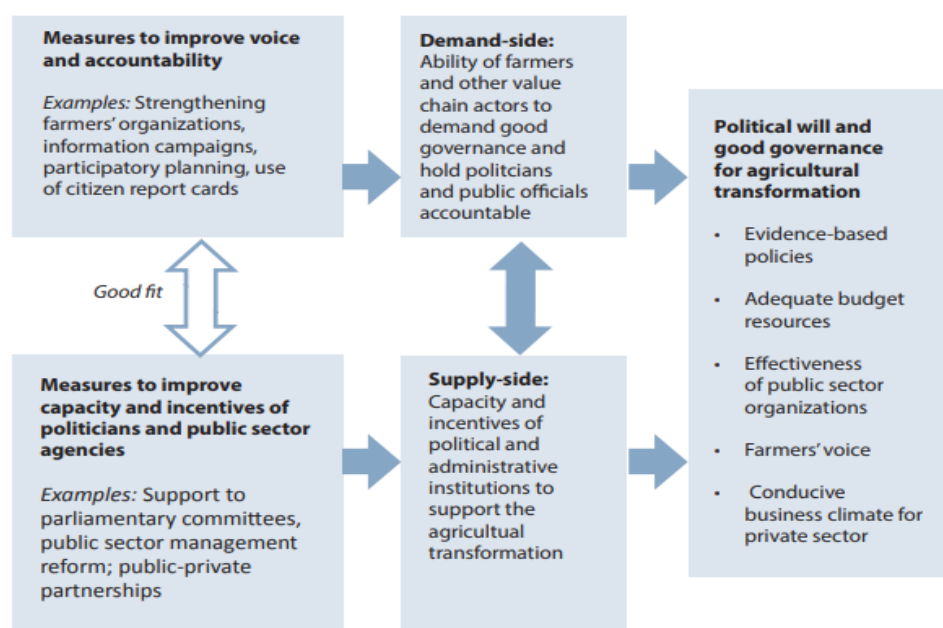


Figure 1: Supply and demand side strategies to strengthen political will and improve governance in agriculture

Source: Adapted from AGRA (2018:39)

Agriculture can play a central role in addressing the issue of poverty and food security. It is therefore necessary for government leaders, policymakers and development practitioners to support and make the improvement of agricultural productivity a priority in their agendas because it is paramount to achieving the desired food and nutrition security targets.

In most developing countries, agriculture is one of the major pillars of the economy. Encouraging agriculturally based innovative ventures will help the advancement of women in rural areas. It is therefore necessary to empower rural women through agricultural policies that assist them take care of their needs and alleviate poverty (Fabiya and Akande, 2015).

2.1. Summary

This chapter discussed agriculture and its impact on the sub-Saharan economy. It narrated how agriculture is one of the major forms of economic activity that can address and reduce poverty in Africa, especially amongst women. Irrigated agriculture is also a form of agriculture that many viewed as a substitute for rain fed agriculture; it can help increase food production and help many in sub-Saharan Africa become food secure.

The chapter highlights some of the key factors that curtail the participation of women in irrigated agriculture. It discusses land as a valuable resource that is needed for farming and its impact on women as an asset as well as the socio-cultural factors and constraints that come with accessing it, using it, farming on it and owning it. It is an asset that is predominantly viewed as owned and managed by men. Hence, women's relationship to land is based on their relationship to their communities or to the men in their lives.

Water is a key resource which is important to every farmer. In addition, the chapter highlights how different access rights can be placed on women, depending on their accessibility to land. This is because water access is heavily entwined with land ownership. In addition, the chapter discusses the links with culture and household dynamics, with regard to accessibility, transportation, sanitation and storage; and the impact on communities and the position of women within society with regard to accessing it.

Women's access to credit and other financial inputs is key in helping them manage their farms. The importance of financial resources to farmers, not just women is key in irrigated agriculture. The chapter states that women spend a good amount of what they earn on food, family and ensuring that their farms are in good order in order to sustain their families.

It highlights that the recognition of women as good financiers is not visible within the gender dynamics as many of the financial institutions require security in the form of title deeds or food harvest, which many have no control of, or access to. Furthermore, the development of kit funds for women only is not viewed as a solution to women's access to finance. Rather the development of financial packages that are gender sensitive and can be used by both men and women in increasing their financial strength is preferred.

The adoption of new irrigation technologies on the part of women in irrigated agriculture is highly welcomed amongst women farmers given that this provides an opportunity to increase their crop output and manage their time well. However, not all women in irrigated agriculture have access to new technologies. They are barred by their husbands from using these technologies, and they may not be literate to be taught new and efficient modern methods of farming. To compound matters further, there is a lack of gender sensitive technologies for women. This therefore informs the need to educate women on the use of these technologies so as to assist them increase their crop output.

Lastly, the chapter discusses the impact of politics with reference to political leaders and agricultural policies. It cited the AGRA 2018 report that informed the need for leaders within Africa to increase their willpower in supporting farmers. In addition, this chapter focused on the impact agricultural policies can have on helping farmers improve their outputs, and the impact of agriculture on a country's economy. It illustrated Kenyan examples and the impact various political leaders have had on the agricultural sector, and the impact of these policies on farmers. The chapter concludes by stressing the need to understand why Kenyan political leaders failed to focus on improving the welfare of its farmers, especially women farmers, in terms of the country's agricultural policies.

CHAPTER III

THEORETICAL FRAMEWORK

3.0 Introduction

According to Amusan and Olutola (2017) women, including young girls, constitute one of the most vulnerable groups in Africa. In addition, as in the rest of the world they play crucial roles as domestic workers. Furthermore, they assert that women are depicted as being ‘saddled’ with home and domestic chores, while men are viewed as enjoying the exhilaration of life in the ‘outside’ world. For the most part, they view societal roles of men and women as being different. As mothers, wives and housemaids, women perform vital roles such as child bearing/nurturing, home making and other domestic services which are crucial to the well-being of the family as a social unit.

Amusan and Olutola (2017) argue that women work very long hours in agriculture and that their role in agriculture is primarily subsistence and is a means to ensure household survival, supplementary to whatever support they receive from the dominant male head of the family. ‘Patriarchy,’ according to them, is the prime obstacle to women’s advancement and development. It creates obstacles for women to go forward in society and consolidates gender subordination in the context of men women relations. The growing challenge to patriarchy, according to Menon (2018), is attributed to the work of feminist scholars and economists.

Feminism, according to Gaebel (2018), is a philosophy intended to work for the liberation of all women. Gaebel posits that Western nations that claim to be committed to resolving the various forms of discrimination against women on a global scale are often more problematic than helpful. This is because they engage in the practices of cultural imperialism (that is, the imposition of western standards onto women in developing countries) and ethnocentrism, often on feminist issues in developing countries. To effectively work towards improving the situation of women in developing countries, western feminists need to inform themselves about global feminist issues within the context of the latter’s respective cultures.

Capitalism and neo-liberal globalization are seen to largely flourish off the exploitation of poor women in developing countries. Thus, according to Gaebel (2018), to be truly committed to the liberation of all women, western feminists must be committed to a version of feminism, like socialist feminism, that seeks to dismantle global capitalism. Furthermore, western feminists must support and trust the insight and power of the women who are being affected. Some women in developing countries - particularly poor women - are already challenging capitalism through feminist movements based on their own work within their respective cultures, specifically through eco-feminism.

“Eco-feminism is a neologism that was coined by a French feminist, Françoise d'Eaubonne, in her path breaking book, *‘Le Féminisme ou la Mort’*” (Sharnappa, 2018:3). According to Sharnappa, the fundamental intention of the book was to call upon women to save the planet. Later, the concept of eco-feminism evolved into a theory with contributions from various academic endeavours and activist movements against the destruction of the environment at the global scale, and with a focus on women and nature.

Tan (2017) asserts that Eaubonne’s book argued that the liberation of nature could not be divorced from the struggle for women’s liberation. Ecofeminism’s main concern, as a sub-branch of feminism, is the struggle for the liberation of women, and against the patriarchal world order. Ecofeminism connects women and nature, and asserts that patriarchy has oppressed both. Hence, ecofeminism successfully combines the philosophies of feminism, and environmentalism. Ecofeminists have several arguments that advocate for the connections between feminist thought and ecological concerns.

There has been a general notion for some time that concepts related to women, nature and animals were regarded as inferior. On the other hand, aspects related to men, masculinity, reason, mind and intellect were regarded as useful and worthy. Tan (2017) views ecofeminism as a challenge to these false premises. Tan also contends that ecofeminism connects feminism, animals and the environment, and is based on the contention that women and animals have become the primary victims of environmental pollution.

According to Tan (2017:34)

there is a significant link between nature and gender, most importantly the link between women and nature. This is because those who make critical decisions with regards to nature are men, and those who are affected by these decisions are women.

Thus, Tan defines four basic principles of ecofeminism: 1. Showcasing the connection between the oppression of women and the oppression of nature. 2. The importance of understanding the nature of these connections. 3. That feminist theory and practice must include ecological perspectives, and 4. Solutions to ecological problems must include feminist perspectives.

Sharnappa (2018: 3) has argued that “ecofeminism has been gradually evolving as a praxis-oriented theory which emphasizes the oppression of women and exploitation of nature by exploring the subtle connections that are based on empirical, conceptual and epistemological concepts.”

According to Tan (2017:37), despite

the fact ecofeminists differ in approach and perspective, they all agree and share the common opinion that gender and the environment are interconnected, and in order to make analysis of the two to be well understood, they have to be studied simultaneously.

It is therefore prudent to use ‘*ecofeminism*’ in understanding the role of women in irrigated agriculture. It is also important to note that much of the literature that follows will focus on the environment, and in the context of agriculture, with agriculture viewed as nature (or the environment). We begin by examining ecofeminism in the context of land rights, water and other natural resources in the environment.

3.1. Women and Land Rights

Land and other natural resources are gendered. In many rural communities, household livelihoods depend wholly or partly on agriculture and the direct use of natural resources for family use and/or for sale. Families depend on the cultivation or gathering of foods and other valuable commodities from the natural environment, including the fields, forests, lakes, and rivers. Natural resources provide heat, food and water for drinking and washing. These resources, according to Sweetman and Ezpeleta (2017), are central to spiritual life and culture.

Sweetman and Ezpeleta assert that women typically lack real power to influence decision making about how natural resources are used today, and how they will be used into the future. They note that in patrilineal and patrilocal societies, women marry into a family and move to live on the husband's land. Women do not own or control land and other resources but can access them vis-a-vis their marital rights. Natural resources may be communally held and allocated to families that men headed, or formally 'owned' by means of a land title that, a male head of household often held.

Cultural norms underpin rural women's insecurity of land tenure which determine women's access to land be mediated by their relationship to men. While such arrangements may have been acceptable in past societies, in the 21st Century women must not be left behind in acquiring property rights to land and to its produce (Samandari:2017).

Sene (2018:52) posits that

land is viewed as a woman who is welcoming a man in the act of procreation. In this analogy men own land, and therefore women cannot own the land as they are owned by men. Therefore, land is used as an aptitude to affirm men's domination over women. Furthermore, it casts women aside and waves them from any possibility of being landowners.

Samandari (2017) asserts that when women are denied equal property rights they experience reduced social, economic and often political status. This is because women acquire property rights through a male counterpart, a husband, father or brother. This association therefore makes women vulnerable to losing land if they are widowed, divorced or deserted. It is important to understand that within the African setting an individual's affiliation to land is determined by his or her locus within certain sets of cultural parameters that structure the society.

Jacob (2017:76) posits that

land is a strategic factor that confers identity. Furthermore, it is important that one understands that land is more than a material source. This is because it becomes a metaphor for one's culture, language, community and social norms. Hence, it is viewed as being an identity.

Lv and Wang (2018:1660) contend that "the patriarchal world outlook results in men's governance over both women and nature. They assert that it is only by uniting the two together can they jointly break loose the shackles of the patriarchal world." Thus, from an ecofeminist perspective, as Samandari (2017:5) posited,

many societies have historically approached physical vulnerability by placing unequal burdens on women and men, leading to the domination and privileging of men over both women and the environment, for example, by traditionally granting men and not women ownership rights to land.

Where land titles exist, according to Shepherd (2014) the omission of names of female members of rural farming households from these documents often remains a serious problem. This is because it undermines the ability of female agriculture producers to access credit facilities and to take out loans, but it also jeopardizes their ability to protect their interests in the face of forced or unfair land acquisitions. Shepherd notes that in countries such as the Philippines, India and China, for example, land documentation generally remains incomplete and in many areas the names of women also continue to be largely excluded from land use certificates, despite them having the same land rights as that of men.

Jacobs (2014:185) claims that

in sub-Saharan Africa, women have had more access to land than anywhere else. He argues that women's lack of control reinforces their subordinate status and poverty and that the reason behind men (husbands and fathers) doing this, is because they make key decisions within patrilineal systems. In addition, land is viewed as a man's property and his wife 'the first maid'.

Jacobs (2014) attributes this line of thought as coming from capitalistic colonialism which has undermined women's position in many traditional societies and reduced their autonomy.

According to (Samandari, 2017:5),

one example of the domination of men over women is the heavy workload that rural women and girls bear in running their households. Women engage in a mirage of activities such as fetching water, cooking, cleaning, animal husbandry, among others, that sees them ensuring efficient household management.

Samaduri argues that the imbalance of gender roles comes as a result of men holding and making all decisions that affect the family. Therefore, making land tenure a key element in the struggle for rural gender equality is important. Gender equality does not mean the domination of men over women. It means all primary assets (e.g., land) of the family are equitably shared regardless of gender and all members benefit. It is therefore important that land policies be gender responsive and aim to ensure that ownership rights of land are not in favour of one gender, and is gender sensitive so as to ensure societies, whether rural or urban, have equally balanced land rights (Samaduri, 2017). In the next section we explore how water as a natural resource is affected by patriarchal systems.

3.2. Women and Water

“Land, water and women are three interrelated concerns of development,” (Jacob,2017:76). Jacob posits that water and women are allied terms that mark the status of any society's dynamics. Jacob's indicate the productive, reproductive, symbolic and synergetic values of human existence. Thus, the link between the degradation of land and that of women cannot be easily ignored. Furthermore, according to Srivastava (2017) water is the most significant form of nutriment in life.

According to Magill and Benedict (2019), ecofeminists have shifted the value of water as a resource to that which must be protected for all species, and safeguarded for the eco-systems which support life on earth. In addition, any structure that values water merely as a commodity has failed to appreciate water in its greatest context. The scarcity of water is at the heart of the water crisis, and is connected to power, poverty and equality and not just the physical availability of water. The issue here is one of governance which ultimately should create equitable sharing for people and ecosystems.

The value system for water, according to Magill and Benedict (2019), has become the key issue with regards to who has access to water, and at what cost. This is because once it is commodified and priced according to the market, water becomes one of the many ‘things’ a consumer can buy. The natural world cannot ‘buy’ water, yet the need for water in nature is quite compelling for human beings. This is because marginalized communities cannot afford to pay the market price for water when it is privatized. Thus, ‘power, poverty, and equality’ factors can be seen in the commodification of water.

Feminist environmentalists on the other hand, argue, that ecofeminism ignores the social construction of gender and nature. However, women do not have an exclusive relationship with nature, while in Africa women and men perform different duties and activities which result in these activities being combined and valued as contributions to the well-being of the household (Nkonya, 2008). Sachs (2013), on the other hand, asserts that ecofeminists fail to account for differences among women, by class, race, ethnicity and national identity. Men and women’s relationship with the environment must be understood in connection with their material reality of the division of labour, property and power.

Women’s participation in irrigation varies widely from one area to another. In addition, the allocation of labour to irrigation varies with the nature of the physical landscape, the centrality of irrigated agriculture to income generation in the local economy and the local cultural norms with regards to women’s visibility and participation (Sachs, 2013). Thus, women’s roles vis-a-vis water are closely tied to the agricultural calendar. Sachs asserts that women are structurally subordinated to men by patriarchal mechanisms that link access to key institutions via sex role stereotyping and the sexual division of labour.

Irrigation is therefore one of a set of key tasks that is assigned to men, and these tasks serve as gateways to critical resources including land, water and cash. In view of this, women are thus prevented from performing key tasks so that they are dependent on men for resource allocation and have their power limited.

The dominance of masculinity in irrigation management is so strongly normalized that it is not necessary to mention 'men' alongside irrigators as everybody 'knows' that agricultural water management is men's work (Lebel, 2019). Lebel argues that even though women also use water for agricultural purposes, water is still a resource under men's control. In addition, most water professionals and decision makers in water management and hydropower bureaucracies are men. This implies that men have complete control over water as a resource. Thus, irrigation illustrates a process of normalization in which ideas and actions are made to appear 'normal' and devoid of power relations.

According to Sweetman and Ezpeleta (2017:360), at “community levels, women are natural resource defenders and are seen as linking their feminist struggles towards social justice and environmental struggles so as to have sustainable development.” According to Perkins (2017: 3) “the face of climate change, is moving and changing in the Global South and North.” She asserts that women who are largely leading this change are resisting the ongoing industrial depletion of natural resources and are working hard to reclaim the commons. This action, according to Perkins, has led the capitalist energy system to being seized and redirected towards common actors. This ‘actually existing’ movement of commoners is the result of the exploited taking over some of the organizations of capital and using them to undermine profit, and negotiate and construct the means for satisfying universal needs.

The ecofeminist theory has drawn attention to the links between development and gender by highlighting the fact that violence against women and nature are both built into the process of development (Khanduja, 2017). Khanduja (2017) asserts that the understanding of ecofeminism resonates especially well in the works of Shiva and Mies (2014) who have sought to highlight the relevance of an alternative to capitalist patriarchy given that it has worsened the conditions for women as well as nature in the wake of globalization.

In another example, Das (2016:53) cites “the example of desertification in Kenya, which was caused by random deforestation, and is currently being reversed by the Green Belt Movement, which was led by the late Professor Wangari Maathai.” Das posits that the movement focused on planting trees, environmental conservation and women’s rights. The late Nobel Laurette suggested to rural women that they should plant trees for firewood to stop soil erosion. This action was a response to her call which has since grown into a nationwide movement that seeks to safeguard the environment, defend human rights and fight government injustice.

The Green Belt Movement (GBM) of Kenya, according to Samandari (2017:10), “showcases women’s successful efforts to build resilience in the face of environmental degradation.” It is for this reason that the work that the late Nobel Laureate started , under the auspices of the National Council of Women of Kenya (NCWK) has grown to showcase the needs of rural women and the impact of land and forest degradation on the environment. Furthermore, it is through this channel that women have become increasingly mobilized and now grow seedlings and plant trees to prevent soil erosion.

Tan’s (2017:44) line of argument is that “men destroy what women build up and men cause death where women give life.” This shows the ultimate connection between “mother nature” and women. The reasoning here is that women give birth, just like nature, and thus in order to restore nature to her unspoiled condition, it is mandatory to overthrow the patriarchal mentality which contributes to destruction and catastrophe. Despite all these efforts, women continue to be affected disproportionately in accessing agricultural resources. It is for this reason, as Shepherd (2014) asserted, that the ‘gender gap’ in agriculture continues to widen. It is therefore important that this gap be significantly reduced so as to boost the incomes of female agricultural producers and create better food security, and reduce the socio-economic fallout that arises from these gaps.

In every civilization, women are the worst affected due to ecological devastation, especially in the Third World countries as their lives are unpleasantly aggravated by the forces of corporate globalization and colonialism (Mohapatra,2019). It is therefore important that we understand that women play vital roles in the process of food security and the management of ecosystems. Mohapatra argues that it is only women who can play a dynamic role in creating and implementing a consciousness in saving the earth.

It is important that women be depicted as users and managers of natural resources as it may help them secure access to resources and receive compensation when the natural resources are lost because of development projects or natural disasters (Lebel, 2019). It is in this regard that we explore the role of capitalism and its impact on women and the environment.

3.3 Capitalist Patriarchy, Women and the Environment

Gordon, (2016:52) posits that

Economic globalization perpetrates the world view of capitalist patriarchy, which has systematically devalued both women and nature. In a world ruled by capitalist patriarchy, consumption conquers needs, the market dominates the household, and the global intrudes on the local, which all inevitably deny women's and nature's productivity

Gaebl (2018:4) asserts that “women in developing countries do have a vital role to play in the dismantling of capitalism, by virtue of their different relationships.”Furthermore, women in developing countries, in general, have different relationships to capitalism in comparison to women in developed countries. Their resistance is different as it caters to their situations and their immediate needs and resources, in addition to contributing to the overall anti-capitalist projects. Thus, women in the developing world must empower themselves and challenge their subordination through their own choices and actions (Jones,2017).

“The relationship between women and economics has for a long time been a mutual refusal relationship, at least within theoretical frameworks” (De Luca,2018:36). For example, some fields of power have economic thinking that men have tailored, and are men exclusive. Furthermore, women seem to have had no choice in their economic roles. Furthermore, women have been largely absent from the economic paradigms that have shaped resource utilization.

De Luca asserts that this is clearly demonstrated in expressions like “the feminisation of poverty” that refers to the worsening of women’s economic conditions since the Eighties. In addition, the emergence of the women in development discourse was not automatic, but rather a process that changes in societies and especially in the social construction of gender and its perception provoked and influenced.

Shiva (2014:98) asserts that

one should not associate subsistence living as poverty. This is because culturally perceived poverty is not necessarily real material poverty. This is because subsistence economies satisfy basic needs through self-provisioning. That is, they neither participate overwhelmingly in the market economy nor consume commodities produced for and distributed through the market.

For example, a farmer may plant maize in his or her small garden to meet the needs of his family. He or she, at the same time, can sell the excess of this crop in the market and earn extra income. The farmer is therefore meeting the needs of his family but is not necessarily engaging in planting crops for profit making. In short, the farmer uses the funds received from selling the excess crop to meet his or her family’s needs. Shiva’s (2014:76) argument is that “nature and human needs are managed through market mechanisms that seek to ensure the maximization of profits and capital accumulation.” Millet is nutritionally superior to processed foods; and houses built with local materials rather than concrete are better adapted to the local climate and ecology. Also, natural fibres are generally preferable to synthetic ones and are often more affordable. The cultural perception of prudent subsistence living as poverty has provided legitimization for the development process as a ‘poverty removal’ project.

In this scenario, ‘development’ is regarded as a culturally biased process which destroys wholesome and sustainable lifestyles and creates real material poverty, or misery, by denying the means of survival through the diversion of resources to resource-intensive commodity production. Cash crop production and food processing, by diverting land and water resources away from sustenance needs, deprive increasingly large numbers of people from the means of satisfying their entitlements to food.

According to Shiva (2014:101),

the addition of more commodities and more cash means less life with regards to nature through the denial of basic needs. She asserts that this brings about the devaluation of women because their work co-operates with nature's processes, and second, because their work satisfies needs and ensures sustenance in general.

It is therefore important, according to Gordon (2016), that we understand women's roles as farmers because of their ability to make such large contributions despite their unequal access to land, credit and information. This is because they have remained invisible as farmers despite their contributions. People have failed to see the work that women do in agriculture. Their production consistently goes unrecorded by economists as work or production because it falls outside of the "production boundary". This issue arises not because too few women are working within agriculture but because so many are. As is the case in most patriarchal-capitalist economies, economists have a difficult time defining women's work inside and outside of the home; and in this instance; they fall within both categories. Most importantly, this discrepancy can be attributed to the fact that while women are working to sustain their families and communities, their work is not measured in wages. Furthermore, since development is measured by capital, women's work in agriculture is then rendered as 'non-work' (Gordon, 2016).

Gordon (2016) explains that this invisibility can also be attributed to the view of man as the primary breadwinner. Therefore, with this patriarchal ideology still in view, women's work will continue to be rendered invisible. It is important to understand that women in subsistence farming faced numerous challenges (Amusan & Olutola, 2017). Furthermore, it is these women who are put out of work when land is converted to industrial agriculture and other activities of neo-liberal globalization. It is therefore important, as Gaebel (2018:5) argued, that "land be protected from the exploitation of globalization and that women's work be recognized as legitimate so as to encourage the involvement of more women in subsistence farming and guarantee food production and consumption for domestic purposes.

Legitimizing women's work in agriculture will serve multipurpose objectives according to Gordon (2016) and will encourage organic food production and put less pressure on foreign exchange in terms of food importation. As asserted by Gordon importation of food and goods is financially draining and has reduced the African continent to be a producer of industrial inputs. Women are consistently challenging the patriarchal paradigm and are leading the movement in the hope of ensuring that food is produced sustainably, in ecologically and socially sound ways. This is because women wish to advance an inclusive paradigm where the interests of others (humans and all species) is accepted (Gordon, 2016). In the next section we explore the impact of natural resources on capitalism and its impact on food production.

3.3.1 Common Property Resources (CPRs)

According to Narain and Vij (2016: 21),

Common Property Resources (CPRs) is a term that was developed by Nobel Laureate Elinor Ostrom in (2009). It refers to a category of natural resources that are owned, controlled, and managed by a group of people. This can include: community pastures, ponds, forests, wastelands or any form of natural resource endowment in the developing world. In addition, it also refers to pastures, grazing lands, village ponds and traditional water tanks that are governed and managed by communities

Common Property Resources are important because they provide support for livelihoods, especially for small and marginal farmers and landless households who have little by way of alternative means of private land or other productive assets. Ostrom (2015), using tools of economic theory, demonstrated that communities can manage natural resources by crafting their own rules for resource extraction and appropriation. However, while advocating this, a stream of economists and other social scientists have advocated for the privatization or nationalization of natural resources to avert the tragedy of the commons (Narain and Vij, 2016). Ostrom (2015) highlights the possibility of effective self-governance regarding managing natural resources. Thus, the study of CPRs has brought about a paradigmatic shift in the debate on appropriate forms of natural resource governance. Other than the state and market, there is a distinct possibility of effective community-based self-governance.

Holt-Giménez (2017:110) argue

that the commons can supplement food, and other resource needs for small-scale farmers, pastoralists, and fishermen by lowering livelihood costs and allowing them to sell their products cheaply. In addition it will allow them to compete with large-scale capitalized productions. Many of the world's food producers cannot survive without common property because the interplay of different property forms under capitalism is very complex and fluid.

However, Holt-Giménez (2017:117) argues that

the commons is used to produce goods for the market rather than for subsistence it will lower the prices in the market and lead to the overexploitation of the commons. Therefore, under certain conditions the market and the private sector would indirectly benefit from the commons. More importantly, the commons would allow industry to obtain labour and power more cheaply, thus essentially allowing industry to appropriate subsidies to the commons.

Capital may seek to privatize the commons in recessionary or deflationary times, in order to put wealth in land or labour needs, and use the power of the state to enclose the commons and force smallholders to sell their land, and enter the labour market. Thus, according to Holt-Giménez (2017), the commons is a historic refuge for non capitalistic relations in the food system it does not always escape manipulation by capital. For example, opening the North Pole to oil rigs and the buying and selling of carbon credits are examples of this. Capitalists prefer this free-for-all open access in order for them to extract wealth without having to pay for externalities or be subjected to regulation. This is because sometimes capitalists need the resources and regulatory power of the state to facilitate access. The mechanism for deciding what happens to both public property and the commons is the public sphere. Without a market, private property (in the capitalist world) would wither or die. Without the public sphere, both public property and the commons will eventually disappear, hence leaving the future of society to those corporations with the greatest market power.

Giacomini (2018) asserts that ecofeminism is based on an understanding that capitalists exploit women and nature, and that, ecofeminist actions stand against exploitation and affirm the commons. The commons here refer to the new and already existing social relations that defend and build shared control over the means of life, while prioritizing those who are most exploited and undermined by capitalism. Having explored the commons and its impact on natural resources, we seek to gain better insight on the role technology and education play with regards to farming, and its impact on ecofeminism.

3.4 Technology and Education

In sub-Saharan Africa, effective application of agricultural technologies in production has strategic gender implications. This is because men and women often have unequal access to the use of new technologies. Although most of the technologies may be gender neutral, project design and implementation may be biased towards one sex, often toward male farmers, thus hindering women's participation (Muriithi, 2018). New technologies may also reduce the role of women even if they were the main contributors to farm production before the technology shift. Therefore, gender differences cannot be overlooked while developing sustainable agricultural technologies for alleviating poverty and food insecurity in sub-Saharan Africa.

The continuing devaluation and invisibility of women and other marginalized perspectives is readily apparent when considering how new food technologies are developed and regulated (Lee, 2018). This is because men dominate science, technology and business. Despite the importance of food to women's lives, decisions related to agriculture and food often rely on science and scientific data and contain little input from women. Furthermore, with increasing scientificity and commoditization which has been signalled by new food technologies, the values, knowledge and experience of women are persistently sidelined and existing power structures further reinforced.

Many major authors like Doss et al. (2001), have included many reviews on developing countries with regard to gender-related issues in agriculture technology adoptions. These reviews have focused on existing microeconomic studies on gender differences in use, access and adoption of land and non-land agricultural inputs including the use of improved crop varieties, labour, fertilizer, credit and extension services.

According to Muriithi (2018:5), “the way technology is perceived and consequently adopted within different cultures and contexts demonstrates the complexity of gender norms.” This is due to the fact that investments in labour-saving technologies are low in areas where labour is scarce.

Kahan et al., (2018:6) assert that the

low levels have affected productivity and productive capacities, as farmers are unable to cultivate large areas of their land. Furthermore, land tenure laws have encouraged a rapid degree of land fragmentation resulting in small-scale land areas being in more densely populated areas, making the use of mechanised equipment to become difficult.

Kahan et al. (2018) contend that the consequence of low farm mechanisation is due to high labour drudgery, which affects women disproportionately. This is because women comprise, on average, 43 percent of the agricultural labour force in developing countries, with 50 percent in many parts of Africa. Mechanised farming in Africa is highly concentrated in large commercial and government farms which cultivate commercial crops like sugarcane, rice, wheat/barley, tea and maize (Kahan et al., 2018).

(Kahan et al., 2018:10) posit that

Improving women’s productivity through mechanisation can make a substantial contribution to raising the overall agricultural production, as well as reducing drudgery in labour activities. To provide access to mechanisation for these small-scale farmers, focus needs to be placed on promoting the hire service business. This is because the benefits of custom hiring reduce the demands for initial investment, repair and maintenance from farmers. In addition, this service can be lucrative for entrepreneurs who regard custom hire as a full-time business venture.

Saugress (2002) and, Bryant and Pini (2006) argued that patriarchal ideology embraces the view that the aim of using machinery and agricultural technology is to remove women from the agricultural sector. They claimed, for instance, that “a tractor is a symbol of men’s power and a means of dominating women. Environmental education has been identified as an essential component of sustainable conservation worldwide. Environmental education aims to ensure that the world population is not only aware of, and concerned about, the total environment and its associated problems but also has the knowledge and skills to address them. It does this by cultivating attitudes, knowledge, commitment and skills among community members to work individually and collectively towards solving current problems and preventing new ones (Mukoni et al.,2018).

Environmental education initiatives and sustainable development strategies that do not promote the full participation and empowerment of women and girls are bound to fail. Bozchelouie (2018) claims that the reason for this is that agricultural education is strongly patriarchal and rarely leads to improvements in the education of rural women. Mukoni et al. (2018) support this argument and assert that women as a group have continued to be marginalized due to the influence of patriarchal systems which privilege men’s voices over those of women. In consequent, women do not participate fully in environmental education programmes.

Quigley et al. (2017:773) affirm that “women along with other marginalized groups, are disregarded and are simply described as being ‘research subjects’ in homogenous, ungended ways. Furthermore, the tackling of the environment ignores the power relations at play that may arise.” According to Amusan and Olutola (2017:118) “it is important to train and empower women through formal and informal education, in both subsistence farming and commercial agriculture. This strategy assists in achieving national food security, since agriculture is the mainstay of economies in the African continent.”

Amusan and Olutola assert that the training and empowerment of women can be facilitated through women's cooperatives or through State sponsored initiatives which may be in the form of provision of extension services or through formal institutions like the Bank of Agriculture (BoA) and other microfinance banks which offer zero or single digit interest rates. In addition, these institutions can look at providing insurance cover to manage any associated risks with regard to the agricultural roles of women. Also, most women farmers in many African societies can be empowered as they are generally natural caretakers and administrators.

Amusan and Olutola (2017) posit the need for new women friendly technologies that should be made available at little or no cost to women farmers at all levels given that they are a socially vulnerable group. More importantly, it is hoped that the new technologies will enable women farmers to mitigate and adapt effectively to the impacts of climate change and other resource-related ecological challenges. In addition, efforts need to be made in extending adaptation technology to women farmers through the distribution of weather forecasting devices. Moreover, there is the necessity for the allocation of extension agents to assist women farmers in interpreting weather information to enable them to make appropriate decisions concerning farm operations.

In order to aid women farmers' knowledge of appropriate and best practices, agricultural cropping calendars need to be produced in their local dialects and distributed to them freely. In addition, gender mainstreaming in all agricultural activities at all levels should be vigorously pursued. According to Hosseinnézhad (2017), women are the main group of people who can transfer eco-literacy and manage household consumption. Hosseinnézhad argued that Shiva (1989) considered environmental problems and crises in her writings, and concluded that humans have just one way in which they can save the environment and nature. According to Shiva, it is only by retrieving feminine principles and values as well as attaching respect for nature that this change can be accomplished. It is important we understand that achieving these principles can only be done through political systems, hence the need for us to explore how political systems can facilitate this.

3.5 Politics and the Environment

MacGregor (2017:16) asserts that “environment scholars are developing ways in which the relationship between gender inequality and the environmental crisis will change politics, policy and practice in significant ways.” This is because “the management of natural resources requires equal participation in decision making levels in local, national, regional, as well as public institutions like parliament” (Caliyurt, 2016:195). Caliyurt asserts that the number of women who are professional agriculturalists, city planners and oceanographers is still very low, although women are playing significant leadership roles in the development of environmental ethics.

Paleo (2017:27) informs us “that environmental and social conditions require that feminism and environmentalism play a key role in environmental matters. Furthermore, discussions with regards to the environment are now changing and focussing on climate change and its impact on women.” On the other hand, Wilson (2017) views this discussion as regarding women as vulnerable to the effects of climate change, in need of pity, and masculine protection.

The WoMin Collective (2017: 429) argue that “women are not viewed as being landowners by companies. This is because when it comes to negotiating land sales they are rarely consulted or compensated. Furthermore, community conversations engage men more than women. This raises the question of why African governments operating under capitalist logics fail to empower women and their wider communities?”

It is argued that capitalism has an opportunistic relation with public goods. Also, for one to access, appropriate or steal resources, the private sector needs the economic and coercive power of the state. This is because in times of capitalist crisis and the lack of profitable investment opportunities, for example, the private sector will call upon the state to eliminate regulations in order to provide capital with more flexibility and opportunities to profit. Also, when the private sector crashes, the state is called upon to bail out capital. Agriculture is an important economic activity in Africa. How then can we close this gender gap and why is it important that we do so?

3.6 Closing the Gender Gap in Agriculture: Why it is important?

According to Ghosh and Ramanayake (2018), gender inequality arises due to gaps in opportunities captured by unequal access to education, the legal system, finances or outcomes such as low female participation in employment, low wages and reduced political power. Gowda (2018:128) claims that “in most societies men’s roles in agricultural activities are understood to be direct and clear. However, women’s roles in agriculture are not clearly recognized. Hence, the need to have a clear picture of women’s participation in agriculture.”

Gordon (2016:58) posits “that women are leading the movement (impacts of globalization on the food system) in the hope of ensuring that food is produced sustainably, in both ecologically and socially sound ways. This is because they are constantly challenging the patriarchal paradigm, which is based on exclusion.” Gowda (2018) asserts that “although this is increasing it has been difficult to gain a clear picture of where and under what circumstances women particularly work on the farm. Women play important roles in helping their families in securing their food demand in the world.”

According to Bozchelouie (2018), agricultural history is perceived as a masculine and patriarchal process with no place for women. Furthermore, the accepted gender pattern is a patrilineal one in which a son has the right to substitute the father and continue his agricultural occupation. Bozchelouie asserts that this is one of the processes that contributes to social inequity and makes the role of women in the agricultural sector invisible. However, he asserts that women should learn to consider themselves as auxiliary workers, not farmers. In reality, according to Bozchelouie, women are “only farmer’s wives” and are only considered to be assistants. This is because the main management roles of the farm are in the hands of men. These kinds of stereotypes have thus emerged from the social conformity of rural women and their marginal roles as wives and housewives. He further argues that the marginal role of women in the agricultural sector is biological, as their bodies are viewed as being of a lesser physical strength. This therefore fuels an agricultural related discourse which incorporates patriarchal perspectives about women’s bodies.

“Gender refers to relations between men and women and does not exclusively focus on women. In addition, the word ‘gender’ and ‘women’ is often used interchangeably,” according to Meinzen-Dick et al. (2014: 6). This is because gender roles are socially, rather than biologically determined, and as such are fluid and subject to change based on changing norms, resources, policies and contexts. Furthermore, gender roles are shaped by ideological, religious, ethnic, economic and cultural factors and are a key determinant of the distribution of responsibilities and resources between men and women (Meinzen-Dick et al.,2014).

A problem that communities face is the lack of a common understanding as to how female farmers are perceived in society. This is because observations indicate that a female farmer is commonly perceived as a co-farmer, a marginal player in agricultural development particularly by those individuals with significant influence in research, extension and development positions. Women are often farming without improved inputs and services which are required for productive and remunerative agriculture. Although the micro-studies documenting the importance of women’s roles have risen steadily, national statistics have undercounted women’s agricultural labour(Gowda,2018).

Shephard (2014) claims that examining gender as a variable that focuses on different experiences of women and men is a good way to study resource politics. Meinzen-Dick et al. (2014: 56) argue that “explicitly incorporating gender analysis into discussions of agricultural productivity will expand the definitions of agricultural production. Furthermore, it will provide better insights into some of the constraints facing both male and female farmers.”

According to the Stockholm Environment Institute (2018), when women are economically and socially empowered they become a potent force for change. In rural areas of the developing world, women play a key role in running households and make major contributions to agricultural production. But the inequalities that exist between women and men make it difficult for women to fulfill their potential.

Women rarely have access to the resources that would make their work more productive and ease their heavy workload. Ultimately, it is not just women who are held back, but also their families, their communities and local economies. Rural women have many roles, and they have responsibilities and knowledge that differ from those of men. As farmers, they plant, weed and harvest food crops and tend livestock. As caretakers, they look after their children and relatives, prepare meals and manage the home.

Gowda (2018:130) claims that

the gender gap remains high, particularly in developing countries, despite efforts being exerted by governments and various international organizations. In developing countries in Africa, Asia and the Pacific, women typically work 12 or more hours per week than men. Similarly, Gowda asserts that efforts to make agricultural enterprises more sustainable and productive need to explicitly address gender differences. This is because, in many developing countries, the benefits to women with regards to improved farming practices and innovations have been limited, as agricultural extension programmes do not target women farmers. It is in regards to this, that women's groups have called for specific targets for women with regard to extension services and business skills and technology training.

According to Meinzen-Dick et al. (2014: 55), “a good starting point is to repeal discriminatory laws, such as those that limit women's ability to own property, engage in business, or make their own employment choices.” Furthermore, using community-level interventions that engage both men and women to convey the benefits of increased gender equality may play a crucial role in agricultural production. This is critical for designing agricultural policies that increase productivity, enhance economic growth and reduce poverty.

3.7 Summary

In this chapter we have reviewed and discussed the relationship between nature/environment and women. The chapter begins by discussing feminism, and illustrates how feminism was broken down into ecofeminism to highlight the role it plays in linking nature with women, globally. Ecofeminism is a theory that defines the relationship between women on the one hand, and their environment/nature on the other. It is also within this context that we note that western views with regards to feminism and ecofeminism cannot be truly applicable in developing countries. Moreover, Western feminists need to allow women from the developing world to evolve their own understanding of ecofeminism so that it relates well to their own social, cultural and political context and environment. Ecofeminism is also introduced in this chapter and is used to explain how it links not only to nature, but highlights the link between agriculture (nature/environment) and women.

The chapter proceeds to discuss the relationship women have with land, and how ecofeminism as a theory interprets this relationship within wider contexts. One is therefore able to understand that land is a valuable natural resource and asset that is viewed as key to gaining access to food. Furthermore, land as an asset is firmly under the control of a male hierarchy. Women's relationship with water is still tied to their relationship with land. The chapter discusses the relationship water has with regards to ecofeminism and how water is viewed as a common resource commodity that should not be sold. This is because the impact of commodifying water has a greater impact on those who cannot afford access to it as a resource. Individuals, especially women and other underprivileged members of society, end up suffering as a result of not having access to water. The chapter further notes that water and land, as resources, fall under patriarchal control. Moreover, women cannot be seen as managers of water as the patriarchal system does not view them as important players in the agricultural sector.

This has a negative effect on nature, as men seem to destroy what nature gives birth to. Hence, women have responded to fighting the patriarchal system through the establishment of various movements, such as the Green Belt movement in Kenya, and ecofeminism. The chapter further discusses the links between natural resources and the capitalist world where one begins to understand the importance of natural resources to the economic world, and the impact that capitalism has not only on agriculture but on the natural environment and women. Famous ecofeminists such as Shiva and Mies (2014) argue that capitalism has a strong impact on small-scale women farmers because of patriarchal systems that value capitalism. The chapter expounds on how feminism from the West plays a key part in exploiting women from Third World countries, and the impact that it has on their families. In short, it is important to understand why capitalism is very active in ensuring that natural resources are not under the control of ordinary citizens.

This chapter explores the need to improve financial, technological as well as educational support to women. It identifies the challenges that face women with regards to accessing these resources and noted that these are due to the availability of these resources within the patriarchal system. In addition, those who develop educational materials to train persons on the use of these technologies do not consider women as key players in the agricultural sector. Hence, there is a gender gap with regards to accessing these resources.

This chapter specifies that if we want to increase agricultural productivity and output, it is necessary to provide women with better tools, equipment and education. Furthermore, ensuring that we have more well trained and educated women in the agricultural sector will see the sector improve dramatically. In addition, it is key to note that technological equipment in agriculture should be gender sensitive to the biological differences between men and women. This is because many of the women who would use the equipment are poor, small-scale farmers who may not have completed their education beyond the primary school level.

In this chapter the relationship between politics and agriculture and the impact politics has on agriculture is discussed. Often many political influences come into play with regards to agriculture and women are not necessarily consulted with regards to such developments. As asserted by a key author Shiva (1989). Ecofeminism seeks to fight capitalism, which is strongly linked to politics. This is because large corporations seem to want to purchase common resources which they use for capitalist gains. In this process, resources are often destroyed - leaving those originally benefiting from the resources worse off. Women are often affected by such practices and suffered a great deal under these political-capitalist agendas. New and better policies need to be implemented that impact positively on the lives of the small-scale rural farmers.

The chapter concludes by discussing the gender gap in agriculture and the impact it has on women and the economy at large. To appreciate the gender gap, one needs to understand the role the patriarchal system plays within different societal settings. This understanding is a prerequisite to understanding how women are viewed as players with the agricultural sector and for those working to develop agricultural policies that seek first, to have women's challenges and issues brought to the forefront.

Lastly, this chapter states that it is important that we understand ecofeminism's important role in linking women and nature together. It is for this reason that ecofeminism was adopted. This is because it showcases women's use of natural resources within the different aspects of their lives that sees them fight also to protect nature. Ecofeminism also exposes the impact that the patriarchal system has on nature and the role of organizations within different parts of the world to fight for the protection of nature. This is viewed as being key in protecting nature and in ensuring that women are integrally involved in the management of natural resources.

CHAPTER IV

RESEARCH DESIGN AND METHODOLOGY

4.0. Introduction

Flick, (2015:5) asserts that

Social research is the systematic analysis of research questions by the use of empirical methods. The aim of social research is to make empirically grounded statements that can be generalized. This, for example, can be done by asking, observing and analyzing data.

According to Taylor et al. (2016:3), “our assumptions, interests and purposes shape the methodology we choose to use when conducting a study.” The term methodology, Taylor et. al. (2016) asserted, refer to the way in which we approach problems and seek answers. In social sciences, the term applies to how research is conducted. On the other hand, methodology according to King and Horrocks (2010:6), “relates to a process where the design and choice of particular methods for a study are justified in relation to the research project.”

According to Flick (2015), a central task of social research originates from scientific interests which prioritize the production of knowledge. Flick asserts that the generalization of knowledge is more important than solving a concrete problem in a particular case. This is because scientific research is confronted with the expectation that its results have an impact on the field that is studied, or in the way society deals with an issue or social problem. In addition, Flick asserts everyday knowledge and problem solving as the starting points for theory development and empirical research.

In everyday life, we make informal observations about people and things around us, and very often, we use these observations as a basis for making decisions. Thus, empirical research according to Patten (2016) refers to the making of planned observations by following careful plans. In short, we engage in a systematic thoughtful process that is called research. Research thus refers to a search for knowledge and is an original contribution to the existing stock of knowledge for further enrichment. The different types of research bring to light the fact that there are two basic approaches to research: quantitative approach and qualitative approach (Daniel & Aroma, 2011).

According to Jonker and Pennick (2010), quantitative methodology has a long tradition. It is based on the premise that knowledge about reality can only be obtained ‘through the eyes of the researcher’. It implies the extent to which something either does or does not occur in terms of the amount, number and frequency. Anyone who conducts quantitative research wants to know the degree to which something occurs or not, and if it does, to what degree? In other words, quantitative research entails putting a theoretical construct to the test.

On the other hand qualitative methodology sets itself other priorities in that one does not necessarily start from a theoretical model of the issue being studied. In addition, qualitative research is not modelled on measurement as found in the natural sciences. Instead, qualitative researchers select participants purposively and integrate small numbers of cases according to their relevance (Flick, 2015).

Maxwell (2012) asserts that qualitative research design is a ‘do it yourself’ process rather than an ‘off the shelf’ process and involves tacking back and forth between different components of a research design, all the while assessing their implications for one another. Qualitative research does not begin from a predetermined starting point or proceed through a fixed sequence of steps, but involves interconnections and interactions. “Qualitative research is inductive,” posits Kelly (2016:1). It attempts to make broad generalizations from specific studies. It explores the areas, asks questions and examines if there is a pattern and concludes with an observation. According to Rubin (2016:1), “qualitative research methods have a long and influential history in shaping theory, and practice, particularly in the field of gender and development.”

Rubin, (2016:4) argues that

Qualitative methods are well suited to exploring the context and cultural difference, and drawing on tools and techniques that have been developed by social historians and anthropologists among others to make visible beliefs and practices otherwise taken for granted and unanalyzed.

It is for this reason that this study will use a qualitative approach in exploring the study at hand. In addition, the study will use tools and techniques that are utilized in qualitative research. Qualitative research takes context and cases seriously for understanding an issue under study. A lot of qualitative research is based on case studies or a series of case studies (Flick, 2008). Kumar (2008) defines a case study as a method of explaining and analyzing the life of a social unit, be that unit be a person, family or an institution of a community. Case studies provide a means to investigate complex situations with multiple variables under analysis.

According to Yin (2009), case studies help one to understand the different contextual conditions that are highly pertinent to the study being undertaken. Case studies are particularly appealing for advancing a field's knowledge base. They are very popular in the fields of applied sciences, social sciences, education and health. Case studies offer a good opportunity for innovation and to challenge current theoretical assumptions. However, it can be difficult to use them when establishing a cause-effect connection to reach certain conclusions and thus, it can therefore be hard to generalize, particularly when a small number of cases are considered (Almeida et al., 2017). Tight (2017), however, argues that when it comes to case studies, what may be interesting or significant for one researcher may not be so for another.

The research used Ahero Irrigation Scheme as its primary location. This chapter discusses the reasons why Ahero Irrigation Scheme was chosen as the primary location for the study, and gives a detailed description of the site. The chapter discusses the qualitative means (or techniques) used to collect data from the site, the sample size chosen, how they were chosen, and gives a detailed description of how data analysis was conducted with reference to the study. This chapter also discusses the reliability and validity of the instruments used in the study, the ethical considerations taken into account while the study was conducted, the challenges encountered when conducting the study, and presents a summary of the chapter.

4.1 Geographical Description of the Study Site

The study was conducted in the Western part of Kenya in Kisumu County. The focus of the case study was the Ahero irrigation scheme which the National Irrigation Board of Kenya manages. The scheme was identified on the basis that it is one of the oldest irrigation schemes in Kenya.

4.1.1 Kenya

Kenya lies on the eastern side of the African continent and extends towards the Indian Ocean. Kenya borders Uganda in the West, and the United Republic of Tanzania in the South. Kenya's other neighbours include Ethiopia in the North, South Sudan to the North East and Somalia on the West. The area of study lies west of the country and is situated near the lake city of Kisumu, which is the administrative capital of Kisumu County. The city of Kisumu lies on the shores of Lake Victoria, one of Africa's great lakes (Commonwealth Secretariat, 2019).

4.1.2 Inhabitants of Ahero

Ndeda (2019) posits that the communities in Nyanza and western Kenya comprise of two linguistic families, the Bantu and the Nilotes. The Bantu of western Kenya comprise of the Abaluyia, Abagusii and Abakuria, while the Nilotic group consists of three groups: the river lake Nilotes who comprise of the Luo who practice fishing and reside near the shores of Lake Victoria; the plain Nilotes who comprise of the Masaai; and the highland Nilotes who comprise of the Nandi, Samburu, Turkana, Teso, Njemps and Nubi who practice pastoralism. The various clans in the Luo locations of Kenya have diverse historical origins but have a dominant culture and a common language (Dholuo). The Luo came from Sudan several centuries ago.

According to Ogechi (2019:115), "87 % of the inhabitants in Nyanza are Luo speaking indigenes." "Although fishing has been the main economic activity in the region, irrigated agriculture is taking off in the region due to the decline of fishing in the last two centuries due to overfishing and the spread of predator fish species such as the Nile Perch (Hebnick, 2019:13)."

4.1.3 Ahero Irrigation Scheme

Ahero is an agricultural town with an area of approximately 3,880 hectares (ha) of which about 2,000 ha is available for crop cultivation. The National Irrigation Board managed the area (1,077.7 ha) under irrigation. The Schemes location can be seen in figure 2, below.

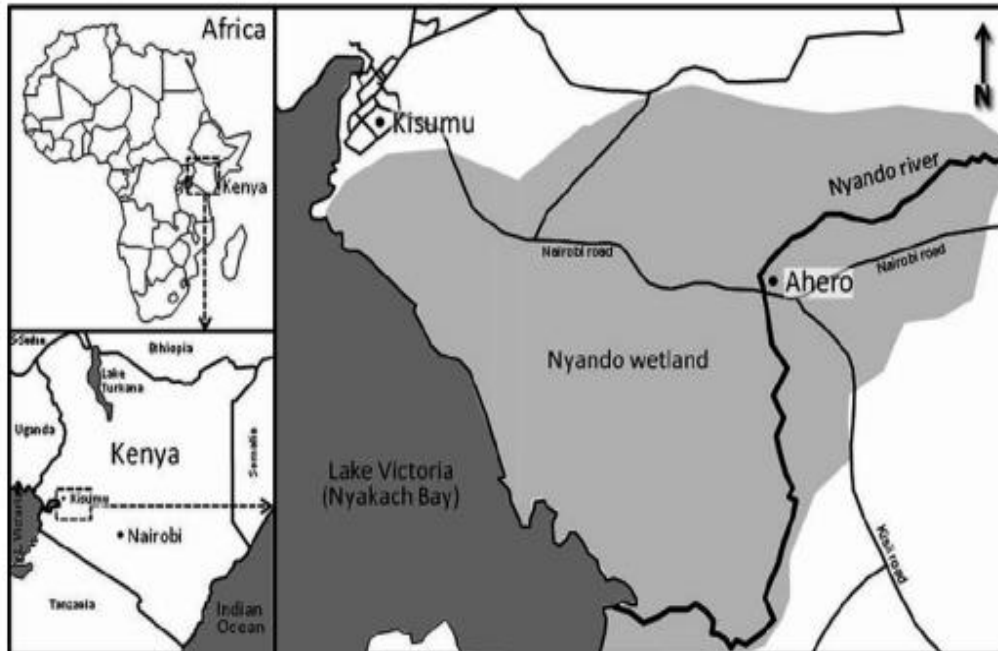


Figure 2. Nyando wetland, Western Kenya

(Adapted from: Asking V. and Nilsson J., 2019:1)

The scheme is in the Kano plains between Nandi Escarpment and Nyabondo Plateau. It is in Muhoroni District in Kisumu County. The scheme has about 1,650 farmers with a gross area of 1,740 ha, with farm sizes ranging from 1-4 acres. The scheme has a population dependency of about 30,000 people. Rice is the main crop in the Ahero Irrigation Scheme, with four main varieties: Basmati 370, IR 2793, ITA 310 and BW 196 (National Irrigation Board, June, 2018).

See Figure 3 below showing the town, with the settlements and irrigated areas.

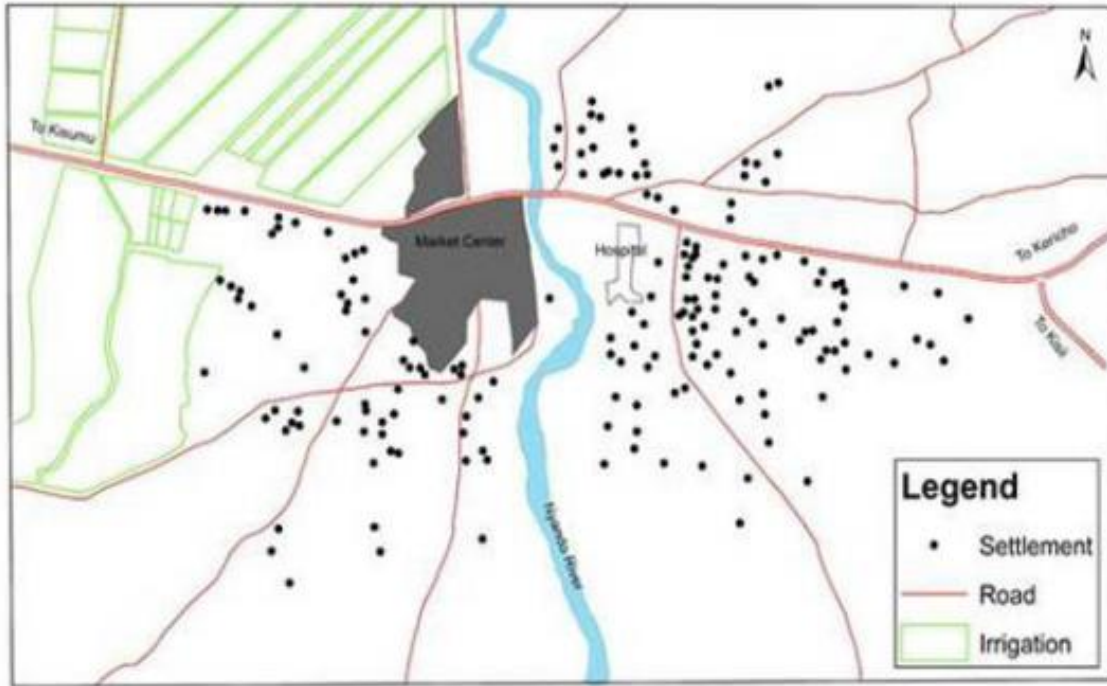


Figure 3. Ahero town with settlements, roads and irrigated areas

(Adapted from: Kisumu County Urban Sustainability Review, 2017:10)

According to the Kisumu County Urban Sustainability Review (2017) agriculture is the economic backbone of Ahero. It employed about 70% of the population. KCUSR report claimed that a majority of people within the area were moving from rural areas to the urban areas within Ahero, as they sought employment within the irrigation schemes in the area. The types of crops grown in Ahero - besides the varieties of rice mentioned - were: tomatoes, kale, watermelon, black night shades, cow peas, butternuts, onions, capsicum, maize, cassava, millet, cotton, fruit (mangoes and citrus) and sugarcane.

We are informed that some crops were grown primarily for subsistence consumption. These included maize, millet, beans, green-grams and sorghum. The KCUSR report asserted the unpredictability of weather patterns within the area caused farmers within Ahero to turn to other crops during the dry season so they have other sources of reliable income. Beans and green-grams were intercropped with maize and sorghum while the other crops such as rice, tomatoes (see Figure 4), kale, watermelon, black night shades, cowpeas, butternut, capsicum, onions and pawpaw were grown for commercial use. These crops were grown under irrigation using water from the Nyando, Nyatini and Ngadi rivers. In general, the youths used water pumps to irrigate the farms. The KCUSR report claimed that crop cultivation had created employment for the youth in the area both directly and indirectly (Kisumu County Urban Sustainability Review, 2017).



Figure 4. Tomato cultivation in a greenhouse (2018)

The KCUSR (2017) report asserted that delayed payments from cooperatives and millers affected the planting of rice as a cash crop within Ahero. In addition, middlemen from neighbouring counties have affected the price of rice within the market. This was because middlemen buyers of paddy rice paid low prices and later sold at higher prices, therefore making a profit for themselves and not the farmers. Hence, this constituted the main reason why farmers turned to growing other crops as returns from rice declined. Another loss was the non-utilization of agricultural residues, mainly the rice husks, wood chips and straw. Most farmers discarded or burned these wastes although they could be used as animal feed (dairy cattle and chicken), building materials and fuel.

Unprocessed rice (paddy) was sold to customers from Uganda and other parts of Kenya. Ahero town has privately owned rice mills and one which the government (National Irrigation Board) owned where value addition was done. During value addition, the by-products were processed and packaged, and sold to supermarkets within the county and beyond. Agriculture in Ahero is vital for employment creation, food security and improved living standards. However, the Ahero Irrigation Scheme faced many challenges including: high electricity costs to run irrigation pumps, high farm input prices (for example, fertilizers), competition from rice imports, weak farmer organizations and river bank erosion which led to the loss of land and damage to infrastructure.

It is with the above in mind that the research sought to gain a better understanding of the challenges women faced within the scheme. Although women were the primary target of the research, men's views were also sought. The next section discusses the research instruments used to collect data for the study.

4.2. Data Collection Tools

Bryman (2015:10) informs us that “many people view data collection as being the key point within a research project”. He posits that some methods of data collection entail a structured approach and that a researcher needs to establish an advanced broad shape of what he or she needs to find out about designs and research instruments. This study collected data using interviews and questionnaires. These are discussed below.

4.3. Interviews

According to King and Horrocks (2010:6), “qualitative interviewing has become a prominent research method in the social sciences. Interviewing is one of the most frequently used methods when generating data.” Furthermore, according to King and Horrocks (2010), when undertaking qualitative interviews, the assorted context of people’s lives become relevant data and all accounts are understood to be infused with subjectivity. In addition, the researcher, rather than remaining neutral, communicates the perspectives from which he/she is approaching the work. This is thus seen as helping the researcher’s audience appreciate his or her work.

The use of interviews as a means of gathering data as interviews “focus on gaining meaning and experience,” (King and Horrocks,2010:26). King and Horrocks noted that interviews should not focus on establishing causal relationships or generalised patterns of behaviour. Silverman (2016:52) posited that “interviews provide us with access to social worlds and act as evidence for both the interviewer and interviewee on ‘what happens’ to them and how individuals make sense of themselves and their experiences within their places in these social worlds.”Silverman (2016:52) goes on to explain, that “qualitative interviewing provides us with a means for exploring the points of view of research subjects while granting the points of view which are culturally honoured.”

It is for this reason that interviews were used in the data collection process of this study. It was hoped that women and other participants who were interviewed within the study would “tell us more about their experiences as well as their own interests and formulations that are framed within the study” (Silverman,2016:56). The study used semi-structured interviews. This approach is seen as particularly useful to professionals studying applied policy questions in professional fields such as community development and social work. This is because semi-structured interviews can be used to gain in-depth understanding of how key stakeholders perceive and understand an issue.

According to Olson (2016), all participants are asked the same questions in the same order, and thus the researcher is able to easily summarize the respondents' responses, as it takes less time to complete in comparison to other interviewees. However, Olson asserts that the limitation of this type of interview is that it provides a little opportunity for the participant to add new ideas that are not addressed by the survey questions, but are central to his or her experience. This limitation constrains the ways in which a participant would otherwise describe an experience. This is because in "this type of interview, one can take a pre-designed outline of topics, issues, or themes, and have the possibility of varying the wording and order of questions in each interview" (Eriksson and Kovalainen, 2015:94). Furthermore, the advantage of this is that the information sought is somewhat systematic and comprehensive and has the tone of a conversational informal interview. However, Eriksson and Kovalainen (2015) noted that this type of interview works well when you have some interview experience and the interviewer has prepared themselves thoroughly. Another major challenge is ensuring that all topics on the outline are covered and at the same time being prepared to probe for more in-depth information (Eriksson and Kovalainen).

Silverman and Patterson (2015) however asserted that semi-structured interviews have clearly defined roles and boundaries between the interviewer and interviewees. This is because the act of interviewing entails a high degree of focus on the research question and reflexive thinking that informs responses to questions. In addition, spontaneity in the interviewing process is replaced with understood roles and rules of engagement which enable the researcher to collect in-depth information about a focused research question. It is for this reason that this form of data collection was chosen. Questionnaires were also used for data collection, let us explore them and how they were used in the study. (A copy of the interview form is attached as Appendix F).

4.4. Questionnaires

“Questionnaires provide a way of gathering structured and unstructured data from respondents in a standardised way either as part of a structured interview or through self-completion” (Somekh,2011:219). According to Ruane (2016:164-165), “a questionnaire is a self-contained, self-administered instrument for asking questions.” Ruane notes that the questionnaire lacks the personal touch, unlike the interview. In addition, it is also viewed as an extremely efficient data collection tool. This is because if developed well, it can enable the researcher to collect data without requiring any personal contact with the respondent. This trait means that questionnaires can transcend the barriers of time and space, as it can be sent electronically without leaving the comfort of one’s home.

The questionnaire is a versatile tool as it has several goals of research such as exploration, description, explanation or evaluation. In addition, it has no limit to the kinds of information one might obtain via questions. This can range from age to questions on behaviour to questions about people’s attitudes, beliefs or opinions. Ruane (2016) noted that this is good so long as we pay careful attention to how we phrase our questions as there are no limits as to what we may find out when using questionnaires. In addition, according to Somekh (2011), a questionnaire should have clear aims and objectives and should be structured logically into sections and subsections (if necessary) with filter questions to ensure that respondents answer only the relevant questions. This is important so that the data collected are relevant to the study after the questionnaires have been returned. According to Ruane (2016:167), “utmost care must be taken when we are wording our questionnaires.” According to Somekh (2011), this care will enable us to maximize the responses we receive from our participants and will enable us to be confident about the instrument of choice used, and give it credibility. Hence, we must choose our words carefully and follow the rules of question formulation (Ruane,2016).

In formulating the questionnaire, according to Somekh (2011:221), the following was taken into consideration: “The questions were to:

1. Be clear and unambiguous and should not have technical language or language that is inappropriate to the respondents.
2. Not lead the respondents to answers.
3. Be simple rather than complex.
4. Avoid asking questions that ask more than two questions that are double-barrelled at the same time.
5. Avoid the use of negative and double negative questions.
6. Ensure that in multiple-choice questions and rating scales, all categories should be considered and are mutually exclusive if a single response is required.
7. Avoid questions that may antagonise or irritate the respondents or any questions that can be perceived as threatening.”

In addition, “instructions need to be clear on how the questionnaires need to be filled. This should be explicit, clear and polite” (Somekh, 2011:221). Ruane (2016:176) informs us that “this is best accomplished by first sending a persuasive introductory statement or cover letter (for mailed questionnaires).” The introductions should serve to assure the respondent of the questionnaire’s importance and legitimacy. Furthermore, it should convince the respondent that the time they spend filling out the questionnaire will be time well spent.

In considering the exact wording or phrasing of questions, the researcher needed to decide the amount of freedom to give the respondents when they answered the questions in the study. Hence, both open and closed questions were used in the questionnaire. With closed questions, the responses received were predetermined responses in the first section of the questionnaire, while with the open-ended questions, the respondents gave their own responses which were free of any confines and thus enabled the researcher to receive unique answers that were relevant to the individual and the study.

Ruane (2016) informs us that in deciding to use closed and open questions, we should consider the advantages and disadvantages of each style of questioning. This is because closed-ended questions are easier to answer and tend to cut down on non-responses that may not be beneficial to the researcher. They also reduce the time and effort needed to code responses to data entry and analysis. ‘Coding’ decisions are achieved via predetermined response alternatives which can be disadvantageous as they may encourage respondents to circle or check responses even when the responses do not really ‘ring true’ for the respondent.

On the other hand, Ruane, (2016:173) asserts that

the clearest advantage of open-ended questions is that they do not put words in the respondents’ mouths. This is good as this allows the respondents to think or do (and not just to measure what the researcher believes the respondents thinks or does). Open-ended questions also allow the researcher to find out some things which he/she may not have anticipated while conducting the study. This is good. However, the disadvantage of this is that allowing respondents total freedom may give them the chance to supply answers that the researcher may have to work harder at coding or interpreting the responses, as responses will vary according to the different respondents.

Furthermore, open-ended questions are also harder for respondents to complete as they require respondents to work harder, in the sense that they must ‘write’ something to provide an answer. Open-ended questions also suffer from a low response rate than closed-ended questions. This was important to note as some of the farmers were not well educated. Hence, some struggled with their responses and gave simple responses to some of the questions asked in the questionnaire. Having reviewed the data collection tools of the study, the next section of the chapter, discusses how the research participants were chosen (A copy of the questionnaire is attached as Appendix E).

4.5. Sampling Selection of Research Participants

Bryman (2015:416) posits that

one of the problems that qualitative researchers face is the ability to identify the number of people who will take part in a study. This is because it is impossible to know for example, how many people should be interviewed before theoretical saturation is achieved. In addition, more groups may be identified for interviews and they may not have been anticipated at the outset of the study.

Bryman goes on to assert that the rule of thumb in qualitative studies requires that when more comparisons between groups are to be carried out, then more interviews need to be done. Furthermore, for a qualitative study to be published, a minimum number of interviews need to be conducted. This number ranges from between 20-30. This implies that minimum levels of acceptability operate when it comes to selecting sample sizes. On the other hand, Bryman (2015:416) argues “that not all practitioners agree with the figures of between 20-30.” Bryman notes that ‘fewer than 60 interviews cannot support convincing conclusions and that more than 150 will produce too much material that will not be effectively and expeditiously analyzed. However, a range of between 12 and 60, with a mean of 30, can be acceptable. These differences, he notes, suggests how difficult it can be to try and specify a minimum sample size. Bryman (2015) claims that samples of fewer than 20 increase the qualitative researcher’s chances of getting close involvement with participants and increases his/her chances of generating fine-grained data.

Bryman (2015:417) notes that what is crucial is to justify rigorously any sample size. In his words:

rather than rely on others’ impressions of suitable sample sizes in qualitative research, it is almost certainly better to be clear about the sampling method you employed, why you used it and why the sample size you achieved is appropriate. It may be that reason why you feel that the sample size is appropriate.

The study used purposive sampling. According to Bryman (2015:419)

purposive sampling involves more than just one sampling approach. This is because it entails sampling initial participants without the snowballing approach. It then allows one to later use these initial contacts to broaden the participants' base throughout a study. This approach helps the researcher to further his or her sample size base, and to have participants who have the ability to participate in the study and share information which is rich in data and can greatly influence the study a great deal.

The next section of the chapter explores how both the questionnaires and interviews were administered to participants in the study.

4.6. Procedure of Administering Questionnaires and Interviews

4.6.1 Questionnaires

The study drew participants from 12 blocks situated within Ahero Irrigation Scheme. This was to ensure that the information drawn from the participants was rich in data and secondly, to ensure the data collected was not homogenous to one area within the scheme but represented a wider area within the irrigation scheme. This is because different clans and kins reside within different parts of the scheme. Hence, data collection from the 12 different blocks had a great impact in ensuring that the data collected was heterogeneous. The study was able to select a total of 66 participants. Out of this figure, 42 were women and 19 were men. Of this figure five were 'key informants' who took part in interviews (three women and two men). Out of the total number of women, 39 women filled in the questionnaires and the remaining three were interviewed. Out of the 19 men who took part in the study, two were interviewed. One of the male respondents was a manager at the irrigation scheme. The interviews and questionnaire administration were done in the month of January 2018.

The management of the scheme aided the study by providing a research assistant who recruited an additional three research assistants from the National Irrigation Board Research Institute to assist in data collection. This is because the area covered was large and the research assistants had adequate geographical knowledge of the areas where the 12 blocks were located within the scheme. The researcher had a one day, three-hour training session with the research assistants prior to data collection beginning. At the meeting the researcher explained the study's objectives, consent letter, consent form and questionnaire. This was to help them understand what information the study sought and to have them follow data collection procedures when collecting the data. This interactive session provided the opportunity for the research assistants to ask any questions they may have had with regards to the study so as to help them answer any questions they may receive from the respondents in the field during data collection.

Residents of the scheme were notified via informal means (e.g., the research assistants informed the heads of the blocks via meet-and-greet sessions) of the intention to visit their blocks. Also, copies of the research letter were presented to the block heads informing them of the intended research to enable them understand the study. This helped to develop rapport with the block heads and informed them of the dates and times the researchers and their assistants were in the block areas for data collection. The block heads communicated this information to the block residents. Feedback received from these meetings informed the research team that there was no guarantee that all members within the various blocks would be available, but that they were free to interview those who were in the blocks at the time of their visit.

During training the research assistants were requested to engage with as many women farmers within the 12 blocks whom they could find within the scheme on the days of data collection. They were also informed that if women were not available in the homestead, they were to engage the men so as to cover a wide diversity of participants. The research assistants were also provided with stationery and transport fares to help facilitate the collection of data from the field.

Data collection was carried out in four days during the first two weeks of January 2018. The researcher and the research assistants were split into groups of four (4). The researcher was part of one group and was accompanied by one of the research assistants to help facilitate data collection and translate the English and/or Kiswahili questionnaires, into the local Luo dialect. This, widened the pool of participants and made it easier for those not able to read or write to participate in the study.

The research teams, after every day of data collection, had a review meeting to discuss the progress of their data collection and report any difficulties they may have encountered in the field. This was important as it enabled the researcher to gain a better understanding of the data collection process and also handle any issues that arose during the days of data collection. The following section discusses how interviews were conducted and the gender of the participants who participated in the interviews.

4.6.2. Interviews

Five ‘key informants’ took part in the interview process. The researcher had hoped to have interviewed a total of five members of the Ahero Irrigation Scheme management, but due to circumstances beyond the researcher’s control, the researcher was unable to do so and was only able to interview one member of the Scheme’s management. This was due to the time when data collection took place, namely, the first two weeks of the 2018 New Year when a majority of the staff members were still on leave. In addition, the researcher hoped to interview 10 members of the local farming community, comprising of five men and five women. Unfortunately, this was not achieved due to conflicting dates with farmers who were engaged in other activities. Thus, the study was able to have three women and one man, who were part of the local farming community within the scheme. The respondents came from different blocks within the scheme. This enabled the researcher to have data that were rich as the participants came from different clans from within the scheme.

The 'key informants' were taken through the nature of the study as well as given the consent forms to sign so as to ensure proper research protocol was followed and that no ethical conflicts arose. The interviews were conducted first with the women, and subsequently with the one man who had availed himself to participate in this research. The instruments used to record the interview comprised one video camera and one mobile phone recording. Two instruments were used to ensure that there was a back-up of the data recorded during the interviews and the administration of the questionnaires.

During the interviews, soft drinks and water were served to the participants to ensure they were comfortable. During two interviews (4th of January 2018) the video camera did go off during the interview process - thus interrupting the interview process. This allowed the researcher time to engage with the respondents and gain valuable insights regarding their personal experiences within the Ahero Irrigation Scheme. This unplanned situation enabled the researchers to better understand the respondents' answers.

After the interviews, the researcher had a group discussion with the 'key informants'. This was not recorded as the researcher wanted a setting where the respondents could come together and share their experiences. Thereafter, the respondents were each given a token of Kshs.500 to pay for their transport costs back to their respective homes. This was in appreciation of the respondents' taking their time and money to come assist the researcher in data collection.

The next section discusses how data collected in the field were analyzed; the tools utilized, and how deductions from the data were established with reference to the study.

4.7. Data Analysis

Walliman (2015: 162) states that

qualitative research does not involve counting and dealing with numbers but is based on information that is expressed in words, descriptions, accounts, opinions, and feelings. It is for this reason that there is a constant interplay between collection and analysis when it comes to qualitative analysis as this process produces a gradual growth of understanding. This is because you collect information, review it, and collect more data based on what you have discovered, then you analyze again what you have found.

“Qualitative data analysis is often a two-stage process of one making analytic memos in a research dairy or field notebook and two, of understanding the systematic process of fragmenting data and attaching concept labels” (Somekh,2011:338).Qualitative research is a demanding and difficult process as it is prone to uncertainties and doubts.

According to Walliman (2015:163),

the central requirement in qualitative analysis is clear thinking on the part of the analyst, as the analyst is put to the test with the data. This is because; there is an element of ‘art’ that comes when one is dealing with qualitative data. One has to convince others of your conclusions, which must have good arguments to support them.

A good argument, Walliman contends is one that has high-quality evidence and sound logic. Bazeley and Jackson (2013:2) claim that “there is a widely-held perception that the use of a computer can help to ensure that there is rigour in the analysis process.”Somekh (2011:338) further posited this notion and stated that “there are some computer software which allows one to attach concept labels to sections of text and this can be very helpful especially when coding.” Somekh argues that the use of Nvivo is the obvious starting point when wanting to carry out computer-aided qualitative analysis.

Walliman (2015:166) argued that

such programs have facilities for coding, creating memos, filing and retrieving coded information. They allow codes to be attached to the numbered lines of notes or transcripts of interviews and for the source of the information/opinion to be noted. This thus enables the researcher to have rapid retrieval of the selected information from the mass material collected. It is for this reason that this study sought to use computer aided software known as Nvivo, to help in data analysis of the information retrieved from the field. We are however informed that it takes quite some time to master the techniques involved, so advice should be sought before using these programs.

It is with this regard that the researcher involved in the Ahero irrigation study undertook classes on You-tube on how to use Nvivo software before data collection and analysis began. Given the cost of purchasing the Nvivo software, the researcher in the Ahero Irrigation Scheme was unable to use Nvivo and used the skills gained from the training programme to develop means of analyzing the data collected. Data received from all the questionnaires were first coded to ensure confidentiality of all respondents who took part in the study. The data were then inputted into an Excel spreadsheet and grouped according to the various sections, questions and sub-themes as arranged in the questionnaire.

Data inputted on to the sheet were then selected to match the relevance of the questions asked. The responses selected were chosen on the basis of their relevance to the question, the weight of the response and the information the respondents provided. Unique responses were then highlighted in green to enable the researcher to easily identify them. The responses that were supportive of the answers were then marked in orange. This indicated to the researcher the response was also similar to what the researcher had chosen. The rest of the responses were not colour coded. This helped the researcher identify the responses within the different sections of the questionnaire.

Part A of the questionnaire comprised of closed questions, related to the socio-demographic information of the participants. Hence, the data here were inputted, tabulated and analyzed, and presented in various tables and figures which showcase the results of the questions. The results of the data collected are discussed in chapter 5, 6, and 7 with relevance to the literature and theoretical framework of the study.

Walliman (2015:168) claims

traditional text-based reports tend to be lengthy and cumbersome when presenting, analyzing, interpreting and communicating the findings of a qualitative research project. Hence, it is important that the use of certain graphical methods of data display and analysis be used to overcome these problems.

The second part of the questionnaire was grouped in to various subthemes that the study investigated. These sections of the questionnaire comprised of open-ended questions which the respondents addressed. Thus, responses in this section that contradicted the literature or supported the literature were chosen and were coded with the colour green to indicate their relevance to the Ahero study. Other responses from the respondents that were deemed as significant with regards to the study were coded with the colour yellow, to highlight their importance. The same procedure and analysis were replicated with the subsequent sections of the questionnaire, until all data was analyzed. Some of the responses elicited were more in phrases than in lengthy statements. Furthermore, some of the responses are similar and appear repetitive. This meant two things: First, that the research assistants opted to abbreviate the information received due to time (as some of the respondents were unable to read or write and hence the researchers filled in the questionnaires) or second, that the respondents who personally completed the questionnaire did not feel the need to go into lengthy details with regards to the information sought. The next section discusses the validity and reliability of the instruments used in the study.

4.8. Validity and Reliability

According to Wang and Reio (2017), readers of a research paper are more likely to be convinced about the reliability and validity of researcher's conclusions by examining the strength of their argument and also the clarity and comprehensiveness of their evidence. However, Flick (2014) argues that validity typically receives more attention than reliability. Adams (2014) asserts that validity is the strength of our conclusions, inferences or propositions. This is because it involves the degree to which one is measuring what one is supposed to. To be more specific, it is the accuracy of one's measurement.

On the other hand, Adams goes on to define reliability as the degree to which an instrument measures the same phenomena each time it is used under the same conditions with the same subjects. This is essentially consistency. If one measures the same phenomenon many times and the result is always the same, then one can say that our measuring instrument is reliable. Maxwell (2013) asserts that validity in qualitative research is not the result of indifference, but of integrity. It is in this regard that the researchers choose to use qualitative research techniques to undertake this research.

4.9. Ethics

“Ethical issues are relevant to research in general,” (Flick,2015:32) Flick posits that

Research ethics addresses the question of which ethically relevant issues caused by the intervention of researchers can be expected to impact on the people with or about whom they research. It is concerned in addition to the steps taken to protect those who participate in the research if this is necessary.

“Ethical decisions are the result of a weighing up of a myriad of factors in the specific complex social and political situations in which we conduct our research,” (Somekh,2011:56). She notes that sets of principles are frequently drawn up to guide researcher actions in the field as well as to protect the rights of participants in research. This is done to ascertain whether the methodologies are appropriate for the study.

It is in regard to the concerns raised in the above paragraphs that the researcher sought approval to access the research site from the National Irrigation Board of Kenya and the Ahero Irrigation Scheme, so as to interview the farmers who reside in the scheme. This process exists to “ensure that researchers have considered the ethical issues that are likely to arise and have developed protocols to protect participants from harm” (Somekh, 2011:57). In other cases, Somekh noted that they act as guardians of what is to count as a research methodology. (Please see Appendix A: Letter from National Irrigation Board of Kenya).

Silverman (2016:33) observed that in “rural communities, local government representatives sometimes provide the researcher with a sample of people; hence it is important to gain their consent.” Informed consent, Ruane (2016: 50) posited, is

the principle right of individuals to determine for themselves whether or not they want to be part of a research project. More specifically, it refers to the right of the research participants to be fully informed about all aspects of the research project that may influence their decision to participate. (Please see: Consent Letter and Consent Form in Appendix C and D).

In terms of the ethical issues addressed above, each respondent was given a letter explaining the nature of the study. For those respondents unable to read or write, the contents of this letter on ethics was explained to them. In addition, respondents were asked to sign a consent form (or mark a cross on the form if they were unable to write) before participating in the study. This ethical clearance process enabled the participants to make up their own minds regarding their participation in the research, and to confirm their willingness to do so. The importance of protecting the anonymity of the respondents was stressed to them, and this included the publication of the findings of this research. Anonymity is a procedure to offer some protection of privacy and confidentiality. In regards to this study, the respondents’ details were coded according to mode of data collection, gender and number. Thus, participants who took part in interviews were coded as MINT or FINT (M- male, INT- Interview) (F-female- Interview).

A number was then added to MINT or FINT to enable the researcher to specifically identify each respondent. Those participants who took part in data collection via questionnaires were coded using numbers and gender, for example,(001F-emale) or (019M-ale).

According to Somekh (2011:57),

the second common assumption in ethical social science practice is confidentiality in the process of conducting research. Confidentiality is the principle that allows people not only to talk in confidence but also to refuse to allow the publication of any material that they think might harm them in any way.

Trust, as Silverman (2016:33) noted, is

the third classic concern and refers to the relationship between the researcher and the participants. This is important as it is the researchers' responsibility not to spoil the field for others in the sense that potential research subjects can in the future be reluctant to participate in other studies. This therefore goes a long way in defining the standards for presenting both the researcher and the works as being trustworthy. Trust is the classic key to good field relations and is a challenge constantly unfolding during the research process.

The researcher was able to gain the trust of the participants, through discussions that discussed farmer's needs and challenges within the scheme as well as engaged the farmers on day to day talk about the activities in the scheme. The researcher also affirmed the importance of the study to the farmers and why there input towards the study was important.

The next section gives a summary of the chapter and highlights the key points as discussed in the chapter.

10. Summary

At the beginning of this chapter the study introduced the research design and methodology and discussed its impact with regard to the choice of the research design for the study. The researcher then discussed the reasons why a qualitative approach was chosen, and provided reasons why a case study approach was chosen. A detailed description of the study's research site was then presented. Ahero Irrigation Scheme is located in the Western part of Kenya in Kisumu County. The economic activities the residents engaged in, the major cash and subsistence crops that were grown in the area and within the irrigation scheme, and a summary of the challenges the farmers within the scheme faced were then discussed.

This chapter also discussed the two data collection methods used in this study. These are interviews and questionnaires. The researcher discussed the advantages and disadvantages of using these data collection methods and the specific procedures used to administer these data collection tools to the respondents in the Ahero Irrigation Scheme, as well as the methods used to determine sample sizes. A total of 66 participants took part in the study, comprised of 42 women and 19 men. The study also engaged five 'key informants' who were interviewed.

The last section of the chapter discussed the methods used to analyze the data, and the concepts of reliability and validity and their applicability in gathering data for this study. The chapter concluded with a discussion on ethics, the impact ethics has on the research and steps undertaken to ensure that ethical standards were upheld in this research

CHAPTER V

SOCIAL DEMOGRAPHICS

5.0. Introduction

This chapter presents detailed insight and analysis of the responses received from the participants who took part in the Ahero Irrigation Scheme study. This chapter is divided into two key sections: the first section highlights the demographics of all the participants, while the second section provides detailed analysis and interpretation of the data collected via the questionnaires and interviews. The responses are discussed according to two key themes of the study: social demographics and women and agriculture. The information is analyzed in regards to the literature review and the theoretical framework underpinning this study. We begin the chapter by highlighting the social demographics of the participants in this study.

5.1. Socio-demographic Information

5.1.1. Gender of Respondents

The study gained information on female as well as male farmers who resided within the Ahero Irrigation Scheme in Western Kenya. The scheme had 565 farmers who were located within 12 blocks within the scheme. The study was able to access 12% of this total farmer population. Although this proportion was low, the respondents were sampled from the 12 different blocks within the scheme. The inclusion of respondents from the 12 blocks ensured adequate spatial coverage and richness of the data that were collected as different clans were housed within the different blocks. This diversity amongst the respondents helped facilitate different views on farming from both genders, and from the diverse clans. The respondents comprised 68% females, and 32% male. This is represented in Figure 5 below.

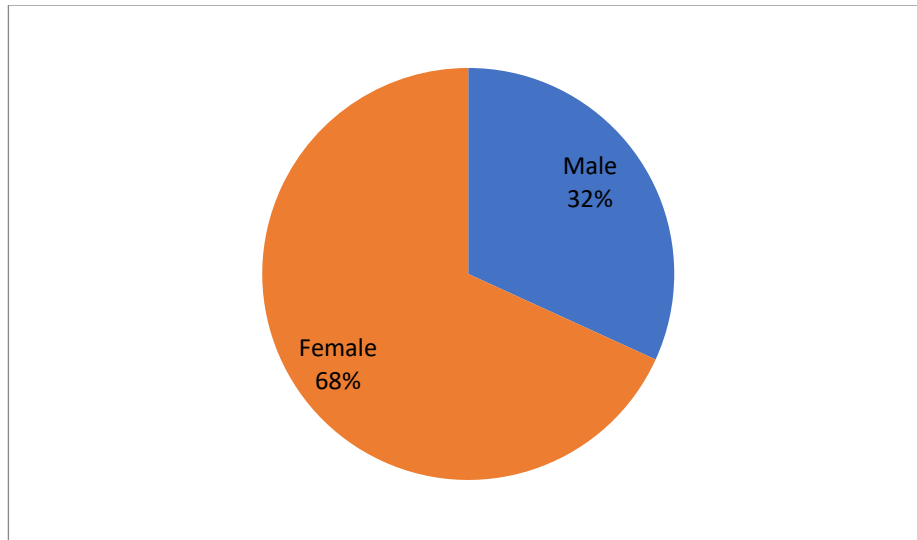


Figure 5:

Research respondents by gender (2019)

5.1.2. Ahero Irrigation Scheme: The marital status of research participants

The study wished to understand whether marriage as a socio-cultural dynamic had a role to play within the scheme. It was observed that 64% of the sample in this study were married, while 35% comprised widows and 1% were widowers. This is represented in Figure 6 below.

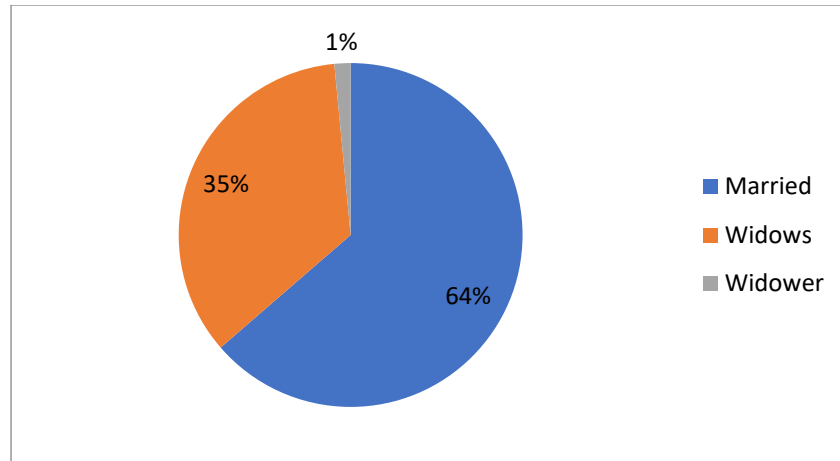


Figure 6:

Research respondents by marital status (2019)

Marital status within any society is important. In Ahero Irrigation Scheme, respondent's marital status is important. This is because without holding a strong position within the family, one is unable to access the rewards that come with marriage, in this case (land ownership). For example, MINT 002 responded to the question about women having challenges in getting access to clan land, by stating that:

They can easily get land after their husband...That one she can't have?... Atapatawapi- (Where will she get it?) ...when the husband is not there okay...who can give her?

Another respondent FINT002 stated that: '... I have, I got it from the father of my husband, who gave it to my husband...' (Personal communication; Mint002, 5 January 2018).

Ng'uono et al. (2014: 11) indicated,

land ownership or access to other productive resources and the organisation of agricultural production is influenced by cultural practices and traditions. For example, rules of land inheritance (by lineage, gender and/or culturally determined characteristics give one core access to land). That in some communities land is owned by a tribe or kinship group.

Thirty-five percent of the sampled population who were widows indicated that acquisition of their land came from them inheriting the land from their husbands, as some were named as successors; and if the land was left to them as per their late husbands' wills. However, this was not always the case and some of the women faced challenges from their in-laws, as respondent MINT001 explained:

First generation the father has died and the son took over, I have left my wife and sons and maybe I named my wife as the successor, you see I have moved my wife as second generation, what happens there is a dispute as this land belongs to our father, and our father named my brothers as the dependents. I have taken over and neglected my brothers and named my children and my wife as my successor, so they are such disputes. That this land belongs to our father, it is not you, the woman who came to take over, even if you are named as the successor, you are the wife. We have these our sons, the in-laws so there is that dispute. But since you are the woman, the wife even if you look at the original file our names are there, so we are the ones who are supposed to take over the management of the farm. So it is like, can we inherit you, so that you are under us, so.... in as much as you are named the successor and you are the wife, the sons-in-law, who are the enemies will try and force that change, in as much as you are named the successor, you should be a dependent like you are a child...

(Personal communication, MINT 001, 2 January 2018)

Ng'uono et al. (2014) indicated that

agricultural development in Kenya for women is hampered by the fact that land ownership is the preserve of men and not women. Furthermore, women do not have the power to make decisions on land. In many patriarchal African countries, cultural customs dictate that if a woman becomes a widow, she has to remarry one of her husband's brothers. This custom allows the woman to continue having access to land and food security. If no, she would have to leave the lineage of her dead husband.

Makhado and Pelizzo (2016:33) argued that "this leaves women struggling for their own subsistence." According to Makhado and Pelizzo, it is important to note that women's access to land is contingent upon their relationship to men and their marital status. Since 1% of the proportion of respondents sampled were widowers, it was interesting to note that the above scenarios do not seem to play out with the same magnitude. However, one respondent noted that '...ladies are not entitled to inherit land...I will divide the land among my sons' (Personal communication, 004M, 4 January 2018).

Ly and Wang (2018:1660) asserted that 'the patriarchal world outlook results in men's governance over both women and nature.' They added that it was only by uniting the two together can they jointly break loose the shackles of the patriarchal world. Thus, from an eco-feminist perspective, as Samandari (2017:5) posited,

many societies have historically approached physical vulnerability by placing unequal burdens on women and men, leading to the domination and privileging of men over both women and the environment, for example, by traditionally granting men and not women ownership rights to land.

This will be further discussed in the theme women and land tenure systems. The next section discusses the age demographics of the respondents in the study.

5.1.3. Age

Thirty-six percent of the participants in the Ahero Irrigation Scheme research were aged 60 years and above, followed by 24% who were between the age range of 51 to 60 years, 21% fall in the age range of 41-50, 10% between the age range of 31 to 40, nine percent did not respond to this question, while there were no respondents who fell in the age groups of 21 to 30, and 15 to 20 years. Maiga et al. (2017: 4-5) claimed that “to make a livelihood out of agriculture, one needs to acquire or rent land and that ill-defined land tenure policies in many African countries, hinder the ability of individuals to buy or rent land.” Maiga et al. (2017) go on to conclude that one of the main reasons why the youth are leaving agriculture is because of the lack of access to land. This study asserts that the respondents who hold titles to the land are from the first, second or third generations, and have inherited the land from their grandfathers and fathers as several of the respondents (e.g., Respondents 008F, 004M and 003M) in the Ahero Irrigation Scheme study testified. In the next section we discuss the household status of respondents in the Ahero Irrigation Scheme in 2019.

5.1.4. Household Status

The Ahero Irrigation Scheme study noted that 48% of the participants came from male-headed households, while 38% were led by female-headed households, while 14% of the participants did not respond to this question. Leadership roles within the households in the scheme were predominantly male dominated. While leadership within every household is important, this becomes key when it comes to financial expenditure within the households. This will be discussed in greater detail under the theme financial resources and assets.

Chigbu (2019) has asserted that the role of women in household management may be a factor of women’s disempowerment in some communities within sub-Saharan Africa because it places them in a dependency relationship with men who are breadwinners. However, this might not be the case in some other sub-Saharan communities where women are mostly the breadwinners. In these other communities, women are seen as empowered, rather than disempowered.

It is therefore important to consider the “differences”, rather than only the “commonalities” when tackling development challenges that relate to cultures, gender and people. Figure 7 below showcases the household status of respondents in the scheme.

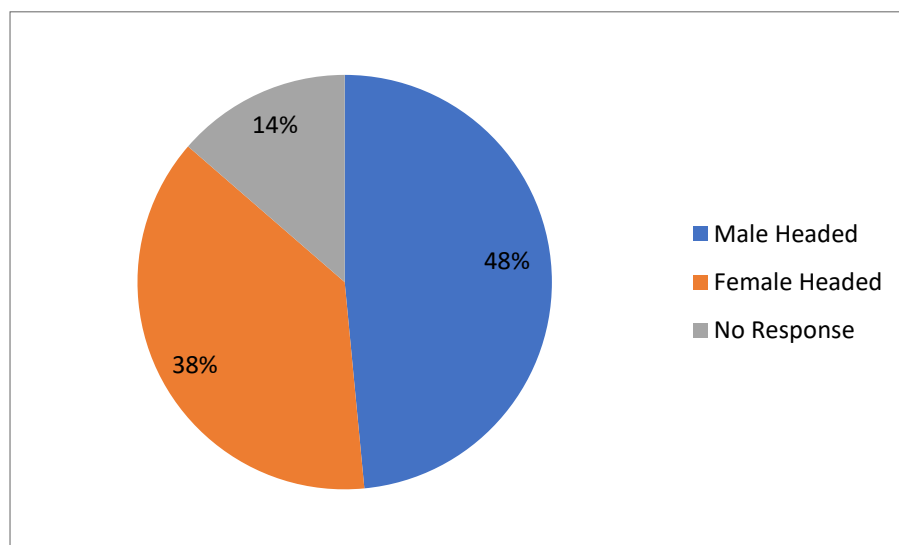


Figure 7:

Research respondents household status (2019)

5.1.5 Number of People living in households in Ahero Irrigation Scheme

The number of people within the various households within the Ahero Irrigation Scheme varied. Sixty-two percent of households in this study stated that they had between 1 to 5 people living in the household, followed by 29% of households stating that the average number of people within their home was between 6 to 10, only 1% of the households had between 11 to 15 people, while 8% of the respondents did not answer this question. There are several reasons why the sizes of households were small. For example, older children may have moved out of the family household; family members migrated out of the scheme, but the study has no concrete answers as to why the number of household members ranging between 1 to 5 are few. The next section discusses the education level of respondents within the scheme.

5.1.6. Highest Level of Education

The study noted that only 3% of the respondents had attained university education. A further 9% of the respondents had received education up to tertiary level; 24% attained secondary education, 56% of the respondents attained primary education, while 8% of the respondents did not respond to this question. This is represented in figure 8 below:

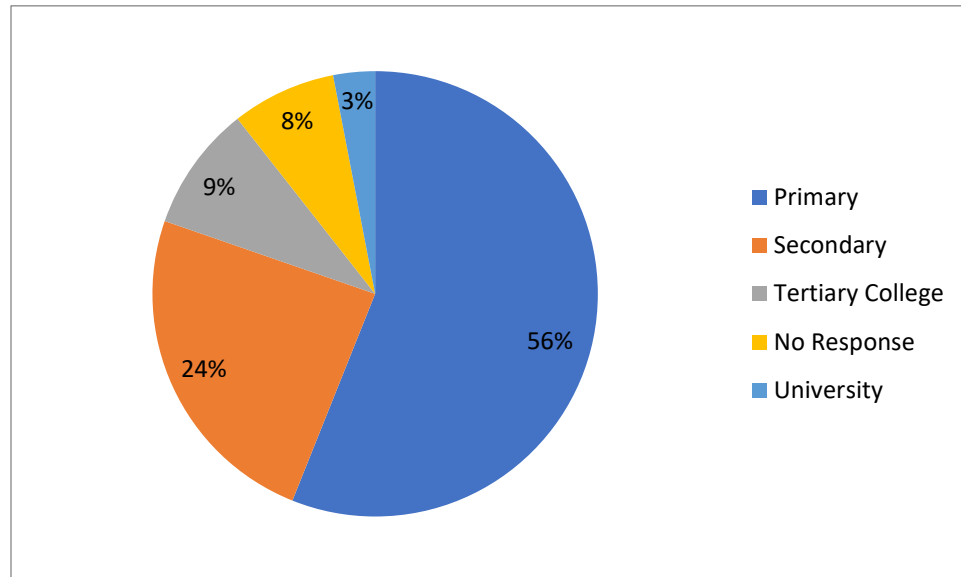


Figure 8:

Research respondents highest level of education (2019)

Figure 8 above shows the levels of education attained by respondents in the scheme. This is important as education has a great impact on farming. As Sharma and Maheshwari (2016:61) argued, “when training opportunities for rural agricultural producers arise, they mostly go to men, who already have some formal education.” One male participant when asked if education is a factor hindering women from becoming better farmers noted that: some women believe that farming is only for men and another stated that women lacked knowledge in farming techniques (e.g., Respondents 018M, and 015F) in the Ahero Irrigation Scheme study testified.

The “low levels of education attained by female farmers are a cause of great concern” (Hart and Aliber,2015:4). Education is crucial to enable end-users adopt and make optimal use of new technologies. According to Hart and Aliber (2015), the education levels of farmers in Africa will need to be boosted, especially as farmers engage in more sophisticated input and output markets.

...Looking at the Kenyan education system ... fortunately our farmers at least have some basic education. It is not easy to train them...you know to be a great leader like a secretary you have to keep records of cash transactions, and they do this as a group, and it is basically done by the group leadership, as they have to negotiate on the price of the crop. So, ... if you lack basic knowledge then it affects....

(Personal communication, MINT001, 5 January 2018)

Mukoni et al. (2018) assert that environmental education initiatives and sustainable development strategies that do not promote the full participation and empowerment of women and girls are bound to fail. Bozchelouie (2018) claims that the reason for this is that agricultural education is strongly patriarchal and rarely leads to improvements in the education of rural women. Mukoni et al. (2018) support this argument and assert that women as a group have continued to be marginalized due to the influence of patriarchal systems which often privilege men’s voices over those of women. Consequently, women have not participated fully in environmental education programmes. Having programmes that ensure women's participation in irrigated agriculture is a step forward in ensuring women gain better access to agricultural skills and training. As shown in figure 9 below. The highest level of education attained by women in Ahero Irrigation Scheme is in primary level at 67%, 24% attending secondary school, and 2% attending tertiary education (attending college not University).

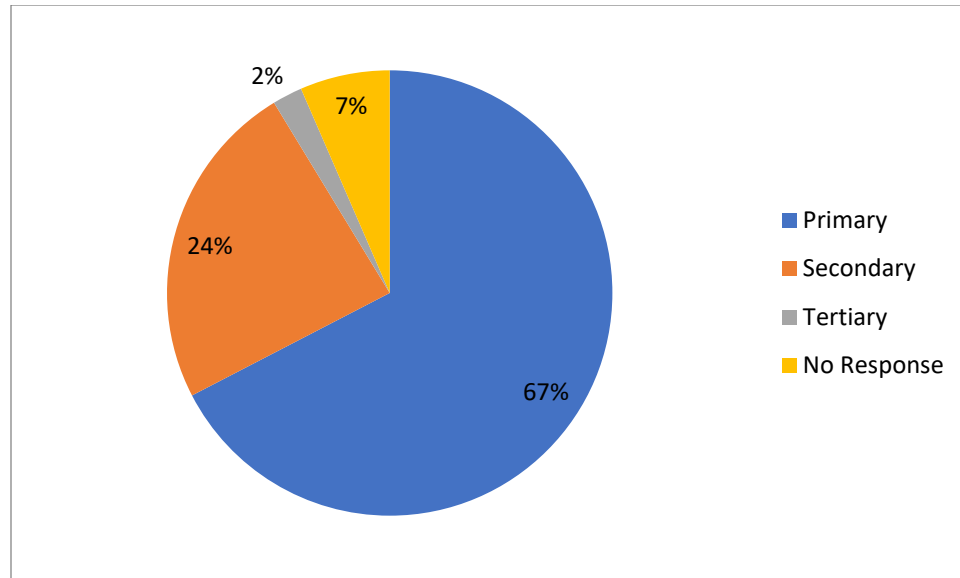


Figure 9:

Research respondents education levels (females) (2019)

Thirty-eight percent of the male respondents had primary education; 19% had secondary education, 24% had tertiary education (attending college not University), and 9% had university education. Ten percent of the respondents did not respond to this question. As shown by figure 10 below.

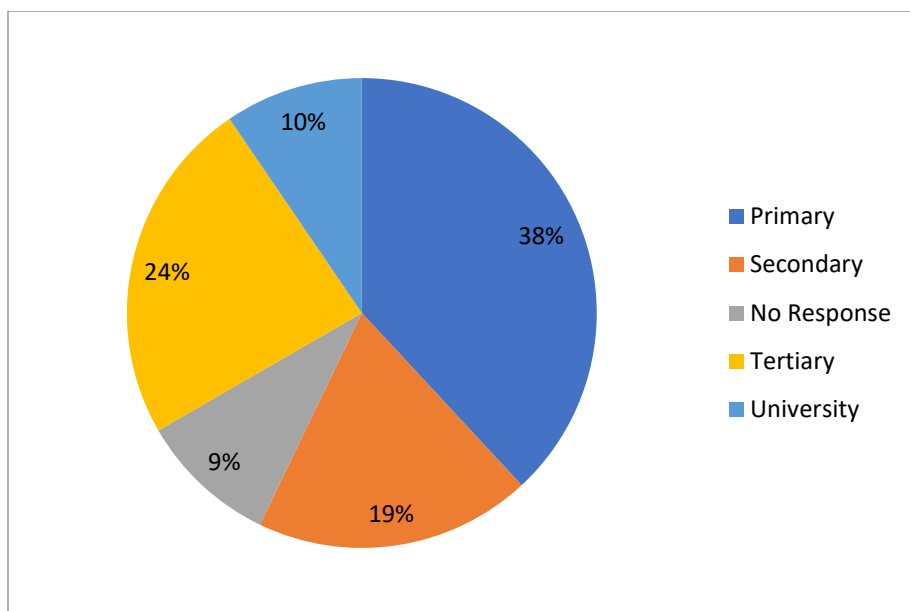


Figure 10:

Research respondents education levels (males) (2019)

5.1.7. Employment status of participants within Ahero Irrigation Scheme

Sixty-four percent of the participants viewed themselves as farmers as shown by figure 11 below. This was important to note as some farmers within the scheme undertake farming as a secondary occupation. Also, some respondents stated that they were unemployed, others were employed while still others left the question unanswered. Moreover, 33% of the female respondents stated that they were unemployed with only 58% of the females indicating they were farmers. These figures of (33%) differ strongly when compared to those for males where 15% were unemployed while 60% stated their profession as ‘farmer’. It becomes clear from these data that the higher proportion of unemployed individuals within the scheme were female. One can argue that this group of females within the scheme “need to be engaged” (Sharma and Maheshwari, 2016:61). In addition, most rural farmers were illiterate and poor and were not be in a position to gain new skills and knowledge that could help them become self-employed.

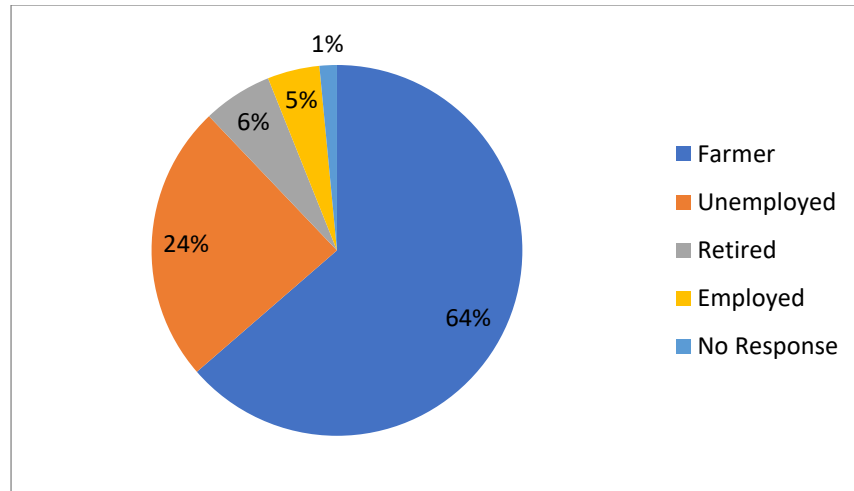


Figure 11:

Research respondents employment status (2019)

Fifty-eight percent of the female participants viewed themselves as farmers, 33% as being unemployed, 2% as employed and 7% did not respond to the question on employment status. As shown by figure 12 below.

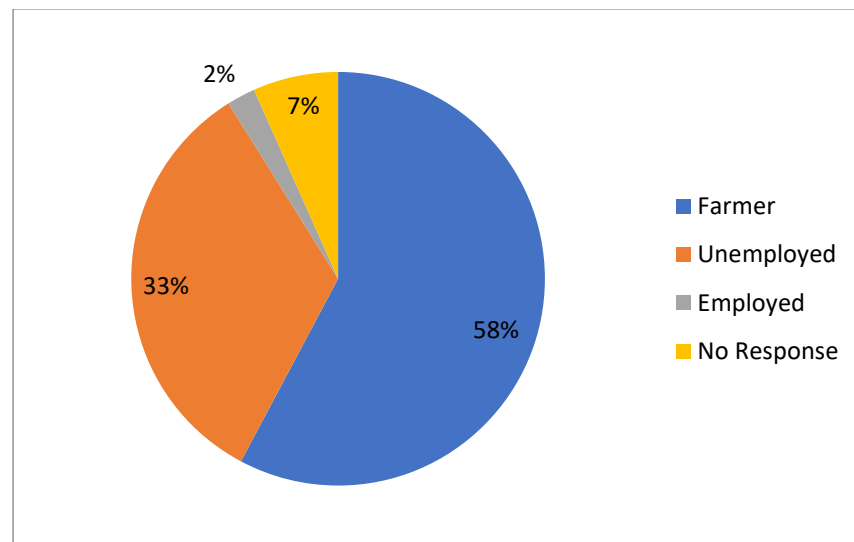


Figure 12:

Research respondents employment status (females) (2019)

Sixty-percent of the male respondents viewed themselves as farmers, 15% as retired, 5% as unemployed, another 5% as employed and 15% did not respond to the question on employment status. As shown by figure 13 below.

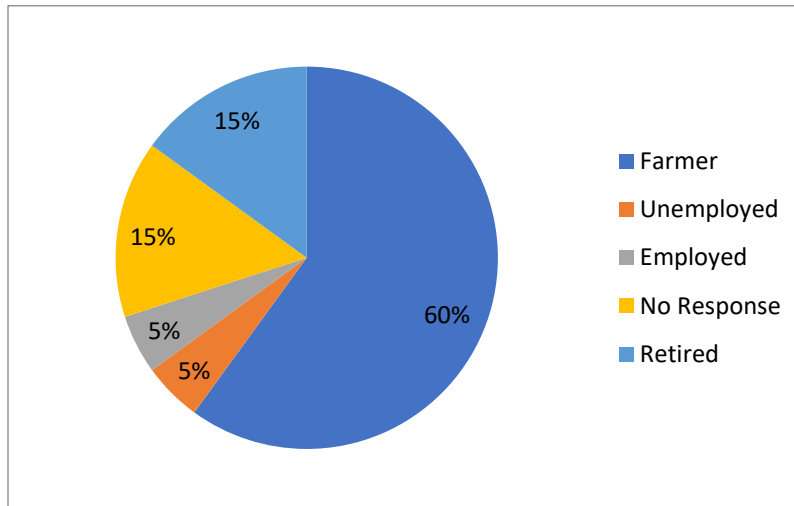


Figure 13:

Research respondents employment status (males)(2019)

5.1.8. Duration of stay at Ahero Irrigation Scheme

Forty-one percent of the residents who were sampled lived in the area of the Ahero Irrigation Scheme for 20-years and more. As shown in figure 14 below. This meant that a large proportion of the respondents has called no other place home. This figure (41%) closely resonated with those between the ages of 60-years and above, who comprise of 36% of the respondent population. Only 3% of the population sampled lived in the scheme for a period of 1 to 3 years. This meant that they may be new inhabitants who may have bought land from a previous owner and have decided to settle in the scheme, hence showcasing the young age group of 31-40 years. Those who are the ‘inbetweeners’ who have lived in the scheme for 16-20 years are at 20%, while those who have lived in the scheme for 11-15 years total 14% of the population. The remaining have lived in the scheme for 6-10 years. Seven percent of the respondents did not respond to the question.

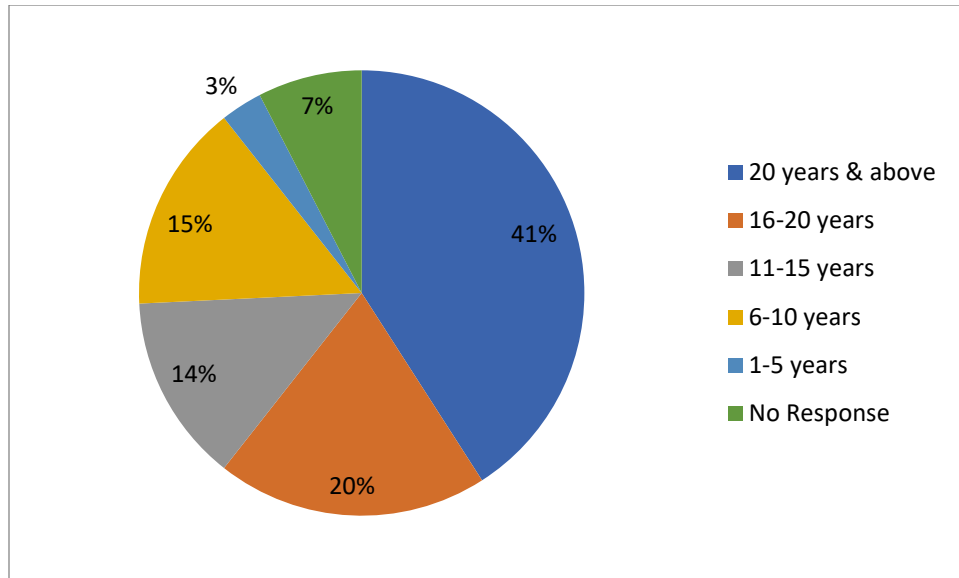


Figure 14:

Research respondents duration of stay (2019)

The next section discusses one of the key themes of the study: women and agriculture. This theme is divided into sections, with participants responses in tables. We first begin by discussing the role of women and agriculture.

5.2. Women and agriculture

5.2.1. Women's roles in agriculture

Men and women provided different responses on the role that women played in agriculture in the Ahero Irrigation Scheme. These varied responses are presented in Table 1.

Table 1. The role of women in agriculture (2019)

| Respondent Number | Respondent Response |
|--------------------------|--|
| 004M | <i>‘Any activity in our society of today requires active participation of both men and women so as to ensure joint contribution towards developing our economy.’</i> |
| 003M | <i>‘Yes, women are the most determined people in the society therefore, having them taking a major role in agriculture will help us in ensuring improved production.’</i> |
| 002M | <i>‘Women should get involved in all farming activities to reduce cost of labour.’</i> |
| 032F | <i>‘..., I feel women have a major role to play in agriculture because most women are always serious in whatever they do and they are always determined, therefore women have a major role of ensuring the agricultural sector does not collapse.’</i> |
| 014M | <i>‘Women should get involved in active farm activities so to ensure increased production’</i> |
| 026F | <i>‘Yes... as a widow I do play a role for schooling my children through agriculture’</i> |
| 023F | <i>‘Yes, I do provide for my family through farming’</i> |
| 009M | <i>‘No... I have a very lazy wife’</i> |
| 006M | <i>‘Yes... My two wives sell my products’</i> |
| MINT001 | <i>‘Yes, in rice production. They are six major activities, and it is women who actively participate.....so in the entire chain of rice production you can say 80% is done by women...the major role mostly in production... Yes, in production, you see it is divided into two. We have production, and maintenance and infrastructure. The infrastructure is done by the government and the production by the farmers. Eighty percent of it is done by women.’</i> |

In Ahero, we note that 68% of those who participated in the study were women and that they considered farming as their primary occupation. One respondent noted that ‘...they have a major role to play, because there is some work especially in rice plantation, believed to be for women.’ and another respondent noted that ‘...I feel women have a major role to play in agriculture because most women are always serious in water. ... they are always determined, therefore women have a major role of ensuring the agricultural sector does not collapse. (e.g., Respondents 021F and 025F in the Ahero Irrigation Scheme study testified.

In addition, respondents 013M and 014M recognize women’s contribution towards agriculture within the scheme. This was important as it showed that some of them see women within the scheme as important players in the agricultural sector.

Johansson (2016:14) argued that

the inclusion of women, in many water projects appears only on the surface. Women are either briefly mentioned in water management descriptions or only given power on paper; and that even in some cases women are represented by their husbands or brothers in water committees.

Johansson (2016) asserted that women were less recognized when they were viewed as irrigators, fishers or farmers. Doss et al. (2018:69) argued that

the global community is mobilising support for Sustainable Development Goals (SDG) and that 5 of these goals focus on gender equality and women's rights, and at least 11 of the 17 SDGs require indicators related to gender dynamics. The second goal of ending world hunger explicitly mentioned addressing the constraints for women small-scale food producers and the nutritional needs of women and adolescent girls.

Doss et al.(2018) noted that this mobilization has contributed to a growing demand for nuanced and accurate data on women's contributions to food security and that despite this emerging global movement for reliable indicators, well-intentioned but statistically unfounded stylized facts on women, agriculture and the environment continue to circulate in written documentation.

5.2.2. What are the challenges faced by women in agriculture?

This question had diverse responses from both males and females. Some respondents choose not to answer the question. Hence, the initials N/A were noted on some of the respondents' answers. Some of the female respondents felt that women did not face any challenges when it came to the agricultural sector. This is shown in Table 2 below.

Table 2. Challenges faced by women in agriculture (2019)

| Respondent Number | Respondent Response |
|--------------------------|---|
| 009M | <i>'Women are lazy that is the only challenge'</i> |
| 008M | <i>'Women lack skills and strength to be farmers'</i> |
| 033F | <i>'Leadership is a problem as some leaders value their personal interest.'</i> |
| 034F | <i>'Some equipment, are very expensive that women cannot afford, like fertilizer, and the government should help through giving them some money to buy those equipment'</i> |
| MINT002 | <i>'... They are having some sickness because of working hard, because they are hungry ...'</i> |
| FINT003 | <i>'During the time when we are going to the field, we do bending...okay besides bending what else? During the time we stay long in the field when working so we get diseases?... Malaria, pneumonia, back ache, because of bending for a long time.,...'</i> |
| FINT001 | <i>'Yes, we face a lot of challenges sometimes when it is planting season.,you may be forced to take your children to go with you to the farm to plant.... Because if you are to be paid to till someone else farm, and they promise to pay and they don't, it means you cannot have enough money to pay someone'</i> |

| | |
|------|---|
| | <i>to assist you on your own farm,hence you must face your problem, so this means you take your children to the farm to help you till/weed your own farm, it also means that you run at a loss.'</i> |
| 014F | <i>'Lack of water for irrigation, poor leadership by the management, the government should provide more irrigation equipment's; women should also be allowed in the leadership.'</i> |
| 032F | <i>'Women are mostly underrated in the society and most people, especially men, do feel that women should not take active participation in agriculture. We normally overcome this through keep on going on. Lack of adequate finance- This is a major challenge to us. We normally get assistance maybe from our sons or borrowing from other business people.'</i> |
| 019M | <i>'They face challenges like discrimination in the scheme. Many of them are not allowed to own a farm. And I think therey should be gender equality and fairness amongst us when it comes to land ownership'</i> |
| 030F | <i>'Discrimination - most people feel that women are weak and therefore cannot actively take part in agriculture.... We normally try to get involved in any activity... even those that people feel are meant for men, so as to show them that we are able to do them'</i> |
| 025F | <i>'Lack of enough funding to acquire or to prepare the land for planting. Sometimes it forces you to acquire loans elsewhere to settle your problems later, you return the money with some profit.'</i> |
| 018F | <i>'Lack of capital to purchase farm inputs- I usually borrow money from friends and my retained earnings to overcome it. 2. Insufficient water - I usually overcome it by consulting with the water users to increase the volumes of water.'</i> |
| 008F | <i>'Lack of sufficient finance;, this is a major challenge to women but we normally try to seek credit from money lenders - mostly from business men.'</i> |
| 001F | <i>'Customary laws and traditional beliefs - widowed women should not inherit land after the death of the husband. In our clan women are not supposed to go to the farms earlier than the men being men who are the head of the family.'</i> |

| | |
|------|--|
| 010F | <i>‘Financial challenge is the major problem; I do overcome it by getting financial support from money lenders.’</i> |
| 014F | <i>‘Capital to start the agriculture- we have skills and knowledge but how we can access capital is difficult so we overcome them by borrowing loans for other firms.’</i> |

Women face numerous challenges that affect them within the scheme. One of the respondents noted.’ They face challenges like discrimination in the scheme. Many of them are not allowed to own a farm. And I think gender equality and fairness should be among us when it comes to land ownership (Personal communication, 019M, 3January 2018)

Another respondent noted the following:

Mostly it is about land ownership. None of this land is owned by the farmer holder. It is trust land. But the farmer is a holder, when the land was being distributed to farmers, the licensee. In the books of the scheme many of the owners are mainly male farmers ... okay and we have what we call succession on these farms. The policy is that the person needs to name a dependent as a successor from the family. A majority of the farm holders name their sons as the major successors. That means if the man goes, the person who gets land are the sons, who are male. The wives and daughters come as dependents.

(Personal communication, MINT001, 3 January 2018)

Other respondents have noted the following: the ‘lack of water for irrigation, poor leadership by the management, the government should provide more irrigation equipment; women should also be allowed in the leadership’ (Personal communication, 041F, 4 January 2018); ‘Women lack skills and strength to be farmers’ (Personal communication, 008M, 4 January 2018; ‘financial problems – capital, lack of capital’ (Personal communication,005F, 3 January 2018).One other respondent noted the following: ‘Capital to start agriculture- we have skills and knowledge but how can we access capital? It is difficult, so we overcome this by borrowing loans from other firms’ (Personal communication, 014F, 4 January 2018).

A final response regarding the challenges that women farmers experience is enunciated in the following response:

‘Discrimination - most people feel that women are weak and therefore cannot actively take part in agriculture. We normally try to get involved in any activity even those that people feel are meant for men, so as to show them that we are able to do them’

(Personal communication, Respondent 030F, 5 January 2018).

The researcher, however, noted that some of the respondents’ comments showed that not all of them saw themselves as having any challenges. Those farmers who saw themselves as facing challenges stated that accessing finance was one of their biggest challenges while other challenges included accessing farm inputs such as fertilizers, seeds and other farm inputs. The challenges women faced within the Ahero Irrigation Scheme were viewed by both men and women within the scheme. Some of these challenges were similar to what had been mentioned by key authors on the subject, namely, land ownership, lack of capital and water access. These challenges are discussed continuously in the chapter.

5.2.3. Cultural barriers that hinder women from farming

This question sought to understand the cultural barriers that female respondent farmers faced within the Ahero Irrigation Scheme study and the impact this had on hindering them from farming their land. Some respondents noted that a few traditions impacted their farming while some felt no cultural barriers affected them. One respondent noted that: ‘...a lot of cultural barriers hindered women from farming. These beliefs included; no farming on burial days or even when one is pregnant’ (Personal communication, 019M, 3 January 2018). Another, noted, ‘relatives of a dead person should not go to the farm until the person is buried.’ (Personal Communication, 033F, 3 January 2018) and ‘a woman who gives birth to twins should not go to the field until cleansing is done. The reason for this is that it is believed that women are dirty and may cause hailstones to rain and destroy the crop.’ (Personal communication, 001F, 4th January 2018).

Some respondents contended that cultural beliefs did not have a strong impact on their farming except when linked to two major socio-cultural aspects within their communities, namely, death, and childbirth. The death of any farmer within the scheme was treated with the highest respect and regard as no farmer was allowed to farm during the funeral of another farmer. It was presumed that the land shall be cursed and that hail stones will destroy the crops if the land was cultivated. The second was the birth of twins. A woman was not allowed to go to the field after birth – rather the mother needed to nurse her baby during this time.

Having explored some of these challenges it becomes clear as to why some women, are not able to till their agricultural land. Farming is an age-old activity that still bears certain socio-cultural aspects that affect it as an economic activity. These aspects are not likely to be removed because they have apparently been ingrained within communities, from one generation to the next. Consequently, it would take a lot of convincing to change the belief systems that have been passed on from generation to the next. Also, men and women play central roles in agriculture. Some of the respondents noted this and were keen to point out that men carried out some of the key activities within farming in the scheme, including supporting the women farmers in the rice fields. In the next question we explore, women's feelings, with regards to men being supportive to women as they engage in agricultural activities within Ahero Irrigation Scheme.

5.2.4 Men's supportive role to women in agriculture

The responses in table 3 below were from both male and female respondents. The statements below indicate the respondents' views with regards to women's role in irrigated agriculture within the Ahero Irrigation Scheme.

Table 3. Women's perspective on men's support of their role in agriculture in (2019)

| Respondent Number | Respondent Responses |
|--------------------------|--|
| 009M | <i>'Yes, I offer my wife capital(money to buy inputs) to farm'</i> |
| 008M | <i>'Yes- we men do almost everything on the farm'</i> |
| 006M | <i>'Yes, I am supportive, I give my wives chance to practice agriculture.'</i> |
| 002M | <i>'Without men, women cannot do farming alone..., some duties are harder and require men to do; that is, during the dry spell water issues are above women capabilities.'</i> |
| 042F | <i>'Yes, some farm activities are not done by women (e.g., harvesting of rice, puddling) since they require a lot of energy.'</i> |
| 040F | <i>'No ,men concentrate too much on politics than farming.'</i> |
| 038F | <i>'Yes, they help us perform some hard farm activities like harvesting the rice.'</i> |
| 037F | <i>'No, men feel they are able to do all the farm activities so they don't support women's role in agriculture.'</i> |
| 032F | <i>'Yes, men do offer services that require a lot of energy that we women cannot do, this includes ploughing and harvesting of rice for stacking during harvesting.'</i> |
| 017M | <i>'No, many are not supportive of women's roles in agriculture because some men think that women are unable to own land ...'</i> |
| 030F | <i>'Yes, some activities, for instance water issues when volumes are low, only men are able to deal with it. This is because at times water is pumped late in the night and at this time the women are not able to do it.'</i> |
| 027F | <i>'Yes, most families are headed by men. ... men ... provide financial support to women who carry out agricultural activities.'</i> |
| 028F | <i>'No, men feel they are superior to us.'</i> |
| 025F | <i>'Yes, they help women in clearing land before cultivation occurs.'</i> |
| 015F | <i>'Yes, they help women in clearing land before cultivation occurs.'</i> |
| MINT002 | <i>'Yes, they are.? Supporting them with money, providing them with money- if I</i> |

| | |
|---------|---|
| | <i>have - and helping her, doing some work with our hands,... things like weeding? If you don't have money, I go with her and help her, but most of it is her work ...'</i> |
| MINT001 | <i>'Ten to 15% of the men are there only? ... I think it is cultural ... men appear at two stages of the rice production. ... at the beginning, and during the harvesting and marketing; that is where you see a majority of the men, where money is involved... but in-between it is work that is being done by the women and the rest of the family...'</i> |
| FINT003 | <i>'Yes, almost two-thirds of men do work in making bands, clearing canals and when they are preparing the land they use cows for levelling the land ...even in the nursery it is mostly men...'</i> |

Women within the scheme felt that they received some support from the men as noted from the statements from: (Personal communication, 038F, 4 January, 2018), and (Personal communication, 032F, 5 January, 2018). On the other hand, some of the respondents did not feel the men within the scheme were supportive of the women: '...men feel they are able to do all the farm activities, so they don't support women's role in agriculture.'(Personal communication, 037F, 3 January, 2018).Furthermore, some of the male respondents, felt that without them being present women would be unable to conduct agricultural practices in the farm, as stated by statements by (Personal communication,002M, 3 January 2018) and (Personal communication, 042F, 5 January 2018). These remarks highlight the patriarchal values that are held by some men within the scheme.

The Stockholm Environment Institute (2018) asserted that when women are economically and socially empowered, they become a potent force for change. According to Personal communication, MINT001, 3 January, 2018) ‘... in farms where the farm succession has been given to a lady family member. The output of agricultural proceeds is better because activities are controlled by a lady.’ In rural areas of the developing world, women play a key role in running households and make major contributions to agricultural production. However, the inequalities that exist in agriculture between women and men make it difficult for women to fulfill their potential. Women rarely have access to the resources that make their work more productive and ease their heavy workload. Ultimately, it is not just women who are held back, but also their families, their communities and local economies. Rural women have many roles, and they have responsibilities and knowledge that differ from those of men. As farmers, they plant, weed and harvest food crops and tend livestock. As caretakers, they look after children and relatives, prepare meals and manage the home.

According to Meinzen-Dick et al. (2014:56)

It is important that gender analysis be among the factors of agricultural production. This is important because it will enable researchers and other policy makers to have better insight with regards to agricultural production. Furthermore, it will provide better insights to the constraints faced by both male and female farmers. In addition, it will give data on the different experiences of women and men when studying resource politics. This is important because women have traditionally played a central role in agriculture in developing countries, where on average 40% of the agricultural labour force is provided by them.

In many parts of Asia and Africa the proportion of the women agricultural labour force is as high as 50% (Shepherd, 2014). With agricultural labour force being at 50%, the study, sought to better understand from both male and female farmers what they felt would assist them to become better farmers.

5.2.5 What can assist women to be better farmers

This question required the respondents to state the type of assistance that would make them be better farmers and how best they can be assisted in becoming better farmers. Some of the responses received, have been tabled in figure 4 below.

Table 4. What makes one to be a better farmer (2019)

| Respondent Number | Respondent Responses |
|--------------------------|--|
| 004M | <i>'Availability of ready market so as to ensure easy selling of our products, provision of gravity water so as to ensure continuous flow of water.'</i> |
| 032F | <i>'The local government (i.e), county government) in collaboration with NIB should work together to ensure that we get better market prices. The national government should provide subsidies for farm inputs (e.g., fertilizer).'</i> |
| 011M | <i>'Innovation and invention of new farming technology, mechanization of agriculture, trainings in agribusiness.'</i> |
| 024F | <i>'Eradication of traditional beliefs in agriculture- access to loan facilities to all regardless of gender.'</i> |
| 008F | <i>'To encourage women to be better farmers, training and workshops should be organized so as to enable women to develop new farming idea, and the provision of financial resources.'</i> |
| MINT001 | <i>'Women are already better farmers, maybe what they need is assistance, more support in terms of advances, some training on crop husbandry, financial management they do, may be the issue of record keeping.'</i> |
| FINT002 | <i>'Money is what can assist you? Yes, this is because you can hire people to help you clean the canals, you can purchase fertilizer as soon as cash advance is received and you can plant your crops immediately. Everything is money.'</i> |
| 025F | <i>'Finance...-to be a good farmer you need enough money to buy things required for farming to take place, like good variety of seeds.'</i> |

The women farmer respondents noted that better access to finance would be very helpful in having them improve the returns from their farms. Others noted that better access to farm inputs such as fertilizers, as well as seeds would contribute to achieving better returns. In addition, support from the government in terms of finding better markets for their crops was also highlighted. Better training is needed in ‘... crop husbandry, financial management, record keeping, mechanization and the provision of financial resources’ as indicated by (Personal communication, MINT001, 3 January 2018), (Personal communication, 011M, 4 January, 2018) and (Personal communication, 4 January 2018). It is important when discussing women’s roles in agriculture that certain prisms are taken into account. Doss et al. (2018:70), for example, stated:

the kernel of truth behind the myth that women account for 60-80% of food production is important for food security, especially within women’s households. This is because women's kitchen gardens or homestead plots are often not counted as agriculture, but they play an important role especially in providing dietary diversity. In some contexts, women also grow a large share of the staple cereal or root crops that are consumed by the household.

We have discussed the importance of agriculture and its links to women, in Ahero Irrigation Scheme. We continue to explore this relationship further, by discussing women and land tenure systems that govern the use of agricultural land in the next chapter.

CHAPTER VI

LAND AND WATER ACCESSABILITY

6.0. Introduction

This chapter is divided into two key sections: the first section discusses the theme: women and land tenure systems, while the second discusses water and irrigation. This section will look to discuss their impact on agriculture within the Ahero Irrigation Scheme. The information is analyzed in regards to the literature review and the theoretical framework underpinning this study. We begin the chapter by discussing the theme: women and land tenure systems.

6.1. How did individuals access land they farm

This question sought to gain a better understanding of the manner in which respondents acquired the land they currently farm. This question was asked to both the male and female participants, with a view of gauging the different ways in which the two genders gained access to their land or lands. The responses by respondents can be viewed in table 5 below.

Table 5. Land accessibility in Ahero Irrigation Scheme (2019)

| Respondent Number | Respondent Response |
|--------------------------|--|
| MINT002 | <i>‘The one that I have I gained (inherited) from my father, after his death’</i> |
| FINT002 | <i>‘The land I have, I got it from the father of my husband who gave it to my husband.’</i> |
| FINT002 | <i>‘The farm that I have belonged to my husband’s father.</i> |
| FINT003 | <i>We got it from our grandfathers.-My husband’s paternal grandfather gave the land to my husband, in 1990.’</i> |
| 002F | <i>‘The land belongs to my husband’s family’</i> |
| 006F | <i>‘Through NIB after the death of my husband’</i> |
| 015F | <i>‘Through land leasing and also my own family’s share from my father-in-law.’</i> |
| 017F | <i>‘Land was divided equally by NIB to people who were staying around.’</i> |
| 018F | <i>‘I bought it on a contract... after harvesting my crops the land will be</i> |

| | |
|------|--|
| | <i>free for another person, or if I want to regrow another crop I simply give the owner of the land some money.'</i> |
| 021F | <i>'Through Inheritance'</i> |
| 022F | <i>'Purchase'</i> |
| 026F | <i>'Family land'</i> |
| 029F | <i>'My husband inherited from his father'</i> |
| 015M | <i>'Inherited from my grandfather'</i> |
| 001M | <i>'Was given by the government in 1963 as a pilot project'</i> |
| 007M | <i>'Leased'</i> |
| 005M | <i>'Rented land'</i> |

In the case of Ahero Irrigation Scheme, many respondents either inherited the land from their grandfathers or from their late husbands, within the Scheme. Those farmers who did not fall within these two categories have a working agreement within their family clans: As noted by the following respondents: 'Through land leasing and also my family's share from my father-in-law.' 'the land belongs to the family' and 'Inherited land from my grandfather' (Personal communication,015F, 4 January,2018),(Personal communication,002F,3,January,2018),(Personal communication,004M, 4 January 2018).

It is for this reason that we need to understand the myth that claims "women own 1% or 2% of the world's land" (Doss et al.,2018:71)".This is important because women are extensively involved in food production. The data in the Ahero Irrigation Scheme study show us that women do not hold a lot of power with regards to land as land distribution and control are skewed towards men. In addition, the management of Ahero Irrigation Scheme notes that almost all inheritance systems disadvantage women in terms of inheritance and when women legally inherit, they often face strong social pressure to relinquish their inheritance. As one respondent (Personal communication,MINT001, 3 January, 2018) asserts that when a woman is mentioned as a successor, towards a plot of land in the scheme, they encounter difficulty with regards to taking ownership. This is because the in-laws view the land as family land and not individual land. They therefore use wife inheritance as a means to secure the land. If not the in-laws may fight the women, in order to secure the land for their family.

Samandari (2017) asserted that rural women face insecurity when it comes to land tenure. This was because land accessibility is based on their relationship with men. This situation has not changed over time. This situation needs to change. African customs play a great role when it comes to stewardship of common property resources, and it is for this reason that African women suffer. This is because these customs are made under patriarchal conditions to ensure that men controlled community assets. While this system of land ownership may have beneficial intentions for the community or clan, it impacted detrimentally in ensuring food security to men and women farmers. It is therefore important that laws be introduced and enforced to ensure that both genders reap the benefits of the land they work on.

It is vital that women understand the legal pluralisms of the law so that they can use it to better understand and recognize different situations that may arise with regards to land. Data on land ownership in Africa is scarce. This scarcity is attributed to the lack of accurate data collection and storage. Thus, “it is difficult to give accurate data with regards to gender ownership of land in Kenya and in sub-Saharan Africa as a whole” (Doss et al.,2018:72). With regards to the Ahero Irrigation Scheme, a majority of the respondents do not hold titles to the land as the land is trust land under the ownership of the government of Kenya, since independence.

Thus, in real sense land ownership in the Ahero Irrigation Scheme area does not belong to any one gender. However, the leases within the scheme are in the names of men and not women. According to ecofeminism prisms, where land titles exist, difficulties exist as there is the lack of documentation with the names of female farmers as landowners. This therefore hinders the chances of women acquiring agricultural resources, such as capital, and other farm inputs that can boost their productivity on the land. It is therefore important that we have policies in place that can ensure that women have equal access and ownership to land as men. In addition, there should be initiatives that can support the women farmers to boost their agricultural productivity.

Land disputes take time to resolve and it is in this regard why agricultural productivity within the scheme, may be hampered. This is because; while this is ongoing the land remains fallow. Thus, reducing productivity levels of the farm. In addition, women may not be able to receive sufficient income from the land as they are not able to till the land during this time. Thus, impacting the economic standing of the family, more so if the family is headed by a woman who is a widow.

It is with this in mind, that the study sought to gain a better understanding of the challenges faced by women farmers in the scheme, with regards to land acquisition.

6.2.2 Challenges faced by women in land acquisition

This question sought to understand the challenges women faced in acquiring land and how they overcame these challenges. The question was also presented to men – some of whom chose to answer. Their responses can be seen in table 6 below.

Table 6. Challenges faced by women in land acquisition (2019)

| Respondent Number | Respondent Response |
|--------------------------|---|
| 034F | <i>‘Yes, my-in-laws wanted to take the farm away from me;, I solved the case with the chief.’</i> |
| 038F | <i>‘Yes, due to scarcity of land it becomes very difficult to divide the small land among family members.’</i> |
| 019M | <i>‘I think they face some challenges in acquiring land because women are married and go to new places to where they do nothing and for them to inherit the farm it become tricky unless they buy farms.’</i> |
| 018M | <i>‘Women face a lot of challenges in acquiring of land, like they are headed by men, and most of them don't inherit land from parents unless they rent it for a season.’</i> |
| 011M | <i>‘... the land is a family asset; everybody has a right on it, and distribution is according to the age and number of family members.’</i> |

| | |
|------|---|
| 016F | <i>‘Yes, we were two wives, so we had a lot of cases going on, on succession. The case was solved by the elders and we divided the farm in to two acres each, and that is what I have.’</i> |
| 014F | <i>‘Yes, I faced some challenges that were violent between me and my relatives after the death of my husband. They were after the land but I went further and accused them. After that I succeeded in acquiring the land.’</i> |
| 011F | <i>‘Yes, my husband’s family members were not happy and they never wanted me to inherit the land. The problem was solved by elders, and they resolved that each family member was to be given two acres, because they were four.’</i> |
| 005F | <i>‘Yes, pressure from the in-laws during land divisions. Involved the chief for succession.’</i> |

Respondents indicated that women encountered challenges with regards to land acquisition within the scheme. This situation parallels the literature on women’s agriculture with regards to the challenges women faced in terms of land acquisition. This is because culture plays a strong part with regards to one’s status of ownership to land. In addition, these relationships were encompassed in different ways in which women related with the entire family or their husband’s families as a first or second wife, or with regards to their marital status within their community, or the size of the land that was in dispute. However, some did not view their acquisition of land as challenging as they faced no challenges in acquiring land. They nevertheless noted that due to the small size of the land acquired, it was hard to divide the land among their children in inheritance. For example, respondent 038F noted that, ‘Yes, due to scarcity of land it becomes very difficult to divide the small land among family members’ (Personal communication, 038F, 4 January, 2018).

Respondents in the study underwent challenges when acquiring land within the scheme, and some respondents informed us that customary rights have to be undertaken in some instance. The next question sought to better understand what these rights were and how it affected the respondents within the scheme.

6.2.3. Customary rights and women's land acquisition

This question sought to understand if the female farmers had traditional aspects within their various cultures that hindered them from accessing land or if they were required to undergo certain customary rights in order for them to gain access to the land on which they farmed. Many of the respondents, who participated in the study, did not undergo any customary rights when accessing the land they own. The study was informed that in some cases customary rights such as wife inheritance may take place, but is not always the case.

Customs within the Luo community have an integral part to play with regards to different relationships within the Ahero Irrigation Scheme. For example, brothers-in-law are required to 'inherit' their widowed women to allow for the latter's land retainership by the kin. Women farmer respondents noted that African culture and traditions run deep within the community in the Ahero Irrigation Scheme and that changing the perceptions within the community will be difficult and challenging on matters relating to women farmers owning land. However, the management of the Ahero Irrigation Scheme have adopted measures in order to assist women to fight for their rights when customary rights tend to undermine women's acquisition of land, The Government Land Act (Cap.280) provides that compensation is compulsory when community land or private land is acquired and is payable to the spouse/s of affected persons as well as to "any person actually occupying the land and the spouse or spouses of such person" (LA s. 107). The CLA stipulates that there must be "equal treatment of applications for women and men" (CLA, s. 14 (4) (c) (i). Women marrying into a community may not be excluded as members, and their rights to land remain the same unless they divorce and remarry elsewhere (CLA s. 30 (5). The above there by indicates that there are sufficient grounds for women to appeal against injustices they may have suffered at the hands of the community land committee in matters related to land dealings.

6.2.4 . Crops cultivated within the scheme

The researcher sought to better understand if the farmers planted different varieties of crops – other than rice -within the Ahero Irrigation Scheme. This is represented in figure 15 below:

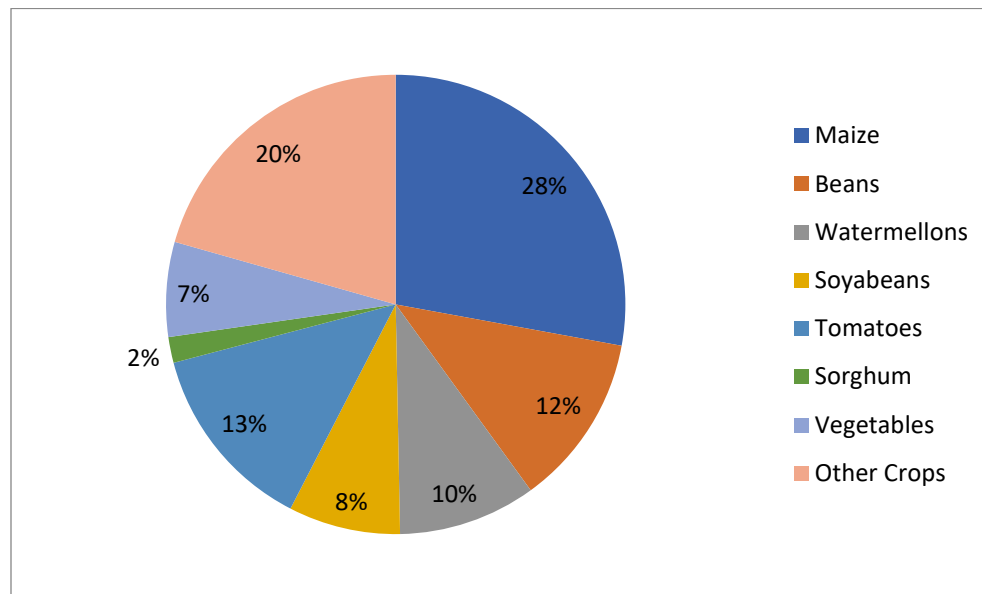


Figure 15

Varieties of crops grown (2019)

In the Ahero Irrigation scheme, maize accounts for 28% of the additional crop, followed by beans (20%), tomatoes (13%), watermelons (10%), soya beans (8%), vegetables (7%), sorghum (2%) and other crops (12%). In short, cereals and vegetables are mostly grown in the scheme. Moreover, the Kisumu County Urban Planning Report (2017) noted that farmers within the Ahero Irrigation Scheme turned to other crops due to the unpredictability of weather patterns. This was to enable farmers within the scheme to have a more reliable income. Beans and green-grams were grown and were intercropped with maize and sorghum.

Crops grown for commercial use, besides rice, included tomatoes, kale, watermelon, black night shades, cowpeas, butternuts, capsicum, onions and pawpaw. The findings in the Ahero Irrigation Scheme confirm Doss et al's., (2018:71) statement: "In some contexts, women also grow a large share of the staple cereal or root crops that are consumed by the household." Having gained insight on how respondents within the scheme acquired land, and the challenges they faced accessing land. It was also important that the study sought insight as to how the respondents wished to transfer land to their children.

6.2.5 Land inheritance within the scheme

The researcher sought to better understand how the farmers in the scheme sought to transfer their land holdings to the next generation, and what factors they would consider when doing so? The female respondents asserted that they will give land to their first-born sons and live with their daughters. Other women farmers said they would divide the land equally amongst their children, whilst others stated that their children should work hard and buy their own land. Yet another group responded that the land would be divided equally among the children, regardless of gender. For some female respondents, the matter did not concern them and was the duty of their husbands.

The issue of land inheritance is handled in different protocols depending on the matter and issue at hand. Eighty percent of the respondents noted that they would nominate their sons as their successors on the land title. One respondent was different and stated that he had only a daughter, and therefore he would leave the land to her. Other respondents stated that they were not giving their children any land and that they should work to acquire their own lands. Yet another group responded that the land would be divided equally among the children, regardless of gender. For some female respondents, the matter did not concern them and was the duty of their husbands.

Lawry et al. (2017) asserted that many farmers in developing countries hold customary rights as a highly secure measure in the context of local social arrangements. However, this may not be the case in regard to the legal status of the country's statutory property regimes. Thus, in such situations, land assigned under customary arrangements was most often statutorily categorized as public land and subject to the stewardship and administration of public agencies.

They argued that in some instances where commercial investments took place, the customary tenure arrangements that delivered secure tenure rights to generations of farming families have been overridden and farming families have faced displacement. Having discussed land as an economic resource and its impact on women in agriculture, we shall now discuss water and its impact on irrigated agriculture, within Ahero Irrigation Scheme.

6.4. Women and Irrigation

6.4.1. Women and water access

This section sought to gain information on how the farmers on the Ahero Irrigation Scheme gained access to water for farming purposes. Water is a key asset in farming and is the source of life. A number of respondents noted that they gained water from the National Irrigation Board and that they paid a fee of Kshs 3,100.00 (\$31) to access this water. The respondents responses can be seen in table 7 below.

Table 7. Water access (2019)

| Respondent Number | Respondent Response |
|--------------------------|---|
| 007M | <i>‘Using irrigation’</i> |
| 032F | <i>‘Irrigation-water is pumped from River Nyando Through canals I am able to get it to my farm.’</i> |
| 011M | <i>‘National Irrigation Board pumps water from River Nyando and then supplies to farmers at fee of Ksh, 3100 per acre.’</i> |
| 023F | <i>‘Gravity from the river.’</i> |
| 018F | <i>‘There are drains which are usually organized by water users who direct water on various farms.’</i> |
| 001M | <i>‘Pay National Irrigation Board for Water’</i> |
| 033F | <i>‘Through Irrigation’</i> |
| 034F | <i>‘Through Irrigation’</i> |
| 015M | <i>‘Water is pumped from the river and through canals we are able to access it’</i> |
| 030F | <i>‘Irrigation - pay National Irrigation Board’</i> |
| 021F | <i>‘I use labour’</i> |

According to Nakawuka et al. (2017:2),

Irrigation is a vital component of meeting the food security needs of the world’s increasing population. In addition, it is a valuable tool that can increase food production and move small-scale farmers to large-scale production. This is important especially in areas where erratic rainfall is experienced. This is because irrigation allows for more than one crop in a year to be grown, and can thus help farmers grow high value cash crops.

Within the Ahero Irrigation Scheme a manager at the scheme indicated that access to water for farming is gained by pumping water from River Nyando and that farmers pay a fee of Kshs.3,100 (\$31) as operational maintenance to have access to the water. All farmers within the 12 blocks of the scheme gain access to water after the cropping plan is agreed upon. As respondent MINT001 asserts: ‘Yes, we do our abstraction from the river; our river is River Nyando, that is our source of irrigation water for the scheme. We pump the water into our system, that is, once the water is in the main canal and then it flows through the canals to the ... 12 blocks. We don’t open the 12 blocks at the same time. Once we have opened and there is water in the main system... we see the water to the block where production is done. Then within a block, we have feeders, so once water comes into the second block, then it is opened through the irrigation water users association leaders at the level, so the uptake has a leader who opens to different feeders within that block, we open feeders, within the specific acres within that block, so that is how farmers get access to water....’ ‘... Yes for the main crop we charge operational maintenance Kshs3,100, for any other crop if you want support in terms of irrigation water you are expected to pay a small maintenance levy or they pump on their own, so what they do they get water through pumping , for a small levy...’(Personal communication, MINT001,3 January,2018)

Having noted how respondents gained access to water within the scheme, it was important to know if women within the scheme faced any challenges in gaining access to water due to other activities besides farming, where water is needed. For example, cooking, cleaning amongst others.

6.4.2. Challenges in accessing water for agricultural use

Ninety percent of the female respondents mentioned that they did not face any challenges in gaining access to water for domestic purposes. In regards to water for agricultural use, they assert that they do encounter some difficulties. Please note below some of the comments in table 8 below:

Table 8. Challenges faced when accessing water for agricultural use (2019)

| Respondent Number | Respondent Response |
|--------------------------|--|
| 040F | <i>'In case there is no power we really suffer since the pump uses electricity''</i> |
| 038F | <i>'Yes, water is scarce, so people scramble for it; I overcame this by doing all the farm activities in time.'</i> |
| 032F | <i>'Yes, the water we are using is normally controlled by some individuals and you cannot access it in your own time; we normally engage the people concerned in a dialogue which is not always easy to come to an agreement.'</i> |
| 019M | <i>'They are no other challenges apart from time; water takes time to reach your farm but we are just patient.'</i> |
| 018M | <i>'As for me there are no challenges in getting water'</i> |
| 031F | <i>'Yes, the water is controlled and yes, can't use it at your convenience . Engage in proper dialogue with the water users.'</i> |
| 027F | <i>No challenges in getting water</i> |
| 025F | <i>'Yes, most of the time you find water being directed to farms at night. So, as a woman that time is difficult to access water to the farm. So, it will force you to hire someone to do that for you.'</i> |
| FINT002 | <i>'Yes, if there is power, we are okay. If there is drought, we have a lot of challenges? It also depends on how many acres you have?'</i> |
| 025F | <i>'Yes- Most of the time you find water being directed to farms at night. So, as a woman that time is difficult to access water to the farm. So, it will force you to hire someone to do that for you.'</i> |
| 016F | <i>'Yes, the pump uses electricity and in case electricity goes off, there is no water.'</i> |
| 015F | <i>'Yes, through using irrigation ... we go for long hours to ensure the water reaches your farm. I always employ someone to do it for me.'</i> |
| 014F | <i>'No,everyone can just access water without any fear or favour from anyone.'</i> |

| | |
|------|--|
| 011F | <i>'Yes, in case of power blackout, which at times goes on for one week, there is always a lack of water since the pump uses electricity. This is a major challenge and there is nothing we can do until the power is back.'</i> |
|------|--|

The respondents noted that the biggest challenge when it came to accessing water within the scheme is when there was no power to pump water from the river to the canals. This caused the grounds to dry up. In addition, those who are not affected, with regards to lack of access to water, fight with other residents as those who are unable to access water tend to change the flow patterns of the water from other blocks to their own.

Nakawuka et al., (2017:3) assert that

smallholder irrigators normally suffer from economic water scarcity. Water resources might be available in a community, but individual smallholder farmers might lack resources that allow them to access and use these water sources adequately. In such cases, the need arises to work in groups (e.g.), farmer cooperatives, or to take up credits or be dependent on government or donor contributions. Thus, making water accessible to smallholder irrigators has been suggested as having the greatest potential of achieving food security in sub-Saharan Africa.

It is important to note that some of the female respondents felt that they had to fight to gain access to the water. As has been noted from respondents (Personal communication,038F,5 January,2018), and (Personal communication,032F,5January,2018).This is because water becomes scarce during drought periods, and when the Irrigation Scheme lacks power to pump water to the various farming blocks within the scheme. Water accessibility, is important in ensuring crop productivity levels for small scale farmers is productive. The control over natural resources is limited for the majority of women within Ahero Irrigation Scheme. This limited participation of women in decision making has the potential to result in the failure of government policies and programmes according to (Le 2018).

Magill and Benedict (2019) assert that the value system for water has become the key issue with regard to who has access to water and at what cost. This can be seen from the comments of (Personal communication,025F, 4 January,2018). This is because once water becomes a scarce resource it needs to be commodified and priced according to the market; thus making water become one of the many ‘things’ a consumer can buy. Water as a natural resource should not be bought, yet the need for water in nature is quite compelling for human beings. This is because marginalized communities cannot afford to pay the market price for water when it is privatized. Thus, ‘power, poverty, and equality’ factors can be seen in the commodification of water. Hence, the reason Ahero Irrigation Scheme charges farmers fees to maintain water access points.

It therefore, becomes important for eco-feminism to highlight the important relationship that gender has with nature, and most importantly why this relationship should not be ignored. As one respondent 014F stated ‘everyone can just access water without any fear or favour from anyone’ (Personal communication,014F, 4 January, 2018).It is with this regard that the next question sought to know if women encountered any challenges when accessing water within Ahero Irrigation Scheme, and how they tackled these challenges.

6.4.3. Cultural barriers that women face in accessing water

This question sought to find out if any traditional or cultural barriers hindered women within the community from accessing water for either domestic or agricultural purpose within the Ahero Irrigation Scheme. Eighty percent of the respondents stated ‘No’ while others mentioned a few factors that constituted a hindrance when it came to water access, more so to the women than the men. Respondents responses can be seen in table 9 below:

Table.9 Cultural barriers faced when accessing water (2019)

| Respondent Number | Respondent Response |
|--------------------------|--|
| 001F | <i>‘No cultural but organization challenge that only elected people should be responsible for the distribution of water to the fields’</i> |
| 014F | <i>‘Yes, some women should not gain water at night because they could be raped.’</i> |
| 018F | <i>‘Yes’</i> |
| 013M | <i>‘N/A’</i> |
| 009M | <i>‘No’</i> |
| 029F | <i>‘No’</i> |

Many of the respondents noted that they did not face any cultural barriers in accessing water. One respondent stated that the barrier was mostly organizational, and not cultural. She stated that there is ‘no cultural but organization challenge that only elected people should be responsible for the distribution of water to the fields’ (Personal communication, Respondent 001F, 5 January, 2018)

According to Nakawuka et al. (2017:7), “aside from infrastructural challenges, there are institutional challenges such as the weak functioning of water users’ associations (WUAs) which tend to lead to ineffective control systems, inadequate monitoring, and ineffective enforcement of activities around the scheme.” Nakawuka argued that water management in small irrigation schemes is usually inefficient. In Ahero Irrigation Scheme, respondents assert that one of the challenges they face in regards to accessing water during drought periods happens when there is no power to pump water from the River Nyando to the 12 blocks within the scheme.

Farmers whose plots are upstream in the scheme will receive ample water; unlike the downstream farmers who especially under conditions of reduced water supply often do not have water reaching their plots. This, we have noted, plays out in the irrigation scheme: ‘Yes, most of the times you find water being directed to farms at night. So, as a woman that time is difficult to access water to the farm. So, it will force you to hire someone to do that for you. (Personal communication,025F, 4 January, 2018). Respondents also note that WUAs, and the Ahero Irrigation Scheme co-operative are not able to cater to the needs of members due to lack of sufficient funds to run activities within the two organizations.

The dominance of masculinity in irrigation management is so strongly normalized that it is not necessary to mention 'men' alongside irrigators, as everybody 'knows' that agricultural water management is men’s work (Lebel et al.,2019). Lebel et al. argue that even though women also use water for agricultural purposes, water is still a male resource that is governed by men. In Ahero Irrigation Scheme, the case holds true as stated by one respondent who stated: ‘...men think they are overall in water management...’(Personal communication,026F, 4 January,2018). Women within the scheme assert that men are in charge of water management and men therefore make all the decisions related to water distribution within the blocks. The next question sought to understand the time taken to access water for both domestic and agricultural purposes within Ahero Irrigation Scheme.

6.4.4 Time taken to receive water for domestic and farm purpose

The study sought to find the time taken to receive water for domestic and farm purposes, depending on locations within the scheme. The question received various answers with some of the respondents stating time and distance from the water source, and the duration it took for the water to reach their farms. This is shown in table 10 below:

Table10. Time taken to receive water for domestic use and farm use (2019)

| Respondent Number | Respondent Response |
|--------------------------|--|
| 036F | <i>'For domestic purposes it takes 5minutes; for farm use it can take seven hours.'</i> |
| 018M | <i>'It sometimes varies, for domestic it is less than the two minutes to get water but for farm purposes the most time it took me to get water was around 5hours.'</i> |
| 016M | <i>'I have a well within my compound where I get water for domestic use; it takes me like 3 minutes to fetch water. For farm purpose it can even take me one day.'</i> |
| 030F | <i>'For domestic use - I have a tap within the compound, for farm purpose- the pump is located at approximately 4km away from my farm, I have to wait for it to be pumped.'</i> |
| 026F | <i>'For irrigation, it is once after 14 days.'</i> |
| 014F | <i>'1. For domestic purposes you can fetch from the flowing rivers which are near and can take you 10 minutes. 2. For farm purpose you can use the water pump to irrigate after connection of the pipes; you can access water so duration depends on the size of the farm..'</i> |
| 007F | <i>'For domestic use I cannot approximate because I have my tap in the compound; for farm use it takes approximate 6 hours.'</i> |
| 002F | <i>'Domestic - 100 minutes and farm purpose 1hour'</i> |
| 023F | <i>'For farming - once a week.'</i> |
| 024F | <i>'I have a borehole at home and also get pumped water from NIB.'</i> |
| 014M | <i>'For domestic is 5 minutes; for farm use it takes approximately 3-4 hours for the water to reach my farm when pumped.'</i> |
| 038F | <i>'For domestic use it takes like 20minutes, for farm purposes it takes 2 hours.'</i> |
| 025F | <i>'For domestic and farm purposes it is just 10 minutes to walk from the water point and back so we are near the water point.'</i> |

6.4.5 Clean water provisions within the scheme

This question sought to better understand water accessibility for women related to domestic use. The respondents noted that the National Irrigation Board provides clean water within the Scheme, while others noted that the scheme did not provide any water. Table 11 below shows respondents comments:

Table 11. Clean water provision (2019)

| Respondent Number | Respondent Response |
|--------------------------|--|
| 010M | <i>'No'</i> |
| 008M | <i>'Yes- collect from the tap in the offices.'</i> |
| 004M | <i>'Yes, clean water is available at NIB compound where we get access.'</i> |
| 033F | <i>'Yes, the scheme has a water treatment plant.'</i> |
| 019M; 017M | <i>'Yes, the scheme provides well treated water that we use for domestic purposes.'</i> |
| 013M | <i>'Yes, clean water is supplied by water tanker at a cost.'</i> |
| 011M | <i>'Yes, we can access treated water at a cost of Ksh 2 per 20 litres every day.'</i> |
| 029F | <i>'Yes, there is supply of clean water by the scheme to the villages.'</i> |
| FINT002 | <i>'We have a borehole and it has clean water and it was built by our councillor; but from the scheme we get water which we use for irrigation.'</i> |
| 017F | <i>'Yes'</i> |
| 014F | <i>'Yes, there is clean water that is treated in the Scheme which we access and it helps us for drinking and cooking purposes.'</i> |
| 016F | <i>'Yes, we can apply for clean water using water tanker from NIB.'</i> |
| 008F | <i>'Yes, the Irrigation Board normally supplies clean water to the scheme residents at a cost.'</i> |

| | |
|------|--|
| 027F | <i>'Yes, the Scheme has a well maintained water treatment plant which provides us with clean water.'</i> |
| 030F | <i>'Yes, water tap with clean water at NIB.'</i> |
| 015M | <i>'Yes, water treating plants are available within the scheme.'</i> |
| 032F | <i>'Yes, within the compound of NIB offices there are water taps.'</i> |

Unlike some other cultures where women face cultural barriers in accessing water, this was not the case in Ahero Irrigation Scheme. The scheme made provisions for clean water for the farmers within the scheme. However, the distance from these water points varied and was dependent on where the water point was situated. In some cases, respondents noted that a water truck with clean water was sent to the various villages within the scheme to give them access to clean water, or others access it from the headquarters of the National Irrigation Board which for some may be their nearest watering point.

According to Van Koppen (2016:5),

access to water' implicitly refers to water in the right quantity and quality, at the right moment, and in the right place. In short, water is available for use. To use water and derive the benefits from it, people need water in the appropriate quantity and quality, and at the appropriate site. Thus, they gain access by moving to the water, for example, through permanent settlement patterns, or by long-term pastoralist transhumance, or seasonal flood recession farming.

Water accessibility within Ahero Irrigation Scheme is not a problem. This is because the management of the scheme has ensured that water is easily available for domestic purposes. This therefore reduces the amount of time spent by women when collecting water for domestic use. In regards to accessibility for agricultural use, water for this purpose seems to take a much longer period. As asserted by Van Koppen (2016) water is an important resource, its absence in the right quantity or quality will always force people to look for it or to move near it as asserted by Van Koppen (2017).

As land and water are important resources to have when farming other resources such as financial resources and assets, education and technology and agricultural politics play a key role in ensuring that agricultural productivity is progressive. The next chapters will discuss these three themes and how they impact agriculture within Ahero Irrigation Scheme.

CHAPTER VII

FACTORS INFLUENCING IRRIGATED AGRICULTURE

7.0. Introduction

This chapter is divided into three key sections: the first section discusses the theme: financial resources and assets, while the second discusses technology and education and lastly agricultural politics within the Ahero Irrigation Scheme. The information in the chapter is analyzed in regards to the literature review and the theoretical framework underpinning this study. We begin the chapter by discussing the theme: financial resources and assets.

7.5. Financial Resources and Assets

7.5.1. Women's access to funds to purchase farm inputs

This section sought to better understand how all farmers within the scheme gained access to financial resources, and to better understand how finance impacts women farmers. It is clear from the respondents that farmers within the scheme sourced funds from the revolving fund (funds that can be accessed from the scheme) and their own personal savings. The remaining portion of respondents received funds from family members or from middlemen businessmen. Respondents' responses can be seen below in table 12 below:

Table 12: Access to farm inputs (2019)

| Respondent Number | Respondent Response |
|--------------------------|--|
| 011F | <i>'Seedlings and fertilizers are provided by the Irrigation Board on credit payable after harvest.'</i> |
| 010F | <i>'Seedlings and fertilizers are provided by the National Irrigation Board on credit.'</i> |
| 019F | <i>'I access through loans.'</i> |
| 023F | <i>'Personal savings, sale of personal assets'</i> |
| 004M | <i>'Get seedlings from revolving fund and I buy fertilizers from the agrovet'</i> |

| | |
|------------|---|
| 035F | <i>'From the revolving fund.'</i> |
| 042F | <i>'Revolving funds.'</i> |
| FINT001 | <i>'Sometimes I do other business to help me get money so that I can buy fertilizers my husband helps me.'</i> |
| MINT002 | <i>'I have 2 ha; I have to lease one to somebody. That money can assist me because ...the scheme does not give you any money to buy fertilizers.'</i> |
| 040F; 038F | <i>'Revolving fund'</i> |
| 032F | <i>'Seedlings and fertilizers are provided by Irrigation Board on credit.'</i> |
| 014M | <i>'I normally keep rice after harvesting to use as seedling for the following planting season, fertilizers I but from agrovet.'</i> |
| 011M | <i>'Own savings and farmers groups'</i> |
| 025F | <i>'There are seedlings and fertilizers that are being provided by the NIB for those who do not have, which they deduct after harvesting.'</i> |

In the Ahero Irrigation Scheme, some of the farmers who were unable to gain access to the revolving fund (funds that can be accessed from the scheme) resorted to seeking funds from businessmen outside the scheme. Respondent FINT002 has noted that this, at most times, turns their harvest into a loss instead of a profit.

'If I do not have money, I normally go to the businessmen in the market and they can give me Kshs, 2,000 and then when it comes to the time to harvest, they can come and collect one or two bags of my harvest. ... This is because if you borrowed, for example, Kshs, 2000 from the businessman and he comes to collect the bag during harvest time, he/she can sell the bag for even Kshs.5, 000 so he benefits from you - after all the work you have done. He/she will not collect the Kshs 2,000 that you borrowed; he/she will just take the bag of rice which is now priced at Kshs5,000 - yet he only gave you Kshs 2,000...like last year a bag of rice was selling for 8,200 Kenya shillings...so you end up going at a loss. It's like you are working for someone else...sometimes the office for the revolving fund can assist you if you come to see one of their officers; if you are a good farmer they will assist you and collect a small interest ...if there is no money then they will not be able to assist you. The office has really helped us a lot.'(Personal communication,FINT002, 5 January,2018).

In addition, those who are in good standing with the scheme are able to buy their seeds and fertilizers from the revolving fund (Personal communication, Respondent MINT001, 3 January, 2018), explained this as follows: ‘...there is a farmer’s body that is in charge of production, so they receive inputs, seeds and chemicals...’. Others stated that they use their own savings to buy their farm inputs, while others use the seeds from their previous harvests (see Table 12 above).

Ng’weno et al. (2018:5) assert that

paradoxically, even when financially included, women appear to get less benefit than their male counterparts. That a 9% gap remains between men and women’s usage of financial services. This they attribute to the financial barriers faced by women in accessing finance.

Women in Ahero Irrigation Scheme, do not have easy access to finance. This is because they do not have the rights to access resources (land) that can enable them access finance. This is because financial institutions that lend money require assets as a form of collateral, and most of the assets such as land are mostly in their husband’s name. In addition, most financial institutions will not accept crop harvests as collateral as they have no guarantee that the harvest will be sufficient to cover the loans.

Wulandari et al. (2017:1) argue that

finance is an important asset in sustaining production of agricultural commodities. However, access to finance for the rural poor is a major challenge, especially in developing countries, such as Kenya. This is because they lack adequate financial knowledge on the various financial products, and are thus unable to make informed financial decisions.

In Ahero Irrigation Scheme, women within the scheme are not well educated, as earlier stated 67% of the respondents, have primary education, with 24% having secondary education. Financial decisions are not to be taken lightly, and need some form of information to enable individuals make informed decisions. In addition, financial information is not easily made available in rural areas, and is sometimes written in English jargon, which may not be easy to understand, especially for rural women. It therefore becomes important for women to be educated to certain levels, to enable them learn ways and means in which they can acquire finances that can assist them engage in agriculture. It is for this reason that the next question in the study sought to know how women access financial resources, and from whom do they access this resource from.

7.5.2. Women's access to financial resources?

This question sought to better understand how women gain access to finances and if their husbands have a key say in their accessibility of funds. In addition, the same question was asked of the men and they too have their own reasons with regards to accessibility, while others chose not to answer this question. Respondent's responses can be seen in table 13 below:

Table13: Other sources of financial resources for women (2019)

| Respondent Number | Respondent Responses |
|--------------------------|--|
| 010M | <i>'Yes, in farmers groups'</i> |
| 007M | <i>'Yes, my wife bails me out at times'</i> |
| 042F | <i>'Yes'</i> |
| 032F | <i>'Yes, my son at times provides financial support'</i> |
| 029F | <i>'Yes, from revolving funds'</i> |
| 026F | <i>'Yes, since its family land so everybody must co-operate'</i> |
| 025F | <i>'No- because I am a widow and do not rely on loans. I just plan well and use the little that I have.'</i> |
| 011F | <i>'Yes, sometimes I do get assistance from my sons.'</i> |
| 008F | <i>'Yes, my husband does provide some cash for carrying out some activities'</i> |

| | |
|------|---|
| | <i>on the farm.'</i> |
| 006F | <i>'From my husband,co-operative society and revolving funds from NIB.'</i> |
| 003F | <i>'Yes'</i> |
| 036F | <i>'Yes'</i> |
| 018M | <i>'I think only from revolving fund'</i> |
| 016M | <i>'Yes, I receive finance from revolving fund.'</i> |

Many of the women in the scheme acknowledged that they did receive support from their husbands. Some of the men also asserted that that they too received some financial support from their wives. If they did not receive it from either their wife or husband, they received it from their children. This is important to note because according to Doss et al. (2018), female heads of households who receive remittances from a migrant husband maintain social connections with the husband's family and expect to have their husband return. In addition, they face different opportunities and challenges than a widowed female household.

Doss et al., (2018:70) asserts that,

This is important in debunking the myth that 70% of the world's poor are women because aside from casting women as victims rather than as contributors to food security, it focuses on women as disproportionately poor and makes female headed households appear as more vulnerable to poverty and can therefore distort the design and implementation of programs and policies.

One respondent noted the following comment with regards to receiving support from her husband: “Yes, my husband always assists me because the process of acquiring financial resources is too long for women for we are not trusted” (Personal communication, Respondent 015F, 4 January, 2018).This thus showcases the team effort between men and women (or couples) in the scheme, and the impact this has on their farming activities.

In the next question the study sought to have a clear understanding of the amount of funds farmers received from farming. This question was asked to both men and women, to better gauge if there was a difference in financial returns.

7.5.3. Financial incomes within Ahero Irrigation Scheme

This question sought to see the highest amount that the respondents received from their farming activities in the Ahero Irrigation Scheme. The income was either paid in cash directly to the respondents, deposited into an account (usually in the name of the husband), or paid out from the scheme's revolving account. The responses of the farmers regarding the funds they received for their produce is presented in Table 14:

Table 14. Money received from farming activities (2019)

| Respondent Number | Respondent Responses |
|--------------------------|---|
| 015F | <i>'Kshs.200,000 - I accessed it after the sale of my harvest.'</i> |
| 008F | <i>'The highest amount I have ever received is Kshs.67,000. This is the amount we got from the one acre, but I received 30% of it as my husband took the rest.'</i> |
| 001F | <i>'Above Kshs. 10,000.00 but depended on the load of the farm activity.'</i> |
| 006F | <i>'I received Kshs.150,000 through farming.'</i> |
| 017F | <i>'I received Kshs.75,000 by working hard and doing everything on time as required.'</i> |
| 019F | <i>'The highest amount I have received is 50 bags of rice'</i> |
| 025F | <i>'The highest amount I have ever received is Kshs. 80,000. I got this after selling all the bags of rice harvested, and deducted all the expenses incurred.'</i> |
| 030F | <i>'Kshs.,44,000 I got it after selling'</i> |
| 014M | <i>'Kshs. 64,000.00 I received from revolving account'</i> |
| 032F | <i>'Kshs. 62,000.00 I received from revolving fund.'</i> |

Two hundred thousand Kenya Shillings (Kshs.200,000 (\$2,000)) was the highest amount received during a harvest. The respondent stated that she obtained these funds from selling her harvest. The second highest amount received was Kshs.150,000 (\$1,500). A conclusive amount cannot be stated in this section, as respondents did not state the time period in which these funds were received. In addition, the study cannot make assumptions with regards to the income received from harvest as this was not tracked for a specific period. It is important to note that some women within the scheme do receive access to funds through the revolving fund and through harvest returns. It is also important to understand how the women receive access to their returns from the farm. For example, respondent FINT001 stated:

‘I have received around 60,000 to 80,000Kenya shillings ... My husband ... takes and divides the money. He gives me a little and he takes a good chunk. Women here do not have accounts in their names. We are paid from the irrigation board here to the bank account, or you come here and collect the money, or you come and collect cash from the revolving fund because you have no account. He (i.e., the husband) comes and collects the money and pockets it all - the hard cash. If he gives you Kshs 10,000 you cannot complain ... because if you complain... , you can end up being beaten ...he also becomes harsh and at that time he can tell you to pack your things and go ...because he has money ... when the money is all finished, then he will remember he has a wife.’

(Personal communication, Respondent FINT001, 5 January, 2018).

It is important that we understand that not all women will receive funds, from the selling of their crop harvest. This is because it is left up to the man to decide whether he wants to share the funds or not. In other cases as explained by respondent FINT001, the man may decide not to share the funds at all. It is therefore important that women within the scheme are empowered financially. This will strengthen them financially and empower them to make financial decisions.

In the next question, the study sought to gain a better understanding from respondents with regards to the reasons why women within the scheme are unable to receive financial assistance and the challenges they face when seeking financial assistance.

7.5.4. Challenges women face in accessing financial resources

This question sought to understand the challenges that women face in accessing finance. The question was also asked to the male respondents to note their views, with the intent to better understand the factors that hinder women from accessing financial resources. Table 15 below, showcases this.

Table 15. Challenges women face in accessing financial resources

| Respondent Number | Respondent Response |
|--------------------------|---|
| 010M | <i>'Poor repayment by women and misspending the money.'</i> |
| 007M | <i>'Lack of knowledge about financial resources'</i> |
| 005M | <i>'Women are poor spenders and women are poor financial managers'</i> |
| 033F | <i>'Gender discrimination'</i> |
| 042F; 038F | <i>'The process of receiving the money is too long, so at times we lose hope.'</i> |
| 040F | <i>'Financial delays after loan application.'</i> |
| 016M; 018M | <i>'Nothing hinders women from accessing the financial resources.'</i> |
| 014M | <i>'Ignorance, beliefs that women are less privileged in society'</i> |
| 011M | <i>'Risk taking; misuse of funds by some women, thereafter some women obtain loans. Suppose you secure loans from the women enterprise fund and fail to repay on time, an auction will follow.'</i> |
| 029F | <i>'It takes time to get financial resources after application.'</i> |
| 026F | <i>'Misuse of available funds in buying luxuries'</i> |
| 024F | <i>'Assumption that women are poor loan payers—hence, high rates of interest accrue during repayment period.'</i> |
| 019F | <i>'Some women don't know how to access financial resources.'</i> |
| 018F | <i>'Lack of education.'</i> |
| 017F | <i>'Women are not normally regarded as real farmers, hence it becomes difficult for them to access financial resources.'</i> |
| 016F | <i>'We lack items to provide security for loans, and our husbands think we</i> |

| | |
|------|---|
| | <i>misuse the money.'</i> |
| 014F | <i>'Many people think that women misuse financial resources by regarding them as their own, and they use them for their own budget.'</i> |
| 008F | <i>'Discrimination from other people; most people think that women cannot manage or spend money in a proper way - therefore it is very difficult for them to secure financial resources.'</i> |

When it comes to accessing financial resources, within Ahero Irrigation Scheme, women within the scheme face numerous challenges. Among the list of challenges as listed in (table 15 above) by several respondents is the lack of education, with regards to accessing loans, the delays in processing loan applications and discrimination that women face, when trying to access the loans among others. In addition, women within the scheme assert that they lack assets that they can use to secure loans as asserted by (Personal communication, 016F, 4 January,2018) view in (table 15 above).

Women in the scheme view other women as not having the capability of being good financial managers, as asserted by respondent 026F and 014F (view table 15 above). It therefore becomes, important to have avenues in which women in the scheme can access loans, which are tailored to their needs and can meet their financial capabilities.

In the next section we discuss the challenges women face as farmers in accessing financial resources and assets.

7.5.5. Challenges women face in accessing financial resources and assests

The question sought to see the key challenges that women face in gaining access to finance. Refer to table 16 below for respondents responses.

Table 16: Challenges women face in accessing resources and assets (2019)

| Respondent Number | Respondent Response |
|--------------------------|--|
| 042F | <i>‘Yes, some farmers do not repay the loan given by the revolving fund, hence the revolving fund refuses to give loans to the farmers. This problem can be solved if all farmers pay their entire loans.’</i> |
| 039F | <i>‘There are no challenges.’</i> |
| 007F; 032F | <i>‘Yes. High interest rates from money lenders. I believe that when the interest rates are favourable, I can get access to funding.’</i> |
| 030F | <i>‘Yes, gaining financial resources requires a lot of procedures to be followed. You need to be patient and determined to get access.’</i> |
| 028F | <i>‘No challenges.’</i> |
| 013F; 026F | <i>‘Yes, most of the times, the revolving fund provides loans. When the period is almost over we borrow from middlemen who are rice buyers.’</i> |
| 025F | <i>‘Lack of skills- if women are trained on how to use some of the resources it will help a lot.’</i> |
| 005F; 023F | <i>‘Interest rates are very high, and there is difficulty in getting a guarantor’</i> |
| 021F | <i>‘Poor attitudes towards women. Access will be gained when sensitization has been put in place that everybody is equal.’</i> |
| 019F | <i>‘Yes, male partners ask for several favours before they can assist you to obtain financial assets. We need the women enterprise fund to be devolved to us down here.’</i> |
| 015F | <i>‘Yes, because as a married woman you must consult your husband, and as a family you need to agree on what to give in return whenever you are not be able to pay.’</i> |

The respondents felt that women mishandle money; others felt that women lacked enough information about how to obtain loans, while others felt that revolving fund defaulters were to blame. It was important to note that some of the women respondents felt that discrimination still played a part in their failure to access financial resources. The application process was also noted as being a hindrance to gaining access to funds. High interest rates were also mentioned as part of the challenge in seeking loans.

According to Omobitan, Khanal and Honey (2019), when farmers are subjected to challenges, it is interesting to analyze the financial choices they make so as to enable them meet their agricultural investments and spending. Thus, given these circumstances, informal credit sources are unquestionably the most popular source of finance to the rural and urban population because the formal credit sources have scared many food crop farmers due to the encumbrances.

The informal financial sector is an unorganized sector that consists of money lenders, relatives, friends, neighbours, landlords, traders and groups of individuals who operate mainly in the rural setting, and who seldom engage in lending money (Gbigbi,2019). These informal financial groups are the major providers of funds for the promotion and development of small-scale farmers in the rural areas. Furthermore, they play a key role in resource mobilization and allocation in developing economies.

Historically, financial services interventions for smallholders have tended to focus on loans for working capital to access non-labour inputs (such as seeds, fertilizers, and pesticides) with some interventions aimed at longer-term, community-level projects such as irrigation or processing. With overall credit access being low, it's hard to tell whether men and women have different credit needs in agriculture. This is because both genders require credit, when engaged in agriculture. In the case of Ahero Irrigation Scheme, both genders have financial needs, but women need to access the credit more, but are unable to do so due to loan requirements. Furthermore, men are more likely to take the decisions about large investments, thus it seems likely that men have a higher demand for larger, longer-term loans for irrigation or mechanization. It is therefore important to note that farming households have a definite demand for working capital loans. However, these working capital loans are currently being met mostly in the informal sector.

Gbigbi (2019) asserts that the major obstacle to effective rural banking relates to the lack of banking facilities, which facilitates the patronage of moneylenders. It is claimed that in most rural areas where banking facilities are deficient, informal credit and savings markets are predominant and that farmers patronize moneylenders for both consumption and investment credit during land preparation and planting season. Inadequate access to productive resources limits women's livelihood options and exacerbates financial strain on women. By improving women's access to productive resources, their potential could be unlocked, thereby enhancing their efficiency and productivity. Therefore, the status of women farmers in accessing resources in different regions is needed so as to assess and design suitable strategies that will improve their access to resources (Sarkar et al.,2018).

In regards to Ahero Irrigation Scheme, the implementation of women's farmers groups, may be key and the first step in tackling access to financial resources. This is because the groups can be used to educate women on financial resources, and the same group can obtain assets and help members' access credit that will enable members purchase agricultural inputs that they may be lacking. This same groups, in addition can be used to help better train and equip women with new farming techniques that will help them increase crop productivity.

Technology and education are key if farmers are to increase crop productivity within their farms. In the next section, we discuss the impact technology and education has on women within Ahero Irrigation Scheme.

7.6. Technology and Education

7.6.1. Ahero Irrigation Scheme tillers

These questions sought to find out what means are used in land preparation within the Ahero Irrigation Scheme and who among the family members tills the land. It was noted that modern methods of tilling lands were used. That farmers within the scheme used tractors, with a small proportion of farmers still using family labour. Table 17 below represents the tools used in tilling farm land within the scheme and the time taken to do so.

Table 17. Tools used and time taken in tilling farm land (2019)

| Respondent Number | Respondent Responses |
|--------------------------|---|
| 006M | <i>'Tractor takes 6 hours'</i> |
| 005M | <i>'I till the land myself'</i> |
| 004M; 013M; 031F | <i>'Oxen plough; it takes 2-3 days.'</i> |
| 034F | <i>'Co-operative, it takes about 1 hour'</i> |
| 042F | <i>'Co-operative tractors which takes like 2 days after application.'</i> |
| 039F | <i>'Tractor, and it takes 5 hours'</i> |
| 019M | <i>'We use tractors from the co-operative society and they provide their operators. It can take upto 5 hours to till all the land.'</i> |
| 030F | <i>'I contract tractor owners.'</i> |
| 026F | <i>'Contracted machinery-it takes two hours.'</i> |
| 024F | <i>'Co-operative society but at a fee of Kshs. 2800 per acre.'</i> |
| 021F | <i>'Labourers; tilling takes 2 weeks.'</i> |
| MINT002 | <i>'We are using the tractor ... so the tractor comes and tills.It comes from the irrigation scheme - from the co-operative society which was formed by the irrigation scheme'.</i> |
| 018F | <i>'Labourers- who take 2 to 3 days tilling one ha of land'</i> |
| FINT001 | <i>'For the first phase we use a tractor, then for the second phase the men dig using hoes and to do the levelling... So, we use both the tractor and hoes.'</i> |
| 017F | <i>'I till my farm land using a tractor which takes 20-30 minutes.'</i> |
| 011F | <i>'Co-operative tractors; it takes 4- 6 days for the tractors to reach your farm after application, and it can take 2-3 hours.'</i> |
| 007F | <i>'I normally contract tractor owners, it takes a day,'</i> |
| 001F | <i>'Co-operative society - but at a fee.'</i> |
| 005F | <i>'Contracted people.'</i> |

Many of the respondents within the scheme assert that tractors are used in tilling their farm land. In addition, the use of tractors has reduced the time taken in tilling their farm land, from 2 to 3 days to 2 to 3 hours. This is important as it shows how mechanized farming quickly impacts farming productivity, as brings about efficiency and reduces time spent tilling the land, thus creating time for other chores to be done within households and agricultural farms.

In the next question, the study sought to understand how farmers within the scheme were able to learn how to use tractors and who taught them.

7.6.2 Equipment used and training

These questions sought to know what modern methods of land tilling the farmers within the Ahero Irrigation Scheme used and how long it took them to use these methods. Farmers within the study noted that they used tractors which they leased from the co-operative society of the scheme, while others noted that they still used hoes and other traditional methods in tilling their lands. Table 18 below shows the responses received from respondents.

Table 18. Equipment used in land preparation (2019)

| Respondent Number | Respondents Response |
|--------------------------|---|
| 009F | <i>'Tractor, tilling is done by the tractor'</i> |
| 003F | <i>'Tractors and ox drawn plough'</i> |
| 010M | <i>'Tractor and animal drawn ploughs'</i> |
| 007M | <i>'Plough and I hire extra farm workers'</i> |
| 003M | <i>'Tractor- I don't use'</i> |
| 001M | <i>'Tractors. Ox driven ploughs and human labour'</i> |
| 035F | <i>'Tractor, the driver is already trained'</i> |
| 041F | <i>'The tractor and they have their own operators.'</i> |
| 040F | <i>'The tractor does the tilling the operator is already trained'</i> |
| 037F | <i>'Tractor and rotavator and they have their own operator and they are already trained.'</i> |

| | |
|------|---|
| 019M | <i>‘Tractors from the society and have their own trained operators, so I don’t operate them.’</i> |
| 032F | <i>‘I normally contract farm workers ’</i> |

Slavchevska et al. (2016:25) argued that

labour-saving technologies will have differentiated impacts on women and men as long as tasks in agriculture are gendered. This is because some tasks are viewed as women’s responsibility and others as men’s responsibility. Hence, some technological innovations may displace female or male labour, and thus be resisted by both, even though they have the potential to improve productivity.

In the Ahero Irrigation Scheme, this is not the case with regards to incorporating mechanization into the scheme. A majority of the farmers - when asked what kind of equipment they used when tilling their farm lands- said that tractors were mostly used. For example, Respondents 017M and FINT003, reported respectively, as follows: ‘We use tractors from the co-operative society and they are provided with their operators. It can take up to 2 hours to till all the land’ (Personal communication, Respondent 017M, 4 January, 2018), and ‘We use a tractor. The tractor was provided by the co-operative about one year ago’ (Personal communication, Respondent FINT003, 4 January, 2018). However, this was not the case for all the farmers, as others stated that they still used ox- drawn ploughs to till their lands, as well as hoes and other traditional tools to farm. This perspective was best summarized in the words of Respondent 013M who stated, ‘Oxen plough, it takes 2-3 days’ (Personal communication, Respondent 013M, 3 January, 2018) and Respondent 018F who stated that ‘Labourers- who take 2 to 3 days tilling one ha of land’(Personal communication, Respondent 018F, 4 January, 2018).

In addition, some of the farmers were trained to use the equipment while in school, while others said that they trained themselves to use the equipment. A majority of the farmers stated that the tractors that till their lands came with an already trained driver who knew how to operate the tractor, as well as the other machinery that came along with the tractor.

Farmers in the scheme also used traditional farming tools as stated by Respondent 021F who stated, ‘... *Jembe*, *Pangas*, tractor, rakes,... I learnt how to use them through knowledge that I gained in school.’ (Personal communication, Respondent 021F, 3 January, 2018) Another Respondent stated, ‘*Jembe*’- I was taught how to use it by an agricultural engineer in the nearby irrigation scheme.’(Personal communication, 018F, 5 January, 2018).

It was also noted that the time taken to till the lands varied. This came about as a result of the size of land one had and the tools they used. As Respondent,011F, stated. ‘Co-operative tractors it takes 4-6 days for the tractors to reach your farm after application, and it can take 2-3 hours.’(Personal communication,011F, 3 January, 2018). Hence, “for newly introduced practices and technologies to be adopted by farmers, a lot of time must be invested in farmer awareness” Nakawuka et al. (2017: 8).

In summary, it came down to the resources that one had at their disposal, as other farmers may not have had access to the same resources as others, even within the same scheme. As stated by Respondent,10F, ‘Oxen- plough - it takes 2-3 days’. Personal communication,10F, 4 January, 2018).

According to Chauhan (2015:76)

new technological innovations tend to benefit men more than women, thus, lessening the workload of the former and increasing the activities linked to women, such as transplanting, weeding, harvesting and processing. Furthermore, it has been argued that modern biotechnology benefits men more than women.

Also, Saugress (2002), and Bryant and Pini (2006) argued that the aim of using machinery and agricultural technology was to remove women from the agricultural sector through patriarchal ideology. Saugress (2002), and Bryant and Pini (2006) claimed for instance, that “a tractor is a symbol of men’s power and is a means of dominating women.”

According to Lefore et al.'s, (2017a) study, it was reported that men preferred to irrigate cash crops like tomatoes, while women preferred to irrigate leafy vegetables that could be sold over a longer period of time, and over which they could retain control over income. Furthermore, they noted that women in pump owning households had less of a say over production decisions but used the pump for their own plots. In view of this, they posited that technology adoption should not be viewed as a goal, but rather, understanding the differentiated impact of technology within the household and orienting technology promotion activities to advance specific development objectives.

According to one respondent: MINT001, 'It is a government institution; we normally have farmers capacity building at least quarterlyWe have not had much, apart from what we received from the central government, but there was one that was done in 2013 when the World Bank had a project and supplied farmers with inputs and when they are coming up with new products they give training – other independent organizations– No (training)' (Personal communication,MINT001, 3 January,2018).Training is a very important tool in farming; we are informed that farmers in the scheme undergo regular training, so as to learn new farming methods. This is important so as to help farmers gather good farming practices as well as increase their crop harvest.

The next question sought to learn whether farmers underwent training in the scheme, and the impact this has had on their crop productivity.

7.6.3 Farmer training and crop quality

This question sought to find out what training the farmers within the Ahero Irrigation Scheme received and the impact this had on their harvest after the training. Table 19 below shows the responses received from respondents.

Table 19. Farmer training and crop quality (2019)

| Respondent Number | Respondent Response |
|--------------------------|---|
| MINT002 | <i>'I have been trained here - it has taken some years? I have not benefitted from any other training'</i> |
| MINT001 | <i>'It is a government institution, we normally have farmer's capacity building at least quarterly.'</i> |
| FINT002 | <i>'I went for training a while back, but I have not gone recently.'</i> |
| FINT003 | <i>'Yes, we do, but rarely. The last time I went to training was about 6 months ago.'</i> |
| FINT001 | <i>'No,... but we have seminars when they bring us seeds, they tell us how to use them - so that is the only training we receive in terms of the seeds and field days''</i> |
| 038F | <i>'Yes'</i> |
| 032F | <i>'Yes, those organized by NIB'</i> |
| 016M | <i>'I have never attended any training'</i> |
| 031F | <i>'Yes, Those organized by the National Irrigation Board.'</i> |
| 010M | <i>'No'</i> |
| 033F | <i>'Yes'</i> |
| 026F | <i>'Yes, but very rarely'</i> |
| 019F | <i>'Yes'</i> |
| 015F | <i>'Yes, we have gone for training but they have not been so effective, for some are not applicable in this area.'</i> |

Farmers within the Ahero Irrigation Scheme, acknowledge the importance of farmers training. Eighty percent of the respondents in the study indicated that they had undergone some form of training within the Ahero Irrigation Scheme. This training was organized by the National Irrigation Board, as stated by Respondent 031F (view table 19 above). However, some respondents, stated that they had not undergone any form of training. Respondent,016M, 'I have never attended any training' .(Personal communication,016M, 4 January, 2018).

Training is not only done by the National Irrigation Board, but is also taken up by other agencies, the next question sought to know if this was the case, and the governmental agency that led the training.

7.6.4. Farmer training from different organisations

This question sought to gain insight from the farmers within the Ahero Irrigation Scheme on whether they had received any training. In addition, the research sought to establish if the respondents had benefited from any government agency and, what impact – if any - the assistance had on them as farmers or on their farming and their perception of the training. The responses received for this question are shown in table 20 below:

Table 20. The benefits of training (2019)

| Respondent Number | Respondent Response |
|--------------------------|--|
| MINT001 | <i>‘We have not had much training, apart from what we received from the central government. There was one set of training that was done in 2013 when the World Bank had a project and supplied farmers with inputs, and when they came up with new products they provided training. Other independent organizations–no, they did not provide any training’</i> |
| FINT003 | <i>‘Yes, we do, but rarely. The last time we received training was about 6 months ago’</i> |
| FINT001 | <i>‘No Ministry, No NGO, No training’</i> |
| 009M | <i>‘Yes, we had training with Kenya seeds late last year.’</i> |
| 008M | <i>‘Yes, I received a helmet and a reflector from Seed Co’</i> |
| 005M | <i>‘Yes–we received nice trainings on improving of yields and soil fertility’</i> |
| 004M | <i>‘Yes, there is an organization which trained us on application of herbicides, but did not help me because the output was low.’</i> |
| 033F | <i>‘Yes, rice planting has helped me increase my yield.’</i> |
| 042F | <i>‘Yes, the training helped me learn how to plant rice in rows. This has improved yield.’</i> |

| | |
|------|---|
| 038F | <i>‘Yes, it helped me improve my farm yield.’</i> |
| 018M | <i>‘Yes, the introduction of new varieties of seeds improved farming and yields. Also, new techniques like planting in rows has improved yields.’</i> |
| 026F | <i>‘Gained new farming skills, improved the production of rice.’</i> |
| 016F | <i>‘Yes, I now plant in a line which has led to increased yields and less seeds used.’</i> |
| 013F | <i>‘Gained new farming skills, improved the production of rice.’</i> |
| 012F | <i>‘Yes, from NGO’</i> |
| 011F | <i>‘Yes, there was an NGO that trained farmers on how to plant rice in lines, and since I have adopted this system the yields have increased’</i> |

Farmers within the Ahero Irrigation scheme indicated that they had received training from the Kenya Seed Company, and a local non-governmental agency. This training enabled them to gain new farming skills as stated by Respondent; 026F: who stated that ‘...gained new farming skills...improved the production of rice.’(Respondent communication, 026F, 3 January,2018). Another, respondent stated that; ‘...the training helped me learn how to plant rice in rows. This improved my yield. (Respondent communication,042F, 4 January,2018). Training opportunities within Ahero Irrigation Scheme are beneficial, as farmers within the scheme benefit, from new farming methods taught, as well as learn how to use new farm inputs, that increase crop yields as stated by several respondents (view table 20) above. The next question sought to know how the lack of education, impacts women farmers within Ahero Irrigation scheme. This is important as 67% of the women respondents in the scheme have only attained primary education.

7.6.5. The lack of education on women farmers and its impact on agriculture

This question sought to understand the participants’ views of education with regards to farming and whether it has a strong impact on women as farmers or on their farming in general. It was noted that many of the respondents felt that it did. The responses for this question are represented in table 21 below:

Table 21. Challenges women farmers face due to lack of education (2019)

| Respondent Number | Respondent Response |
|--------------------------|--|
| FINT002 | <i>‘Education is good, because it helps women to learn more about production and to know how many bags they can expect when they plant?’</i> |
| MINT001 | <i>‘It does, but fortunately our farmers at least have some basic education. It does for those who do not have basic education? It is not easy to train those who do not have basic education...you know to be a great leader like a secretary you have to keep records of cash transactions, and they do this as a group. This is basically done by the group leadership as they have to negotiate the price of the crop. So, if you lack basic knowledge then it affects one from becoming a better farmer.’</i> |
| FINT003 | <i>‘When you are not educated you cannot know the days when you can start planting your rice. Infact, when you plant early you get a high yield. And when you plant later you get a lower yield. Even when applying fertilizer - if you do not do it on time, it is going to hinder your harvesting.’</i> |
| FINT001 | <i>‘If you have not read about farming, you will not know how long it takes you to make the nursery, the right time to plant and the right amount of chemicals and fertilizers to use; , it is a must - you be educated.’</i> |
| MINT002 | <i>A woman who does not have any education, she does not know even how to sell rice. Therefore she cannot grow good rice, she cannot manage to complete planting in good time - so she cannot manage to get something.</i> |
| 039F | <i>‘Yes, it hinders women because some people use excess fertilizer on their farms - thinking they can produce more products.’</i> |
| 032F | <i>‘Yes, women who lack adequate education do not believe in fertilizers or even pesticides and they do not have proper knowledge about them so they just apply these.’</i> |
| 018M | <i>‘Yes, some women lack knowledge; they do not believe in new techniques.’</i> |

Seventy percent of farmers stated that they received training and that the training helped to improve their yields, as well as their knowledge. However, others stated that they have not received any training at all. For example, Respondent 005M stated: ‘Yes- Received nice trainings on improving yields and soil fertility’ (Respondent communication,005M, 4 January,2018). While another stated, ‘Yes, Row planting has increased the yield’ (Respondent communication,036F, 4 January,2018).

Sulaiman (2018) asserted that recent analyses of curricula and materials revealed that despite visible guidelines and directions, the status-quo reigns supreme. Namonje-Kapembwa and Chapoto (2016:2) argued that it is imperative to design technologies that fit men and women if both genders face constraints in their rate of adoption of technologies. However, if the difference in the rate of adoption is because men and women face different constraints, then it is important to address this unequal access. This is because it is hoped that such actions will promote agricultural growth and will increase women’s participation and contribution in farming and income generation.

According to Nakawuka et al., (2017), there is a need to invest in higher agricultural education to train large numbers of personnel who can modify and adapt applied research and then extend the knowledge to farmers. These extension services are a source of knowledge on various agricultural packages to farmers. He asserted that the four East African countries (Kenya, Uganda, Tanzania, and Rwanda) lacked qualified extension workers and that the number of extension staff needed to reach farmers was not enough because they lacked incentives to retain them. “In Kenya for example, the extension staff to farmers’ ratio is 1:1,500 and the extension officers are limited by lack of fuel for the motor bikes to reach farmers” Nakawuka et al., (2017: 10). In addition, project developers may offer technical support in operation and maintenance of irrigation schemes at the beginning of the project but later leave the management and maintenance to the beneficiary farmers. However, many farmers expect that they will always be provided with this support and are not willing to contribute to such activities from their own time and resources due to lack of ownership.

In regards to Ahero Irrigation Scheme, farmers within the scheme have in the past been reluctant to take ownership, of certain tools in the scheme, due to costs of maintenance and lack of training. Kirui (2019:4) asserts “the importance of education and literacy in enabling farmer’s access to information and knowledge regarding production technologies and market opportunities as it allows them to make better decisions.” He claims that studies have shown that farmers with just a few years of basic schooling are more likely to adopt and correctly apply agricultural innovations.

Applying this framework to technology adoption allows for better understanding of how gender impacts smallholder technology adoption in households. The distribution of rights to technology shapes whether technology adoption is sustained or adopted given that the anticipated distribution is likely to influence men’s and women’s interest in trying out the new technology. However, the lack of education, according to the respondents, does support this argument (Personal communication, Respondent MINT002, 5 January 2018,2018); Personal communication, Respondent 018M, 4 Janaury, 2018).Government plays an integral role in the governance of resources. In addition, politicians and political will play an important part in ensuring that these resources (land, and water) are available. The next section discusses how governance and political will impact farmers within Ahero Irrigation Scheme.

7.7. Politics and Agriculture

7.7.1. The impact of national politics on farming

The question above sought to ascertain, from the respondents, if national politics had an impact on farming and the manner in which this has affected farming within the Ahero Irrigation Scheme. Some of the respondents felt strongly about national politics and the impact it has had on their farming. Respondents responses can be seen in table 22 below:

Table 22. Impact of national politics on farming (2019)

| Respondent Number | Respondent Response |
|--------------------------|--|
| MINT001 | <i>‘Politics came in and some leaders told the farmers ‘this is your money why should you return it’? It was given as a grant and the farm is yours, you are the one who is benefitting, ..., just take everything the government has given. So because of that the project did not continue because there were no funds.’</i> |
| 005M | <i>‘Yes, political affiliations affect the distribution of resources regionally.’</i> |
| 003M | <i>‘Yes, during elections- ... most buyers from other counties did not come to buy our product.’</i> |
| 002M | <i>‘No—I am less concerned with politics.’</i> |
| 034F | <i>‘The government has forgotten about the farmers’</i> |
| 041F | <i>‘Yes, our scheme is in the opposition area, so the government has not supplied us with equipment.’</i> |
| 039F | <i>‘Yes, we receive less support from the national government.’</i> |
| 032F | <i>‘Yes, during the lead up to elections most buyers, especially those from Uganda, go back to their country and this leads to a lack of buyers and even the price is affected.’</i> |
| 018M | <i>‘Yes, the support we receive from the government is less..., despite the fact that we are from the opposition stronghold.’</i> |
| 015M | <i>‘No, all farm inputs are available within the county, hence there is nothing much needed from the national government.’</i> |
| 026F | <i>‘Poor distribution of resources in our region due to poor government caused by politics.’</i> |

7.7.2. Local politics and its impact on farming

This section sought to understand if local politics within the villages in the scheme affected the way in which farmers within the scheme farmed, and the impact this had on their farming. Table 23 below, indicates the responses received from respondents.

Table 23. Local politics and its impact on farming (2019)

| | |
|------|--|
| 008M | <i>'Yes- revolving fund chair always favours his close friends'</i> |
| 005M | <i>'Petty scheme politics hinders the growth of our cooperative and farmers' groups.'</i> |
| 033F | <i>'It does not affect farming.'</i> |
| 042F | <i>'Yes, some leaders satisfy their personal interests.'</i> |
| 040F | <i>'No'</i> |
| 038F | <i>'Yes, Most block leaders take advantage and do not pay their loans, when they are in office.'</i> |
| 016M | <i>'No'</i> |
| 028F | <i>'No, it does not'</i> |
| 022F | <i>'Yes, it affects buyers from purchasing our goods'</i> |
| 016F | <i>'Yes, leaders pursue their own personal interests'</i> |
| 015F | <i>'No, because we have seasons of farming and politics does not matter'</i> |
| 014F | <i>'Yes, they are supportive and ready to assist especially when farmers harvest and look for the market.'</i> |
| 037F | <i>'It does not affect'</i> |
| 013M | <i>'Yes,'</i> |
| 011M | <i>'No'</i> |
| 025F | <i>'No'</i> |
| 012F | <i>'Scheme politics interfere with scheme management, thus leading to poor economic growth.'</i> |

| | |
|------|---|
| 009F | <i>'Yes, some leaders satisfy their personal interests'</i> |
| 006F | <i>'It affects in most cases like clan and bad management.'</i> |
| 003F | <i>'No'</i> |

Politics is entwined within every fabric of society. From the smallest rural community to the greatest nation, there is a group of individuals who are known as the political ruling class, who are generally empowered by their people to rule and guide them. In Africa, as Poulton (2012:2) argued, “Africa’s political elites have been successful in suppressing any genuine pro-farmer political movements.”

In the Ahero Irrigation Scheme, this tone was no different: as Respondent MINT001, states, ‘Politics came in and some leaders were telling farmers this is your money why should you return it. It was given as a grant and the farm is yours, you are the one who is benefitting, you do not need to recover, just take everything the government has given, so because of that the project did not continue because there was no funds.’(Personal communication, MINT001, 3 January,2018). The primary way of gaining the allegiance of a group has been to give it access to government resources by granting its leader(s) control of particular state institutions. (Poulton and Kanyinga, 2014:5) Thus as stated by Respondent,005M ‘Yes, political affiliations affect the distribution of resources regionally’(Personal communication, 005M, 4 January, 2018).

The political process ... is one of perpetual coalition building – of the formation and reformation of coalitions of local organisations that have no common interests other than the control of the state and its resources. Stated simply, the objective of politics is to control the state for the purpose of funnelling state resources back to one’s supporters and local communities. Politics is local and patronage is usually king (Poulton and Kanyinga, 2014:5). As stated by Respondent 033F, ‘... Politics has gone tribal; the government does not help us’ (Personal communication, 033F, 3 January,2018).

The Ahero Irrigation site sits within the western region of the country. This region is viewed as a region that often supports the opposition. Thus, the residents within the scheme feel that they are being punished for voting for the opposition. For example, Respondent,041F states:‘Yes, our scheme is in the opposition area so the government does not supply us with equipment’, while another stated, ‘The government has forgotten about the farmers’ . (Personal communication, 041F, 4 January,2018) and (Personal communication,034F, 5January,2018).

(Poulton, 2012: 5) asserts that

Major agricultural value chains have a strong association with particular groups. This is in view of the fact that major ethnic groups live predominantly in one area of the country, in addition to the major cities. This has made state-supported agricultural institutions powerful instruments of patronage and central features of Kenya’s agricultural policies.

With regard to local politics, some of the respondents felt that the local leaders were in office to satisfy their own selfish and personal interests, while others felt this was not a concern and responded ‘No’ to this question. For example, Respondent, 038F, stated: ‘it does not affect me’, while Respondent 042F, stated that: ‘Yes, some leaders satisfy their personal interest.’ (Personal communication,038F, 4 January, 2018), (Personal communication,042F, 5January, 2018).The next question, sought to understand the impact of government policy on farmers be it national or county government level policies on agriculture. The study also sought to ascertain whether farmers were aware of these policies if any.

7.7.3. The benefits of national/local government policy in the last 5 years

This question sought to understand if the farmers had any knowledge of any national government or county government policy that was related to agriculture. Table 24 below highlights the responses received .To better understand how they have benefited from the two governments and the impact this has had on them within the scheme.

Table 24. The benefits of national and county government policy (2019)

| Respondent Number | Respondent Response |
|--------------------------|--|
| MINT001 | <i>'We have farmers' capacity building and we have training for farmers...; in every financial year we train farmers on matters in irrigation water management, crop husbandry, management of funds, issues with marketing and market access, that one is allocated every year, ...for 12 years until now, farmers capacity building, farmers training is a continuous phase, after the phase we start another.'</i> |
| FINT002 | <i>'No I have not; I only know Eugene Wamalwa, the then Minister of Water and Irrigation, and Martha Karua, who came here in Year 2000s...within 10 years.'</i> |
| FINT003 | <i>'No'</i> |
| FINT001 | <i>'We received tractors from the former governor of Kisumu Ranguma; he stood as a guarantor for us so that we could receive tractors, he saw the way we were suffering and felt that by giving us the tractors it would be a good way to help us. ... He used the county to guarantee the tractors to the farmers.'</i> |
| 017F | <i>'Yes, local government provided the farmers with machines, harvesting machines and this has greatly improved farming technology.'</i> |
| 024F | <i>'Yes, I got fertilizer - 3 bags from the county government and I saved some funds for other use'</i> |
| 030F | <i>'Yes, the county government took some farmers to Uganda on the farmers' exchange programme.'</i> |
| 028F | <i>'No, I have not benefited.'</i> |
| 015M | <i>'Yes, there is a time the national government provided subsidies on farm inputs and this enhances increased output because most farmers were able to access the inputs.'</i> |
| 032F | <i>'Yes, provision of tractors by county government and organizing for seminars and workshops.'</i> |

| | |
|------|---|
| 037F | <i>'Yes, a few years ago we received economic stimulus package from the national government'</i> |
| 041F | <i>'Yes, a few years ago we received economic stimulus package from the national government.'</i> |

The farmers felt that the County Government of Kisumu has been beneficial to them. This is because the County Government was able to purchase tractors for the farmer's co-operative, which they used to till their lands. Hence, they felt they had benefited from the County Government. Some farmers stated they received bags of fertilizers from the National government, which helped them to save some money. However, the scheme also received funds from the National government to train farmers on a yearly basis.

These training sessions were important in training farmers in new farming methods and enabled them to produce greater output from their farms. On the other hand, there was a big gap between the National government and the County Government in the coordination of projects and in assisting farmers in the scheme, and in meeting and understanding both governments' objectives as well as their own.

The next section sought to understand the impact of any government policy on farmers, and whether national or local politicians had made any efforts to discuss these policies with the farmers in Ahero Irrigation Scheme.

7.7.4. Agricultural policy discussions with national/local government leaders

This question sought to know if the farmers in the Ahero Irrigation Scheme had any interactions with politicians, and the sort of interaction they had. It also sought to find out the impact of these interactions on the farmers and in the irrigation scheme as a whole. Respondent responses can be seen in table 25 below:

Table.25 Agricultural policy discussions with farmers (2019)

| Respondent Number | Respondent Response |
|--------------------------|---|
| FINT003 | <i>‘...The Minister for Water,Eugene Wamalwa ,came here to launch the tractors in 2016.’</i> |
| FINT001 | <i>‘In this county, no one but Eugene Wamalwa- (Minister of Irrigation) has come here.</i> |
| 007M | <i>‘Yes’</i> |
| 004M | <i>‘Yes, Our MP promised us that they will try to market our products to other countries.’</i> |
| 019M | <i>‘No’</i> |
| 012M | <i>‘No’</i> |
| 030M | <i>‘Yes, the area MCA(Member of County Assembly) promised farmers that they will organize for some training.’</i> |
| 026F | <i>‘Yes, the county agricultural officer’</i> |
| 025F | <i>‘Yes- but they rarely fulfil their promises to farmers.’</i> |
| 015F | <i>‘Not at all’</i> |
| 014F | <i>‘No, I have not had any discussion between the two’</i> |
| 006F | <i>‘An area member of parliament and the minister of agriculture.’</i> |
| 004F | <i>‘Yes, the women assembly representative.’</i> |
| 001F | <i>‘Yes, but under rare circumstances’</i> |
| 010F | <i>‘The area MP’</i> |
| 009F | <i>‘Yes’</i> |

It is interesting to note that the farmers within the scheme benefitted from a few initiatives during the last 5 years, and most significantly from the County government of Kisumu. The County guaranteed itself to the Japanese government and was able to purchase tractors for the farmers that they used through their co-operative society. For example, Respondent 018M stated: ‘Yes, we received tractors from the county government almost two years ago’ (Respondent communication, 018M, 4 January, 2018). In addition, the Government’s economic stimulus package - that is, referred to as the revolving fund - has also played a key part in assisting some farmers within the scheme, while others noted that they have not benefitted from these schemes at all. Respondent 014F, ‘No, I have not benefitted from either of them’. (Respondent,014F. 4 January, 2018).

It is also important that many of the respondents noted that they had very little interactions with people in government with regards to developing or creating policies that would support them within the scheme. However, the farmers indicated that some discussions were held but these were not an in-depth level. For example Respondent, 025F stated: ‘Yes, but they rarely fulfill their promises’ (Respondent communication,025F, 4 January,2018).However, we were informed that when need be, the government representatives come together in consultative meetings to tackle the issues at hand. As stated by MINT001, who states that:‘When there was a new act,they brought it down for farmers input and when they did that, the local MPs and governor came together for a consultative meeting, then it was discussed in parliament.’ (Respondent communication, MINT001, 3 January, 2018).

Lastly, the study sought to know, what the respondents view was with regards to the national and county Governments supporting women’s roles in agriculture in Kenya.

7.7.5. The actions of national/local governments in improving the role of women in agriculture in Kenya

This section sought to have the respondents’ state their view as farmers within the scheme what they believed the local and national government can do to improve women’s role in agriculture in Kenya.

The respondents felt better training and access to financial resources were some of the key items the national and local government to provide as well as better access to farm inputs and the provision of farm subsidies as seen in table 26 below.

Table 26. Government actions needed to improve women's roles in irrigated agriculture (2019)

| Respondent Number | Respondent Response |
|--------------------------|---|
| FINT002 | <i>'I would tell them that we need loans so that we are able to purchase fertilizers, pesticides and seeds -... you know everything is money; if you have money you can go to Ahero and buy fertilizer and many things you need; even to plant will not be difficult'</i> |
| FINT003 | <i>'The best thing is to bring us together with more seminars to improve our agriculture, employ us and motivate us, support us with materials to make work easier so that we can be successful at the work.'</i> |
| 010F; 031F; 013M | <i>'The government should protect women on farms they inherited... to reduce discrimination.'</i> |
| 008F | <i>'The government should assist in marketing our products and sensitizing us on modern farming techniques.'</i> |
| 007F | <i>'Women should be provided with funds so as to reduce borrowing. The government should provide water for irrigation.'</i> |
| 001F | <i>'Women empowerment programmes to educate women, provision of loan facilities and education.'</i> |
| 014F | <i>'They need to empower women through the organization and groups, such as the Kachiawo women's group.'</i> |
| 015F | <i>'The national government should make it easy for women to own the land. The local/national government should clearly support the women farmers in a way that it reduces labour.'</i> |
| 017F | <i>'Encourage women to engage in agriculture so as to improve the economy of the country and to ensure food security.'</i> |

| | |
|------|---|
| 025F | <i>'Local/ national government should create training opportunities for women in local areas where they can easily access help to help them in their roles in agriculture'</i> |
| 023F | <i>'Women empowerment through loans.'</i> |
| 024F | <i>'Actively involving women in agriculture production, making it easier for women to access loans, modernizing agriculture and doing away with traditional beliefs affecting women.'</i> |
| 015M | <i>Provide gravity water, assist in marketing our produce and provide subsidized inputs</i> |

The farmers acknowledged that women were important players within the scheme and that the national government should consider the following key elements in improving women's roles in agriculture in Kenya. These included: access to finance is a vital part of any sector and gaining access to funds will better assist women within the farming sector. In addition, better access to farm inputs such as seeds and fertilizers at subsidized rates is also viewed as vital.

Educating and training women on better irrigated farming methods is also vital not only for them, but for all farmers within the irrigation scheme. This would enable the irrigation board improve farmers yields, manage their crops and enable them to have a better understanding on how to manage resources. The provision of markets where farmers can sell the crops was also important, and the elimination of middlemen from the equation will better increase the returns farmers receive and reduce exploitation (by the middlemen). As one respondent stated: 'eliminate middlemen from the market, provide more training for farmers, and provide subsidies to farm inputs'. One of the respondents noted the importance of educating the public on the importance of having women inherit land. (Respondent communication, 038F, 5 January, 2018).

A key element in helping reduce the stress of women, especially widows, was to have some form of security for their families, especially in regard to land tenure. This should not only be in terms of financial security, but food security as well. As Respondent 013M stated: 'The government should protect women in their inheritance farms... to reduce discrimination.' (Personal communication, 013M, 4 January, 2018).

Women in Ahero Irrigation Scheme, play an integral part in irrigation farming. Men in Ahero Irrigation Scheme acknowledge the important role women play in farming and irrigation. The management of Ahero Irrigation Scheme, acknowledge this as well, and have measures in place to support women in this role. This is a start, and more needs to be done to support this efforts. The Government of Kenya, can support these initiatives further, by developing policies that support women in agriculture.

Numerous respondents in (table 26) above have mentioned ways in which the government of Kenya can support them. It therefore becomes important for the Kenyan government and other stake holders in the agricultural sector to develop policies and initiatives that will support women in the irrigated agricultural sector, and help them grow in the sector. The next section of the study summarizes the chapters 5, 6 and 7 within the context of the various themes discussed in chapters.

8.0. Summary

In these chapters, we discussed the various responses we received from the respondents, with regards to the six main themes of the study. These are: women and agriculture, women and land tenure systems, water and irrigation, financial resources and assets, technology and education and finally politics and agriculture. We noted that in the demographic section of the study that 68% of the respondents were female and 32% were male, thus ensuring the study was gender sensitive in capturing the views of the two genders. The marital status of the respondents was also captured. This was important so as to understand the impact marital status has on the respondents within the scheme. Marital status is an integral element within the scheme as it is a means by which women can gain access to land. Thirty-six percent of the participants of the scheme were aged 60 and over and twenty-four percent were between the ages of 51 to 60. The least age group within the scheme fell in the age bracket of 31-40 years. These showcase that irrigated agricultural activities within the scheme were mostly carried out by the older generations, as the younger generations have moved out of the scheme.

A majority of the households in the scheme were male headed households; with the household having an average of 1 to 5 people. Those with the highest level of education were male with an university education, with women having the least proportion of higher education but with high proportions of primary education. Many of the farmers in the scheme considered themselves as farmers, with a second group composed of mostly women being unemployed. Lastly, a majority of the respondents lived in the scheme for over 20 years.

Many of the female respondents voiced the importance of the role of women in agriculture. This was also supported by a few of the male respondents, but not all shared this same view of women with regards to agriculture. The women also noted the important role men played in farming in terms of assisting during canal clearing, ploughing of the farm with oxen and decision making when it came to some farm activities.

In the Ahero Irrigation Scheme, women face a few challenges in accessing land even though land within the scheme was owned by the National Irrigation Board, which is a government entity managing the scheme. A major challenge was observed in terms of land succession and division of land, which is only 4 ha; thus, challenging those families with more than two children. Many of the respondents - including the female respondents- noted that they would give the land to first born sons. Those who did not have any male heirs stated they would give their land to their daughters, while others noted that each child would have to work hard and buy their own land.

Land was viewed as very important economic resource that needed to remain in the family. In the irrigation scheme, women were viewed as not carrying ownership of the land within the scheme, as they were seen to be migrants who would move once they were married. Hence, there was a heavy reluctance to allow them to inherit land. This was more a cultural and custom item with regards to gender. This had a great impact on women with regards to land inheritance and succession of land within the scheme.

A majority of the crops grown within the scheme were vegetables and legumes. The farmers grow these foods for subsistence consumption and additional income during planting seasons when rice is not grown. Many women did not participate in many of the irrigation activities due to the nature of the tasks and the hours when accessibility to water for farming was accessed. No cultural factors affected the women in accessing the water. However, a respondent noted that some women did not take part in elections due to the work involved, and that some lacked basic education to handle such positions that entail note making and bookkeeping. It was noted that access to clean water within the scheme was not difficult as many communities within the scheme had boreholes. The major challenge was water for farming that took several hours to reach different farmlands within the scheme.

Access to financial resources was a challenge for some women. The amount of money they received from their husbands with regard to land preparation was not enough for farming. They acknowledged that they received assistance from the revolving fund within the irrigation scheme. If this was not the case, subsidized loans may have been given to some farmers to purchase seedlings and fertilizers.

The amount of money the farmers received as a return on investment from the farm, varied from Kshs 8,000 (\$80) to Kshs 200,000 (\$2000). Others noted that women faced numerous challenges in accessing finance due to discrimination, lengthy loan application processes and poor financial management. Some respondents felt there were no difficulties that women faced when it came to accessing finance.

A majority of the farmers used tractors to till their farm lands, while others used ox drawn ploughs and the older traditional methods of using hoes and machetes to farm their lands. Some of the farmers noted that they had received training within the scheme from external trainers but this was not done often. The scheme manager noted that the scheme received an annual budget from the government to train the farmers within the scheme. The farmers within the scheme appreciated the training they received adding that this had impacted their farming and increased some of their yields.

Many of the respondents noted that national politics had a great impact on the scheme given that the scheme was situated in an opposition stronghold. This view alone reflected the belief that the government had abandoned them. On the other hand, the County government of Kisumu and the regional government had, assisted the farmers by acting as guarantors in purchasing tractors for their farming. Thus these local government structures received great regard from the farmers. Many of the respondents note that women played an important role in farming and that more should be done to support them financially and with regards to accessing fertilizers and seeds, and with training in agriculture and tools accessibility. The importance of educating the public on land inheritance was also deemed a pertinent issue to be taken to task by the national government of Kenya.

Eco-feminism within the chapter was highlighted within the different themes, showcasing how the patriarchal systems have a great impact on agriculture across different fronts. With regards to the themes: women and agriculture, we noted how women take up different roles within agriculture to ensure the cultivation of crops and recorded the challenges they faced within the patriarchal systems with taking up such roles. Water - as a natural resource - is a necessity; however, accessibility to it is was largely based on socio-economic power and access to land. There was the need to safeguard water as a resource and not a commodity that farmers needed to pay for. Water as a resource was still very much under the control of men. The accessibility of financial resources was tied to natural resource ownership as access to credit came with the production of title deeds for lands and that was still largely under the ownership of men. This situation hindered women's accessibility to finance. Moreover, patriarchal dominance in the study location ensured that women remain subdued.

The use of education and technology in helping women access better tools and equipment for their farms was hindered as women were poorly educated. Moreover, the equipment they used and training they were given were not well suited for them. Finally, local structures worked to ensure that women were not able to engage in decision making activities. Rather, it was expected that women were to be engaged in ensuring that their households and child rearing activities were well conducted.

CHAPTER VIII

CONCLUSION AND RECOMMENDATIONS

8.0. Introduction

This chapter will summarize the conclusions of the study in terms of the aims and objectives of the study. This will be in term of the key themes which underpinned this research, and as set out in the objectives of the study. In addition, an evaluation of the key findings will be done within the context of the theoretical framework and the literature. A discussion will follow on what are the research implications of the study for policy and practice in the field of irrigated agriculture for women in Kenya.

There is tremendous pressure for food security in the world. Irrigation farming is seen as one of the best ways in which increased food production can be achieved. It with this in mind that the study sought to better understand how women work in the irrigation fields in Kenya and how their involvement in irrigation farming is assisting in meeting its food requirements. Thus, the Ahero Irrigation Scheme, which is located in the western part of Kenya, was chosen as the area where the study could be conducted. The National Irrigation Board of Kenya runs the scheme and is home to 565 farmers.

The study focused on six key themes in relation to women and irrigated agriculture in the Ahero Irrigation Scheme. The themes were related to women's roles in agriculture, land tenure systems, water and irrigation, education and technology, financial resources and assets, and politics and agriculture.

These six key themes were further subdivided to cover three main objectives:

1. Examine women's roles in irrigated agriculture in the Ahero Irrigation Scheme, in Kenya
2. Ascertain women's contribution in irrigated agriculture in Ahero Irrigation Scheme, in Kenya, and
3. Identify and document the challenges women in irrigated agriculture faced in Ahero Irrigation Scheme, in Kenya.

The conclusions were drawn from an analysis (via Excel) of the responses from participants with relevance to the themes of the study. Other relevant information was reviewed, analyzed and arranged according to emerging themes to the study. These other themes related to women farmers and healthcare needs, household incomes, women's farmer groups and marketing of farm produce.

8.1. Aims and Objectives of the Study

8.1.1. Women's Roles and Contribution in Irrigated Agriculture

Women's role in irrigated agriculture has evolved over a number of years. The challenge over the years has been the need to obtain evidence that can support women's role in irrigated agriculture. Many women in this study acknowledged the role they played in irrigated agriculture and this was also supported by men within the scheme who acknowledged the hard work women put in to ensure rice production took place within the scheme. This was also asserted by the management of the scheme. However, the study noted that some of the women in the scheme did not see their roles as being important. The women viewed their work as being an important aspect in ensuring that their families were well fed and provided for.

Women in the irrigation scheme did 80% of the work as was acknowledged by the management of the scheme. This mostly centered on preparing the land for planting and weeding the crops. In this stage women spent many hours working in stagnant water. The study indicated that despite the efforts made, most of the women failed to reap the benefits of their hard work as proceeds from the sales of the produce went to their partners. If some received any benefits, the figures (returns) were low. In addition, there was a lack of a gender sensitive mechanisms to enable the women to benefit from their work. Furthermore, the study showcased how patriarchal systems affected women in the scheme. This was because there were different clans and communities that managed the 12 blocks in the scheme.

The study acknowledged that there was a significant gender gap when it came to women in irrigated agriculture within the scheme. The lack of data to acknowledge women's roles and contribution to irrigated agriculture was important if women's perceptions with regards to their roles were to be changed. Bozchelouie (2018) asserted that agricultural history was perceived as a masculine and patriarchal process without any place for women. In addition, the accepted gender pattern was patrilineal in that a son has the right to secede the father and continue his agricultural occupation. Bozchelouie asserted that this was one of the processes that contributed to social inequity and made the role of women in the agricultural sector invisible. Meinzen-Dick et al. (2014:6), asserts that "This is because gender roles are socially, rather than biologically determined and as such are fluid and subject to change based on changing norms, resources, policies and contexts. Every society is marked by gender differences". According to (Meinzen-Dick et al.,(2014) every society varies widely by culture and can change dramatically within or between cultures over time.

The study sought to understand if gender in social contexts had an impact on women's access to resources in irrigated farming and the impact gender has on resource allocation. Women's access to land is very challenging as acknowledged by many authors. In addition, there have been many key statements like 'Women own 1% of the land'(Doss et al.2018:69) that have come to be challenged by several key authors like Doss, and Meizein-Dick, among others, with regard to such messages and the impact this has on women in agriculture.

In this study, the researcher noted that the land within the scheme is under administration by the National Irrigation Board of Kenya. Furthermore, the land was leased to the farmers who resided within the scheme. Many of the farmers in the scheme resided within the scheme since its inception. Many of the residents were aged 60-years and above and resided in the scheme for close to 20 years and more - thus a majority called the scheme home. Some of them even referred to the land as their ancestral land, clearly indicating a bond between their families and the land.

Many women faced the challenge of accessing land in the scheme when they become widows. This was because the land was registered in their husband's names and many of the husbands gained access to the land after they inherited the land from their fathers. Thus, conflicts arose when the husband left the land to his wife and children. This then created a dispute between the wife and her in-laws. Thus, when such cases arose, the management of the irrigation scheme intervened and mediated between the families to arrive at a settlement to allow both families to work together. The scheme's advisory board handled land matters. In irrigated agriculture women face the greatest challenge when they need to access land for farming or irrigation. On the other hand, this was not the case in the scheme. Rather a critical issue was the status of women with regard to their relationship with men in the scheme.

This information supported what many authors stated, namely, that women's access to land was subject to their relationship with men, be it as wives, sisters or daughters. Thus, culture played a significant role in impacting women's performances in the irrigation scheme. This also supports the literature with regards to the impact that culture has on women in agriculture and irrigated agriculture. For example, in Pakistan, according to Peveri and Drucza (2018), gender roles and cultural practices such as '*purdah*' (code of honour and modesty, resulting in women's seclusion) explained why women were less visible in the agricultural sector.

Tegada (2018) explained that the farm is a male "domain". This stereotype showcases that women's access to land and water is through marital contract and construct. Their identity is that of being labeled farmers' wives. Thus, gendered work is based on establishing ideological borders between 'the farm' as the workplace and the home. This was a factor that was acknowledged by the irrigation scheme's management. With regard to land inheritance, the Luo tribe who reside in Ahero and its environs mostly leave land to their sons and not their daughters. It was only recently due to the recent constitutional change on 27th of August, (2010) that some members of the community bequeathed land to women. However, this is still subject to kin and clan cultural customs and laws in the 12 different blocks which have 12 different clans.

The Luo are also known to have a tradition where the wife or wives of a deceased man can be inherited by the man's brothers (if any) or by other clan or kin members. This custom has left many women to suffer through the numerous disputes that arose because the clan or kin customs do not allow women to inherit land, even if its owned by the National Irrigation Board. Women faced numerous challenges in this regard as their in-laws preferred to inherit them so as to have their families gain access to the land. In such situations, the scheme managers as well as elders within the community and the area chief, came together to mediate.

This gathering itself showcased the importance of land within any community, even with the land being owned by the government within the irrigation scheme. Furthermore, it showcased the importance the management placed on systems when it came to land management issues that involved women. Many farmers, both men and women, were going to let their first-born sons inherit the land. Furthermore, women were not going to let their daughters inherit the land even if they were the first-born in the family. Only one participant stated that he would let his daughter inherit the land as she was his only child. However, some of the participants acknowledged that they wanted their children to work hard and buy land out of the scheme instead of inheriting the land on which they resided.

This highlights that some of residents, would not like their children to struggle and gain access to the 4ha which may have to be further divided, depending on the number of children. Hence, the children were better off purchasing a piece of land somewhere else. The study was able to ascertain that the scheme had set up systems to help women gain access to land and work within the community to ensure that their needs were taken care of. This showed that there were systems in place within communities that were working to fight for women's access to land and that these systems needed to be supported with regards to assisting communities take care of land matters.

The farmers within the scheme grew a number of different varieties of crops beside rice which is the main cash crop. These crops were grown after the main planting season and helped many women earn extra money, which was used to provide subsistence food for their families.

Doss et al. (2018:71) asserted that

women's kitchen gardens or homestead plots are often not counted as agriculture, but play an important role, especially in providing dietary diversity. In some contexts, women also grow a large share of staple cereal or root crops that are consumed by the household.

It is therefore important that other government institutions and systems have platforms where women within different communities can be heard on different matters and have their cases resolved. This should be done without causing friction between families and letting farm land lay fallow.

8.1.2. Women's Contribution to Irrigated Agriculture

The management of the scheme was divided into four groups: the scheme advisory board which handled land matters, the irrigation water users' association which handles matters dealing with water distribution within the scheme, the farmers' groups which consisted of the farmers within the scheme and the Ahero co-operative society that handled the marketing of the rice crop. The management of the scheme has taken different systems of management which have incorporated farmers into the management activities of the scheme.

The management of the scheme within the four groups did not have an adequate number of women in management positions. The scheme manager acknowledged that women were mostly active in farmer groups than in the water users' association, where they held various positions within these groups. He acknowledged that this was because these positions required some level of education, and that those in these positions needed to take notes and do some bookkeeping, amongst other activities.

In the study, very few women in the scheme had attained tertiary levels of education. A majority of the women had primary and secondary education. Furthermore, some of the respondents did not view holding such positions as lucrative because it was time consuming and one incurred financial costs they could not afford. This was because one has to campaign to be voted into office and this took time. Some of the women felt they had better things to do with their time.

According to Johansson (2016:14), “ ‘gender’ is explicitly mentioned in water policies in the contexts concerning countries’ domestic water development. However, when women are viewed as irrigators, fishers, or farmers, they are less recognized.” She noted that Zwarteveen (1997) has shown how women had not been incorporated in irrigation policies. Johansson noted that irrigation management was closely connected to land rights, which many women in developing countries had difficulty in accessing.

When it came to the operational and maintenance costs, the Ahero Irrigation Scheme charged the farmers the sum of Kshs.3,100 (\$31) to ensure that they were able to cover routine maintenance of canals and pumping stations, as well as to pay for power. However, this was not always the case as some farmers complained that the scheme sometimes did not pay for power, and hence they were cut off from the grid. The scheme was therefore unable to pump water to the canals for the farmers’ plots to be irrigated. The routine maintenance of the scheme was carried out before the crop season began to ensure that the farmers did not encounter any problems during planting.

Clean water access within the scheme for domestic purposes was easily available with some farmers, having a 5-minute timeline in accessing the water from a bore hole within their villages, or from the scheme headquarters, or through water trucks that carry water to the farmers. The farmers, however, faced a longer duration in accessing water for their crops from the irrigation canals with some farmers stating that this took several hours, with others stating that it could take several days for the water to reach their farms.

According to Kelly et al. (2017), community management is considered most viable in situations where the commonly managed resource is moderately scarce: If water is considered very available or very scarce, community members were less likely to participate in operation and maintenance (O&M). Water in Ghana, Kenya and Zambia can all be considered “moderately scarce” - according to average rainfall and the length of dry seasons. Community management is also widely used in areas where local and national governments are unable to carry out sufficient operations and maintenance of rural community water systems. With regards to cultural barriers, when it came to accessing water within the scheme, many of the farmers stated that this was not common. Water accessibility was important for every community member within the scheme. Hence, the scheme ensured that water was accessible from different points within the scheme.

8.1.3. Challenges Women in Irrigated Agriculture face

Women farmers within the scheme highlighted accessing finance as one of the major challenges women faced. In addition, male farmers acknowledged the difficulty farmers underwent in gaining access to financial resources. The irrigation scheme provided farmers within the scheme access to funds from the revolving fund. With this, some of the farmers were able to buy seedlings and other farm inputs such as fertilizers and other farm equipment they needed during the cropping season. With regard to receiving financial assistance from their husbands, many of the women farmers acknowledged receipt of some funds to help them farm. In addition, the male farmers within the scheme shared this same experience. Some of the women, however, stated that some of the funds received from their husbands were not enough and this sometimes forced them to either take on work on other people’s farms. If this was not the case, they would have engaged their children, even more so during the school holidays, to carry out work on their own farms so as to ensure they too were not lagging behind when it came to the cropping season.

There was the need to create better access to financial resources for the women. This was because some of the respondents explained that women had to sell their harvest at below market value price to middlemen from whom they borrowed money in the course of planting. Thus, the middlemen made outstanding gains from the products they received, consequently leaving the women short of the actual value of their produce. With regard to what hinders women from accessing financial resources, Rao (2016) argued that this has come about as a result of them not being able to build long lasting linkages to financial institutions. According to Rao, when females access to financial assets did not result in increased female ownership of productive assets and increased female streams of income, female- male gaps eventually worsened.

According to Omojolaibi, Okudo and Shojobi (2019), financial systems can empower poor households socially, through the delivery of banking services at an affordable cost to the vast sections of disadvantaged and low-income groups who comprise of marginal farmers, socially excluded groups, senior citizens and women. Rao (2016) asserted that the participation of women with financial institutions can increase their ability to use credit and savings vehicles. This is because some studies suggested that group membership of women in microfinance can translate their participation into effective control.

Wulandari et al. (2017:1) argued that

the availability of finance is important for sustaining the production of agricultural commodities. Moreover, the availability of finance contributes to increased income productivity improvements and efficiency. Lack of access to finance is a major problem for the rural poor, especially in developing countries. Financial knowledge is an important aspect for financial decision making. Thus, a lack of financial knowledge, especially among farmers, can explain their low income and slow economic growth.

This explains why many of the women within the scheme, were unable to have access to financial resources. Also, many of them were not well educated and not well informed with regards to the financial services that were offered by local financial institutions within their localities. In addition, they lacked collateral which they could use as security for these loans. This made women within the scheme go to middlemen who provided, short term financial solutions which were not beneficial to them in the long term. Many of the farmers within the scheme noted that the lack of education had an impact on their farming. Women noted the importance and the need for them to be educated and trained, and to enable them to better manage their farms and households in terms of finance and farm management skills.

According to Nakawuka et al. (2017:10)

additional research needs to be carried out on agriculture and specifically irrigated agriculture by both research organizations and universities. This is because irrigated agricultural research has not flowed down to the farmers due to gaps in the information chain. Furthermore, farmers lack knowledge on agronomic management and appropriate irrigation application and scheduling methods.

This, therefore, resulted in the wastage of water, fuel and labour. This was because the lack of knowledge on proper selection and use of farm inputs and subsidies resulted in poor crop harvests. This therefore supported the literature that asserted the importance of having women farmers trained on new and improved agricultural methods. This increased agricultural output and was also asserted by the women farmers who were educated and had the privilege of undergoing training.

Udoh (2016:120) informed us that “improved technologies serve no useful purpose except when they are disseminated to farmers and the farmers in turn use them to achieve higher productivity.” With regards to Ahero Irrigation Scheme, this statement highly resonated with farmers and the scheme. Many of the farmers stated that they had received some farm training on equipment and farm technologies and would have welcomed more. However, others stated that they had not received any farm training and were open to receiving some.

Farmers indicated that some farmers did not know how to use fertilizers and ended up applying the fertilizers incorrectly. This was blamed on poor training and a lack of education by the farmers who applied the inputs. Those who received the training noted that they had improved crop yields from row planting their rice and had applied the fertilizers at the right time during the cropping season. These data support what most authors have noted and cited: that farmers who are trained and educated on better use of farm tools and input receive better returns than those who are not.

Farmers within the scheme incorporated new farming technologies. Many of the farmers informed us of the use of tractors when it came to tilling the land and that they hired the tractors from the co-operative society of the scheme. Some farmers stated that they did not use tractors and others stated that they still used ox drawn ploughs to till their lands. Women in the scheme also used hoes and machetes when weeding the fields and noted that this made them bend for long hours during cultivation, thus affecting their backs. Also, the use of the tractors reduced the ploughing time for many of the farmers from a few days to a few hours, depending on farm size, thus reflecting the impact of mechanization on the farmer's productivity.

Polar et al. (2017:16) conducted a study in Bolivia, Ecuador and Peru and noted that,

different factors have different impacts on the adoption of agricultural technologies by men and women. In their study, they were able to generate three types of factors that were important when it came to considering the adoption of new technologies. These were: one, internal factors, which had the highest level of influence. This was because many factors such as productive characteristics of the region, the crop grown, the cultural and social and historical practices of gender roles influenced the use and adoption of the technology. Number two was the impact created when men and women adopted technology attributes or specific technology characteristics, and lastly external factors or third level influence that was related to access of productive resources.

The study conducted in Ahero Irrigation Scheme showed that factors did not independently influence male and female farmers' adoption of technology but rather interacted and influenced one another. The men and women's adoption of agricultural technologies was determined through embedded interaction potentials between different levels of influence. There was a similar result in Ahero Irrigation Scheme with regards to the adoption of new technologies by the farmers within the scheme.

Nakawuka et al. (2017:11) argued

that up-to-date information on various agricultural services is what farmers need. Furthermore, this information needs to be provided on a regular basis. However, this is hampered by lack of adequate facilities, personnel and limited funds. If these constraints are addressed, then this would foster innovations that can positively influence agricultural production, economic growth and poverty reduction

According to Newell et al., (2017:1)

it is only by harmonizing the relationships between different global institutions, that we can be able to address the global food systems on the one hand, and environmental challenges around water, energy and climate change on the other. The urgency of addressing these issues is underscored by the recognition that Sustainable Development Goals (SDGs) cannot be achieved in isolation from one another and that to simultaneously and effectively achieve goals 2 (hunger), 6 (water), 7 (energy), 13 (climate change) and 15 (life on land) needs us to have the willingness to act on and govern those relationships in a more integrated way across all levels of governance from the local to the global, crossing scales and sectors

The farmers and the management of Ahero Irrigation Scheme noted that politics had a great impact on their farming within the scheme. According to management, some politicians took advantage of the farmers within the scheme and looked for ways in which they could manipulate and change matters to suit their political interests, especially during the election periods.

This method had also been observed by farmers within the scheme who tended to see the politicians once every few years depending on what was on the ground. Many of the farmers believed that they did not receive government support because the scheme was within opposition territory as the region in which the scheme was situated was an opposition stronghold. When the farmers compared the Ahero Irrigation Scheme with other schemes within the country such as Mwea, which is located in government supported strongholds, they felt, that they received more support in terms of finance as well as marketing support, while they received very little. They also observed that within the 12 blocks managed by the three-member committee, there were members who favoured their own interests instead of the whole block. On the other hand, some farmers within the scheme believed that this was not a hindrance to their farming at all.

Many of the farmers within the scheme noted that they benefited from the County Government of Kisumu which helped them to purchase tractors that they used for their farming. The County Government did this by standing in as guarantors for the 12 tractors which they purchased for the farmers in the scheme. They acknowledged that they had benefited from some training from some non-governmental organizations, but this was not often. The scheme's managers advised that the government set aside funds for training the farmers and that this was done quarterly.

In some instances, they received support from the government by receiving some farm inputs such as fertilizers and seeds which they used to farm. They also noted that on very few occasions their area members of parliament or other government officials came to speak with them about government policies affecting them with regards to agriculture within the scheme. They also noted when this happened, they usually had consultative meetings. These meetings usually consisted of the farmers, irrigation scheme managers and the senior government officials in attendance.

Many of the farmers in the Ahero Irrigation Scheme felt the national government could do a lot to support women in agriculture. The most important aspects noted by the women farmers with regards to support was access to financial support, access to better educational training with regards to agriculture, better access to farm inputs, and the development of policies to improve their access to land. Thus, the study acknowledged that women in the Ahero Irrigation Scheme faced similar challenges with other women around the world with regards to accessibility of land, financial services and resources, technology and education training, and most importantly, a lack of sufficient policies to help support them in their roles in irrigated agriculture.

The study further highlighted the need for the national government and county governments within Kenya to create gender sensitive policies that tackle the challenges of women farmers. However, these should not be positioned as being totally gender based, but as fighting for the provision of resources that meet the needs of farmers in irrigated areas within the country. The next section discusses the contribution the study has made with regards to women in irrigated agriculture in Kenya.

8.2. Research Contribution

There is empirical evidence to support the important role of women in irrigated agriculture within the Ahero Irrigation Scheme. Furthermore, literature from the study supported empirical data from women on the challenges faced in irrigated agriculture. The inability of women to access financial services, education and training had a strong impact on women's agricultural output. Many women did not have the financial assets and economic capabilities to purchase farm inputs due to inaccessibility of financial resources. Secondly, women needed to be educated on the important role they played within irrigated agriculture. Many within the scheme did recognize their roles and the impact they had on irrigated agriculture.

Traditional African customs and culture have strong links within the scheme and can be seen to still have strong and negative impacts on agricultural output. This was because within the Ahero Irrigation Scheme we have cultural systems that recognized men, and not women, as owners of the land. Secondly, water access ability is linked to land ownership. Hence, without land, water access ability became an issue. On the other hand, the management of the irrigation scheme noted some of these issues, and put measures towards meeting the needs of women in the scheme. This brought new evidence that supported that gender issues were being considered within the irrigated agricultural sector. In addition, the link between land and water within irrigated agriculture was further highlighted. The two go hand-in-hand and without land you cannot gain access to water. Many authors have given examples of this, not only in sub-Saharan Africa, but in Asia, where irrigated agriculture was seen to have strong links with women and increasing agricultural output.

This showcased the importance of eco-feminism in ascertaining the link between women and nature, and the reason why women fight to protect the environment. When water inaccessibility became difficult, it was women who suffered as they were the ones who sought it for their domestic and farm use. Furthermore, if they were growing any crops, they still had to use water to nurture their crops.

Managers within the scheme asserted the significant impact the lack of proper education and training had on agricultural output. This was because without proper education, many women farmers could not use agricultural inputs. Furthermore, they were unable to take up positions in management as this required them to be literate as they had to know how to read and write. Out of the respondents in the study, only 2% of women have tertiary education as compared to 24% of men with the same and 10% of men with university education. Women in the scheme had the highest levels of primary and secondary education at 67% and 24% respectively. This showcased the reasons why irrigated agriculture may be challenging in being taken up in rural settings.

In the Ahero Irrigation Scheme study, politics played an important role within the scheme. This was because politicians only seemed to remember the scheme during election times, as has been the case in Ahero. However, the new devolution system that had been taken up in Kenya seemed to be forging some head way. This was because the scheme benefitted from the County Government of Kisumu that had helped to purchase tractors for the schemes co-operative. This new machinery helped farmers in the scheme to till their lands. Thus, mechanization had a strong impact on agricultural production with regards to efficiency and time management.

Authors like Meizein-Dick (2014), Doss (2016), and Quinsberg (2018) have highlighted the importance of having women in irrigated agriculture. This study reiterated the need for governments to support women in rural areas in irrigated agriculture and other agricultural practices. Furthermore, policies involving women in agriculture needed to involve farmers at all levels, regardless of gender. This was because men within the scheme, including the management of the irrigation scheme, affirmed that the role of women within Ahero Irrigation Scheme was important so as to have them meet their production levels.

The next section discusses the challenges and limitations faced when the study was conducted. The section highlights a few of these challenges and how the researcher sought to deal with these limitations as they arose, during the course of the research.

8.3. Limitations

During the undertaking of the study, the researcher encountered a few challenges that have been discussed below.

8.3.1.Distance

The research site is located 5km towards the interior section from Ahero town. Accessing the area is difficult when heavy rains occur. This is because the road to the scheme is not tarmac. Hence, four-wheel drive vehicles were needed to access the site. However, in the preceding months (August 2018- December 2018) the road was partially graded, thus enabling the researcher to gain access during data collection. However, access to the Ahero Irrigation Scheme cannot always be guaranteed.

8.3.2 Data collection

The research site was quite vast and required a team to enable the researcher cover a wide area. In addition, research assistants were needed. This was because not all respondents were able to communicate in English and Kiswahili. Hence, research assistants who were able to speak the local Luo dialect were sought so as to make communication easier with the respondents. Furthermore, many respondents were willing to take part in the study. However, due to other duties in their schedules some were not able to participate in the study.

8.3.3 Financial Resources

The study required the researcher to travel numerous times to the research site. This had high financial implications as the researcher also engaged other field assistants to help with data collection. In short, the researcher was not able to cover the vast areas of the irrigation scheme, within limited times. In addition, training of the assistants was required so as to ensure that data collection met with the requirements of the study.

8.3.4 Time

The time chosen for data collection was when the majority of staff within the scheme had closed for Christmas and New Year celebrations.

Researchers who wish to conduct other studies within the same research site should consider these challenges as not all have been highlighted.

8.5. Conclusion

In the many discussions and documentation noted in the study, it was acknowledged that women played a vital role in irrigated agriculture within the Ahero Irrigation Scheme. The scheme management understood this role and knew the vital role women played when it came to planting, weeding and harvesting of the crop. However, some of the women within the scheme did not seem to fully comprehend their role within this context and the importance attached to it. It was within this context that some men within the scheme acknowledged the vital role that women played, while some of them did not fully acknowledge this. The gender gap within irrigated agriculture within the scheme seemed not to be so prevalent. This was because both males and females took on different responsibilities within the scheme and within the agricultural context of rice farming, at the different stages of the crop cycle.

The management of Ahero Irrigation Scheme acknowledged the contribution of women farmers within the scheme. However, more needed to be done to further support them in terms of agricultural training programmes, finance, crop husbandry and the access to financial resources and assets. Although the scheme management played an important role in fighting for women with regards to land ownership status within the scheme, more needed to be done with regards to setting up policies that incorporated socio-cultural factors that hindered and prevented women's access to farmland, including family disputes.

Vital data with regards to the challenges women farmers faced within the scheme was able to be gathered. Many farmers noted the need for financial assistance, training on proper farming methods, and better access to farm seeds and fertilizers, as well as better access to land. This was because some cultural aspects hindered some women from inheriting land from their husbands due to cultural land policies which differed within the various 12 blocks in the scheme. Credit facilities were available to some farmers within the scheme through the revolving fund but was not accessed by all farmers.

The farmers, both male and female, acknowledged the need for better and more frequent farm training sessions within the scheme to better equip them and train them on new irrigated farming technologies. This, for them, would have increased their own knowledge and crop yields. The National Irrigation Board should look into creating policies that promoted gender equity with regards to farming within the scheme. Equity, rather than equality because social cultural aspects did not require one gender, but both genders so as to initiate changes that can be widely accepted by all within the various communities in scheme.

Politics also had an impact on the scheme. Some farmers made reference to the Mwea irrigation scheme, which many saw as a model of what Ahero Irrigation Scheme should be. However, to them Ahero was not a model irrigation scheme and lagged behind in terms of marketing and the sale of rice to other counties.

The Kenyan Government therefore needed to liaise with many stakeholders in the irrigated agricultural sector to see how they could improve farmers' accessibility to farm inputs, such as seeds and fertilizers. Furthermore, this should not be at the national level but should be a collaborative effort between the national government and the county government, with the latter closer to the people. In addition, this will help create policies that positively affected those on the ground. This should be a bottom-up approach, instead of a top-down approach, so as to have greater impact on the small-scale farmer.

In as much as the study sought to better understand women farmers in irrigation, the study gained insight into the challenges farmers face in irrigation farming. Hence, there is a need to develop policies that are gender inclusive, as well as work with communities in developing social-cultural means that allow better access to land, finance and training which hinder smallholder irrigation farming.

Lastly, projects that require funds to be disbursed to farmers at local levels need to be properly communicated through all channels. This is to prevent many within the different stakeholder portfolios having different views and agendas. This then reduces the risk of having mixed messages sent to farmers who are the final recipients of the funds. This would help them take ownership of the funds and better manage the resources given to them to improve their farming skills as well as their welfare.

8.4. Recommendations

The study recommends the following issues be investigated so as to improve irrigated farming in Kenya for women and men farmers, to improve food security within the country:

1. The development of better land access policies for women, with regards to ownership and inheritance.
2. The development of key financial programmes with various agricultural and financial institutions to help farmers access finance to purchase farm inputs and tools.
3. The development of training programmes with agricultural institutions to equip farmers on modern and better ways of farming so as to improve agricultural yields.
4. The development of health-care initiatives for farmers to reduce the incidence rates of malaria and other known waterborne diseases that are known to attack farmers.
5. The development of collaborative initiatives between the Agricultural Ministry, the National Irrigation Board of Kenya and the agricultural ministries within the counties to develop policies that have bottom-up approaches and are inclusive of farmers' needs and welfare.

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APPENDIX A: NATIONAL IRRIGATION BOARD



**NATIONAL
IRRIGATION
BOARD**

National Irrigation Board (NIB)
Unyunyizi House, Lenana Road
P.O. Box 30372, 00100
Nairobi, Kenya
Tel: +254-20-2711380/2711468
Fax: +254-20-2711347/2722821
+254-20-2723392
E-mail: nib@nib.or.ke
Website: www.nib.or.ke

Our Ref: GM/G/21

Date: 7th March, 2014

✓ Mary Nyona Okumu
P.O. Box 17894 – 00500
Enterprise Road
NAIROBI

**RE: REQUEST FOR ACCESS TO IRRIGATION SITES IN WESTERN KENYA
AND INFORMATION FOR PHD STUDIES**

We acknowledge receipt of your request for access to irrigation sites in Western Kenya and information for post graduate studies.

We believe that your proposed research on the role of women in irrigated schemes will generate new knowledge on how to better handle issues relating to that gender.

This is to inform you that permission is granted for you to access information from our schemes in Western Kenya.

You may contact the Officer-in-Charge of Ahero Irrigation Research Centre

(Mr. Njokah tel: 0722 438489) or the Senior Schemes Manager, Western Kenya Schemes (Mr. Kiplagat tel: 0722 366888) for further assistance.

Please keep us posted on the progress of your research and submit a copy of your research work on completion of your thesis.

A handwritten signature in blue ink, appearing to be 'D. Atula'.

D. Atula
For. GENERAL MANAGER

CC. Senior Schemes Manager, WKS
Officer-in-Charge, Ahero Irrigation Research Station

When replying, please quote our reference

APPENDIX B: UKZN – ETHICAL APPROVAL



14 September 2017

Mrs Mary N Okumu 214581096
School of Social Sciences
Pietermaritzburg Campus

Dear Mrs Okumu

Protocol reference number: HSS/1548/017D

Project title: The role of Women in Irrigated Agriculture: A case study of Ahero Irrigation Scheme in Kenya.

Expedited Approval

In response to your application dated 04 September 2017, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol have been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

Please note: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

Dr Shenuka Singh (Chair)

/px

cc Supervisor: Dr Sagie Narsiah
cc Academic Leader Research: Prof M Naidu
cc School Administrator: Ms Nancy Mudau

Humanities & Social Sciences Research Ethics Committee

Dr Shenuka Singh (Chair)

Westville Campus, Govan Mbeki Building

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Website: www.ukzn.ac.za



100 YEARS OF ACADEMIC EXCELLENCE

Founding Campuses: Edgewood Howard College Medical School Pietermaritzburg Westville

APPENDIX C: CONSENT LETTER

Consent Letter

Dear Sir/Madam

My name is Mary Nyona Okumu. I am a PhD student in the School of Social Science, department of Sociology in the University of Kwa-Zulu Natal, Pietermaritzburg South Africa.

As part of my thesis I am researching on *The Role of Women in Irrigated Agriculture: A Case Study of Ahero Irrigation Scheme in Kenya* in the County of Kisumu, in Western Kenya.

This questionnaire seeks to understand your opinion, and views on this subject matter, with a view of informing the study being currently undertaken. I therefore, seek your invaluable input, honesty and openness, when filling the questionnaire. Questions within the questionnaire will seek to identify participants, and seek their views in six key areas identified: *women and agriculture, women and land tenure systems, water and irrigation, financial resources and assets, technology, education, and agricultural politics.*

Confidentiality and Anonymity

Confidentiality and anonymity of participating individuals and institutions is assured. The names used during data collection will be coded in numbers to conceal your identity. Should you choose to participate in filling in this questionnaire please note your details will be made anonymous so that your identity continues to remain confidential, and that you should return the questionnaire in a sealed and signed envelope with your initials’.

Use of Data and Material Collected

I will be using the findings of the research within my thesis. The thesis will be read by my supervisors, examiners, the National Irrigation Board of Kenya and fellow students. It is also my aim to use the findings of the study in future publications, such as journal articles and other professional publishing’s.

Ethical Guidelines

The research will be exercised in accordance with the International Sociological Association <http://www.isa-sociology.org/en/about-isa/code-of-ethics/> and University of Kwa-Zulu Natal Research Ethics Committee <http://research.ukzn.ac.za/PoliciesProcedures.aspx>

Consent

All participants are required to give their consent to taking part in the research. At any point participants, may withdraw their consent for the researcher to use or include their data. By the completion and submission of this questionnaire you have given your consent to participate in the research. You may email the researcher and ask for your data to be withdrawn at any point.

Without your input and experience I would be unable to complete this research so may I thank you in advance for your participation it is much valued and appreciated.

If you have any questions, or require any further information please do not hesitate to contact me at 214581096@stu.ukzn.ac.za +234-9084291000, Supervisor Dr.SagieNarsahi, Tel: +27- 031-2602470, narsiahi@ukzn.ac.za or The Humanities and Social Sciences Research Ethics Committee as follows: MsPhumeleleXimba,UniversityofKwaZulu-Natal, Research Office,Email:ximbap@ukzn.ac.za,Phonenumber+27312603587.

Kind Regards

Mary Nyona Okumu

Participants Consent Form- Kiswahili

Kiambatisho A-Hojaji

Ridhaa

Mheshimiwa wapenzi / Bi

Jina langu ni Maria Nyona Okumu. Mimi ni mwanafunzi wa PhD katika Chuo cha Sayansi ya Jamii, idara ya Sociology katika Chuo Kikuu cha Kwa- Zulu Natal, Pietermaritzburg Afrika Kusini.

Kama sehemu ya karatasi yangu mimi ni kutafiti juu ya *Wajibu wa Wanawake katika umwagiliaji Kilimo: Uchunguzi kifani wa Ahero Umwagiliaji Mpango nchini Kenya* katika Kata ya Kisumu, Magharibi mwa Kenya.

Dodoso hii inajaribu kuelewa maoni yako, na maoni kuhusu jambo hili somo, kwa lengo ya kutoa taarifa ya utafiti zinazofanyika. Basi, mimi niliye kutafuta mchango wako thamani sana, ukweli na uwazi, wakati kujaza hojaji. Maswali ndani ya dodoso watajaribu kubaini wahusika, na kutafuta maoni yao katika maeneo sita muhimu kutambuliwa: wanawake na kilimo, wanawake na ardhi mifumo ya umiliki wa, maji na umwagiliaji, rasilimali fedha na mali, teknolojia, elimu, na siasa za kilimo.

Usiri na kutokujulikana

Usiri na kutokujulikana ya watu binafsi na taasisi za kushiriki ni uhakika. majina hutumika wakati ukusanyaji wa data itakuwa coded kwa idadi kwa kuficha utambulisho wako. Je kuchagua kushiriki kwenye kujaza dodoso hii tafadhali kumbuka maelezo yako yatafanyika bila majina ili utambulisho wako inaendelea kuwa siri, na kwamba ni lazima kurudi dodoso katika muhuri na saina bahasha na initials wako.

Matumizi ya Data na Material Zilizokusanywa

Mimi kuwa anatumia matokeo ya utafiti ndani ya Thesis yangu. Thesis itasomwa na wasimamizi wangu, watahiniwa, Bodi ya Taifa ya Umwagiliaji ya Kenya na wanafunzi wenzake. Pia ni lengo langu kutumia matokeo ya utafiti katika machapisho ya baadaye, kama vile makala journal na kitaaluma nyingine kuchapisha ya.

Miongozo ya kimaadili

utafiti kutekelezwa kwa mujibu wa International Sociological Association <http://www.isa-sociology.org/en/about-isa/code-of-ethics/> na Chuo Kikuu cha Kwa-Zulu Natal Utafiti Kamati ya Maadili <http://research.ukzn.ac.za/PoliciesProcedures.aspx>

Ridhaa

Washiriki wote wanatakiwa kutoa ridhaa yao kushiriki katika utafiti. Wakati washiriki wowote hatua, inaweza kutoa ridhaa yao kwa mtafiti kutumia au ni pamoja na data zao. By kukamilika na kuwasilisha maswali hili umewapa ruhusa yako ya kushiriki katika utafiti. Unaweza email mtafiti na kuomba data zako kwa kuondolewa katika hatua yoyote.

Bila ya maingizo yako na uzoefu ningekuwa kushindwa kukamilisha utafiti huu hivyo inaweza Nawashukuru mapema kwa kushiriki ni mengi yenye thamani na kuthaminiwa.

Kama una maswali yoyote, au unahitaji maelezo zaidi tafadhali usisite kuwasiliana na mimi kwa 214581096@stu.ukzn.ac.za + 234-9084291000, Msimamizi Dr. Sagie Narsahi, Tel: + 27- 031-2602470, narsiahi@ukzn.ac.za au Utu na Sayansi ya Jamii Utafiti wa Maadili Kamati kama ifuatavyo: Bi Phumelele Ximba, Chuo Kikuu cha KwaZulu-Natal, Utafiti Office, Barua pepe:ximbap@ukzn.ac.za, Namba ya Simu 27312603587.

Salamu
Mary Nyona Okumu

APPENDIX D: CONSENT FORM

CONSENT FORM

- ◆ Name of Researcher

Mary Nyona Okumu

- ◆ Title of study

The Role of Women in Irrigated Agriculture: A Case Study of Ahero Irrigation Scheme in Kenya

- ◆ I have had the research satisfactorily explained to me in verbal and / or written form by the researcher.

YES / NO

- ◆ I understand that the research will involve: *(The use of a structured questionnaire)*

YES / NO

- ◆ I understand that I may withdraw from this study at any time without having to give an explanation.

YES / NO

- ◆ I understand that all information about me will be treated in strict confidence and that I will not be named in any written work arising from this study.

YES / NO

- ◆ I understand that any audiotape material of me will be used solely for research purposes and will be destroyed on completion of your research.

YES / NO

- ◆ I understand that you will be discussing the progress of your research with others (including your research supervisor and other appropriate individuals) at the University of Kwa-Zulu Natal .

YES / NO

I freely give my consent to participate in this research study and have been given a copy of this form for my own information.

Signature:

Date:

FOMU IDHINI

- Jina la Mtafiti
Mary Nyona Okumu
- Title ya utafiti
Wajibu wa Wanawake katika umwagiliaji Kilimo: Uchunguzi kifani wa Ahero Umwagiliaji Mpango nchini Kenya
- Mimi kuwa na utafiti kuridhisha alielezea kwangu katika mfumo matusi na / au imeandikwa na mtafiti.
NDIO LA
- Naelewa kwamba utafiti utahusisha: (matumizi ya dodoso muundo)
NDIO LA
- Naelewa nipate kuondoka kutoka utafiti huu wakati wowote bila ya kuwa na kutoa maelezo.
NDIO LA
- Naelewa kwamba taarifa zote kuhusu mimi kutibiwa kwa siri kali na kwamba sitakuwa kutajwa jina katika kazi yoyote iliyoandikwa kutokana na utafiti huu.
NDIO LA
- Naelewa kwamba yoyote audiotape nyenzo yangu zitatumika kwa madhumuni ya utafiti na kuharibiwa juu ya kukamilika kwa utafiti wako.
NDIO LA
- Naelewa kwamba utakuwa kujadili maendeleo ya utafiti wako na wengine (ikiwa ni pamoja na yako msimamizi wa utafiti na watu wengine sahihi) katika Chuo Kikuu cha Kwa-Zulu Natal.
NDIO LA
Mimi toeni ridhaa yangu ya kushiriki katika utafiti huu utafiti na umepewa nakala ya fom u hii kwa taarifa yangu.

Sahihi:

Tarehe:

Women and Agriculture

1. Do you feel women have a major role to play in agriculture Yes or No, please explain?

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2. What challenges do you feel you as a woman face when it comes to agriculture? And how did you overcome them?

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3. Do you face any cultural barriers that hinder you from farming your land?

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4. Do you feel men are supportive of women's roles in agriculture?

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5. What can assist you to be a better farmer?

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Women and Land Tenure Systems

6. How did you access the land that you currently farm on?

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7. As a woman farmer, have you faced any challenges in acquiring the land? If so what were they? And how did you overcome them?

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8. Did you have to undergo any customary rights to acquire the land if so how?

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9. What other crops do you grow, besides, Rice?

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10. How do you intend to transfer the land to your children?

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Women and Irrigation

11. How do you gain access to water that you use on your farm?

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12. As a woman do you face any challenges in gaining access to water? If so what are they? And how do you overcome them?

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13. Are there any cultural barriers that you face in accessing the water?.....

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14. How long does it take you, to receive water for domestic and farm purposes?

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15. Are there any provisions in the scheme that enable you gain access to clean water?

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Financial Resources and Assets

16. How do you access funds to buy seedlings and fertilizers?

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17. Do you receive any assistance from your Husband/ or any other person to access financial resources?

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18. What is the highest amount you have ever received, and how did you access it?

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19. What do you think hinders women from receiving financial resources?

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20. Are there any other challenges that you face as a female farmer in gaining access to financial resources and assets? If so what are they? And what do you believe will enable you gain access?

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Technology and Education

21. Who tills your farm land? And how long does this take you?

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22. What equipment do you use when tilling the land? And who taught you how to use it?

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23. Do you go for any farm training, to improve the quality of the crops that you farm?

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24. Have you benefitted from and farm training, from the scheme, government agency or any non-governmental organisation?

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25. Does the lack of education, hinder women farmers from becoming better farmer producers?

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Politics and Agriculture

26. Does National Politics have an impact on your farming? If yes explain? If no explain?

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27. Does the local politics in your Village affect the way in which you farm?

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28. Have you benefitted from any National/Local Government Policy in the last 5years? If yes which one and how has it impacted, you?

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29. Have you had any local or National Politician discuss with you any agricultural policy?

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30. What do you feel the Local/ National government needs to do, so as to improve the role of women in agriculture in Kenya?

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Questionnaire- Kiswahili
Hojaji

Wajibu wa Wanawake katika umwagiliaji Kilimo: Uchunguzi kifani wa Ahero
Umwagiliaji Mpango nchini Kenya

Hojaji No

Tarehe ya ujazaji fomu Utafiti Msaidizi

Mkulima Jina

Block No Mkono No

Tarehe Kujazwa

Sehemu A: Socio Idadi ya Watu ya habari (Tafadhali Circle)

1. Jinsia

a) Mwanaume b) Mwanamke

2. Hali ya ndoa

a) Married b) Single c) Widowed d) mjane

3. ni umri wako ni upi

a) 15-20 b) 21-30 c) 31-40 d) 41-50 e) 51-60 f) 61-juu

4. Hali Kaya

a) Mwanaume headed b) Mwanamke inaongozwa

5. Idadi ya watu wanaoishi na wewe katika kaya yako ni ipi?

a) 0 b) 1-5 c) 6-10 d) 11-15 e) nyingine ()

6. Ngazi ya juu ya Elimu?

a) Level Primary b) Sekondari c) Msingi college d) Chuo Kikuu

Hali yako ya ajira ni nini?

a) Unemployed b) employed c) farmer d) Businessman e) nyingine

7. Ni idadi ya miaka ya kuwa kulimwa katika NIB Schemes / Small Schemes binafsi ni nini?

a) Miaka 1-5 b) miaka 6-10 c) muda wa miaka 11-15 d) 16-20 years e) 20 years & juu

Wanawake na Kilimo

1. Unahisi wanawake wana jukumu kubwa ya kucheza katika kilimo Ndiyo au Hapana, tafadhali eleza?

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2. Ni matatizo gani unahisi kama mwanamke uso linapokuja suala la kilimo? Na jinsi gani kushinda wao?

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3. Je, wanakabiliwa na vikwazo vya yoyote kiutamaduni akuziieni kilimo nchi yako?

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4. Je, wanaume wanaunga wanawake mkono katika kilimo?

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5. Nini kinaweza kukusaidia kuwa mkulima bora?

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Wanawake na ya Ardhi

6.Ulipata ardhi unao lima vipi?

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7.Kama mwanamke mkulima, je unakabiliwa na changamoto yoyote katika kupata ardhi? Kama ni ndio elezea? Na jinsi gani umeikabashinda hio?

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8.Je, ulifanyiwa haki zozote za kimila ili upate ardhi ? kama ndio? Ulifanya nini?

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9.Mazao gani mengine unakua, badala, mchele?

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10. Je, unakusudia kuhamisha ardhi kwa watoto wako?

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Wanawake na Umwagiliaji

11. Je kupata huduma ya maji unayotumia katika shamba lako?

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12. Kama mwanamke gani wanakabiliwa na changamoto yoyote katika kupata upatikanaji wa maji? Kama ni hivyo mambo gani hayo? Na jinsi gani unaweza kuondokana na wao?

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13. Je, kuna vikwazo yoyote za utamaduni unapitia ili upate maji?

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14. Wewe huchukua muda gani, kupokea maji kwa madhumuni ya ndani na mashamba?

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15.Je, kuna masharti yoyote katika mpango ili kuwawezesha wewe kupata huduma ya maji safi?

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Resources Fedha na Mali

16.Je kupata fedha kwa ajili ya kununua miche na mbolea?

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17.Unapokea msaada wowote kutoka Mume wako / au mtu mwingine yoyote kufikia rasilimali fedha?

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18.Ni nini kiasi cha juu umewahi kupokea, na jinsi gani kupata huduma hiyo?

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19.Una maoni gani inazuia wanawake kupokea fedha?

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20.Je, kuna changamoto nyingine yoyote ambayo wewe kama mkulima kike katika kupata huduma ya fedha na mali? Kama ni hivyo mambo gani hayo? Na nini unaamini utakuwezesha kupata huduma?

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Teknolojia na Elimu

21.Nani hulima mashamba yako ? Na muda gani itachukua wewe?

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22.Vifaa gani unatumia wakati kulima ardhi? Na umekufundishwa jinsi ya kuvitumia?

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23.Je, wewe huenda kupata mafunzo yoyote ya kilimo iliuboresha ubora wa mazao ambayo wewe hulima?

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24.Je umefaidika na mafunzo ya mashamba, kutoka shirika la serikali au shirika lolote lisilo la kiserikali?

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25.Je, ukosefu wa elimu, huzuia wakulima wanawake kuwa wakulima bora?

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Siasa na Kilimo

26.Je Siasa huwa na athari kwenye kilimo ? Kama ndiyo eleza? Kama hakuna eleza?

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27. Je siasa katika Kijiji yako huathiri njia ambayo wewe hulima?

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28. Je umefaidika na Sera yoyote ya Taifa ya Serikali katika miaka 5? Kama ndiyo ambayo mtu na jinsi ina yake wanashikiliwa, wewe?

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29. Je, Mwanasiasa yeyote kutoka kounti or serikali ya Kenya amewahi kujadili na wewe sera yoyote ya kilimo?

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30. Unahisi Mitaa / National serikali inahitaji kufanya, ili kuboresha nafasi ya wanawake katika kilimo nchini Kenya?

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APPENDIX F: INTERVIEWS

Interviews- Irrigation Scheme Managers

1. What management system do you use in managing the irrigation scheme?

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2. Do any women head any of the management systems used in the irrigation schemes?
If yes, please explain, and what role they play? If no, please explain and why not?

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3. Who deals with the maintenance and operation costs of the scheme, and why?

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4. How often do you carry out maintenance operations on the scheme, and who does it?

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5. What equipment requires the most maintenance, and why is this so?

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Women and Agriculture

- 6. Do you feel women have a major role to play in agriculture Yes or No, please explain?**

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- 7. What challenges do you feel woman face when it comes to agriculture? And how do you think they can overcome them?**

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- 8. Do they face any cultural barriers that hinder them from farming?**

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- 9. Do you feel men are supportive of women's roles in agriculture?**

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10. What can assist them to be a better farmers?

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Women and Land Tenure Systems

11. How did they access the land that they currently farm on?

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12. Are women farmers faced with challenges in acquiring the land they farm? If so what were they? And how can they be overcome?

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13. Do they undergo any customary rights to acquire the land? if so how?

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14. What other crops do they grow, besides, Rice?

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15. How do they transfer ownership of land to their children?

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Women and Irrigation

16. How they gain access to water that they use on the farm?

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17. Do they face any challenges in gaining access to water? If so what are they? And how do they overcome them?

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18. Are there any cultural barriers that they face in accessing the water?.....

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19. Are there any provisions in the scheme that enable them gain access to clean water?

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Financial Resources and Assets

20. How do you they access funds to buy seedlings and fertilizers?

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21. Do they receive any assistance from their partners/Husband/ or any other person to access financial resources?

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22. What is the highest amount they have received, and how they access it?

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23. What do you think hinders women from receiving financial resources?

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24. Are there any other challenges that face female farmers in gaining access to financial resources and assets? If so what are they? And what do you believe will enable them gain access?

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Technology and Education

25. Who tills their farm land? Men or Women? And why?

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26. What equipment do they use when tilling the land? And who taught them how to use it?

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27. Do you go for they go for any farm training, to improve the quality of the crops on their farms?

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28. Have they benefitted from any farm training, from the scheme, government agency or any non-governmental organisation?

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29. Does the lack of education, hinder women farmers from becoming better farmer producers?

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Politics and Agriculture

30. Does National Politics have an impact on farming? If yes explain? If no explain?

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31. Does the local politics in the village affect the way in women farm?

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32. Has the scheme benefitted from any National/Local Government Policy in the last 5years? If yes which one and how has it impacted, you?

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33. Has any local or National Politician discussed with you any agricultural policy?

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34. What do you feel the Local/ National government needs to do, to improve the role of women in agriculture in Kenya?

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Interviews- Farmers

Women and Agriculture

1. Do you feel women have a major role to play in agriculture Yes or No, please explain?

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2. What challenges do you feel woman face when it comes to agriculture? And how do you think they can overcome them?

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Women and Land Tenure Systems

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Women and Irrigation

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Financial Resources and Assets

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Technology and Education

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Politics and Agriculture

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30. What do you feel the Local/ National government needs to do, to improve the role of women in agriculture in Kenya?

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