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Classifying the Involvement of Men and Women in Climate Smart Agricultural Practices in Kayonza Sub-county, Kanungu District, Uganda

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Abstract: Globally, climate change is currently recognized as one of the most serious risks to communities' socio-economic activity, health, and livelihood. Climate Smart Agriculture is an essential tactic to developing the technical, policy, and investment conditions that enable actions aimed at achieving sustainable agricultural development for food and nutrition security in a changing climate. The purpose of this study was therefore classifying the involvement of men and women in climate smart agricultural practices in Kayonza sub-county, Kanungu district, Uganda. The study was guided by the specific objectives which include investigating the engagement of both men and women in climate-smart practices, establishing different climate-smart practices that are being used and assessing the climate smart agricultural practices adopted in in Kayonza sub-county. The study used descriptive research design utilizing both qualitative and quantitative data collection and analyses methods. Using simple random and purposive sampling techniques, a total of 374 respondents were selected to participate in the study. Questionnaires, key informant interviews, observation methods of data collection were used in this study. It was found out that both men and women were involved in the planting of trees and crops on farms that are typically used for fruit, fodder. Improved cooking stoves, fisheries and aquaculture, pasture management and planting of plant tolerant verities were among the CSA practices. The study recommends that the government should develop a strategy plan for gender quality based on goals that reflect an awareness of the economic and social implications of compromised climate smart agriculture. It was also concluded that both men and women were active in climate-smart farming methods.

Keywords: Involvement of Men and Women, Climate Smart Agriculture, Kayonza Sub-county, Kanungu, Uganda

1. Introduction

Globally, climate change is currently recognized as one of the most serious risks to communities' socio-economic activity, health, and livelihood [1]. According to Mwanzia [2], climate smart agriculture (CSA) is an important strategy for building the technological, policy, and investment conditions that will allow for measures aimed at attaining sustainable agricultural development for food and nutrition security in a changing climate.

In Africa, a growing number of international stakeholders are recognizing CSA as a way to improve climate resilience while also contributing to food and nutrition security [3]. As a result, CSA is a new method that aids in the identification of potential trade-offs, the empowerment of women, and the prioritization of tasks [4]. Agriculture expansion is the most effective way to reduce poverty and enhance food and nutrition security in low-income countries that rely heavily on agriculture, which are home to the majority of the world's impoverished and food insecure people [5].

Women's participation in climate smart agriculture and its benefits to food security have been widely recognized in undeveloped countries such as Uganda and Kenya [6]. Women play a crucial role in enhancing agricultural output and food security in farming communities [7].

Many studies claim that discrepancies in men and women's responsibilities, priorities, and access to resources and services at the community and family levels are to blame for the gender gap in agriculture in many developing countries [8, 9]. This is typical in agriculture, where social, economic, and gender considerations all play a role [8].

However, unless the gender imbalance in agriculture is addressed, the utility of CSA options for both men and women will be harmed [10]. Women can be better equipped to adapt to a changing climate if they have better access to productive resources, money, and information, as well as more off-farm work and knowledge of adaptation options [11]. Since the CSA's function in agriculture has gotten a lot of attention, its ability to help women reduce their work duties has gotten less attention [12].

There are numerous technologies and practices "on the shelf" that have not been deployed or pushed, according to Wollenbergb [13], but with the current scale and speed of climate change, greater investment in knowledge gaps and research is required. More specifically, work on farmer-friendly incentives and institutions, such as pay for environmental services like soil carbon sequestration, should be prioritized and this is in line with Abegunde [14]. To produce more with less, further research is needed, such as increasing productivity while reducing agriculture's ecological footprint and increasing women's participation in CSAs.

A few studies, such as the classification of men and women's involvement in climate-smart agriculture methods, have been conducted. However, no research has been done to quantify men and women's participation in climate-smart farming practices that contribute to climate stabilization.

As a result, the study looked at the impact of gender participating in climate-smart agriculture methods. The outcomes of this study will aid legislators, conservationists, and local people in developing proper agricultural management practices.

The study provided answers to the following questions:

1. Do both men and women engage in climate-smart practices?
2. What are the different climate-smart practices that are being used in your area?
3. What are the rates of adoption of climate-smart agriculture techniques among households?

2. Materials and Methods

2.1. Description of the Study Area

Kayonza sub-county is located in the Kinkizi West Kanungu District of southwestern Uganda, close to the Uganda-Democratic Republic of Congo border [15]. It is situated on a strategic site that captures a lot of development from various trade, industrialization, farming, and tourism development techniques. Its growth has been aided by its proximity to Uganda's border with the Democratic Republic of Congo, which has facilitated trade between the two countries [16]. Kayonza sub-county was founded on the forces of trade along the border, and its growth has given it a true sense of trade between the two countries [17].

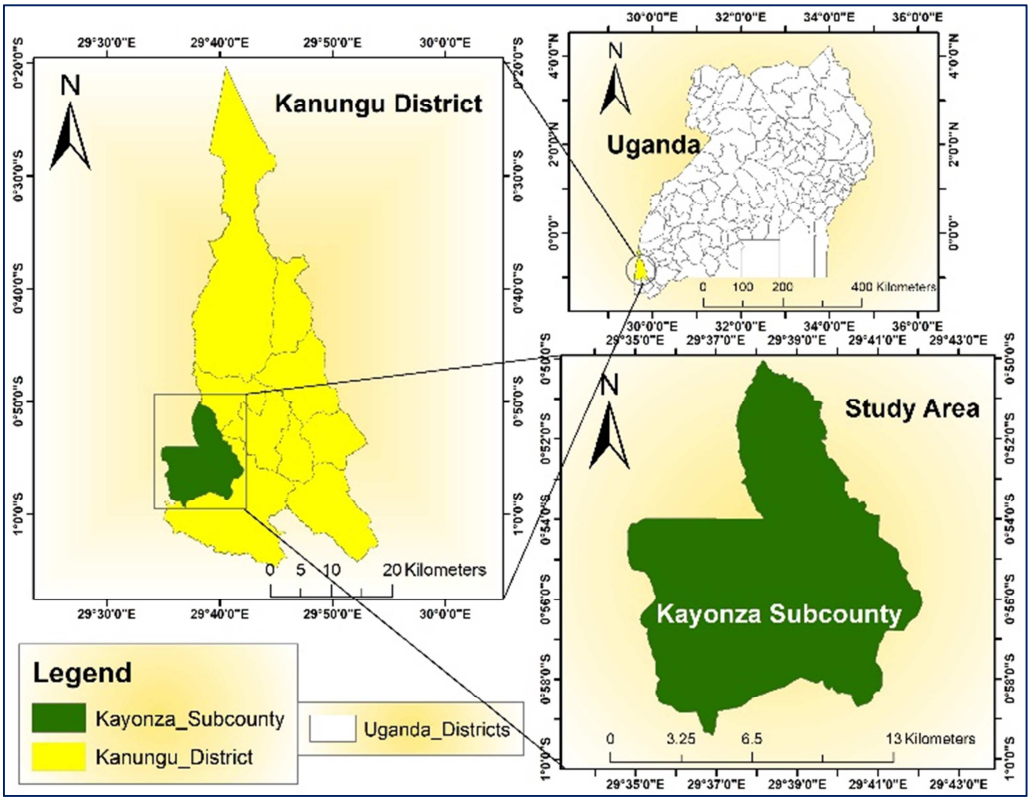

Figure 1. *A man Showing Kayonza Sub-county.*

The farming history of Kayonza sub-county is centered on traditional Western Ugandan food crops, as well as tea production as a key cash crop alongside coffee farming. Kayonza Growers Tea Factory and Kigezi Highland Tea Companies, two tea manufacturers, are also contributing to its development. Hence, both institutions have made significant contributions to the development of agriculture by providing employment opportunities and infrastructural development [18].

Kayonza sub-county has a total household population of 5,701 [19].

2.2. Research Design

The study employed descriptive research design utilizing mixed methodologies in which both quantitative and qualitative approaches were used in data collection and analysis.

2.2.1. Sample Size

In order to get a representative number of houses for the study in Kayonza sub-county, Kanungu District Southwestern Uganda, the sample size was computed using a simple random sampling technique. Therefore, the study population of 5701 people were involved in the study [19]. The method established by Yamane, (1967) was used to calculate the sample size since it was most suited when employing a basic random sampling strategy and produced a large enough sample size for impact evaluations for improved accuracy and efficiency [20]. The sampling technique was justified for the study since it was fair form of sampling that, when used correctly, assisted to eliminate any bias compared to any other sampling methods. The sample size for the study was determined following Yamane (1977) method.

$$n = \frac{N}{1 + N(e)^2}$$

Where n is the minimum sample size, N is the size of total population size of households in the study, which is equal to 5,701 and (e) is the level of precision (5%). Thus, an error of 0.05 was used to approximate a sample size of 374 households.

$$n = \frac{5701}{1 + 5701(0.05)^2} = 373.7 \simeq 374$$

Therefore, 374 respondents were selected under simple random sampling method representing the household's population of local crop farmers in areas surrounding Kayonza sub-county.

2.2.2. Data Collection

The study employed a combination of direct observation, printed guided survey questionnaires, and key informant interviews. The Natural Resource Officer, Environment Officer, and Local Politicians of Kanungu District were key informants who supplied more detailed information. Data from both qualitative and quantitative sources were evaluated (SPSS version 20.0).

3. Results and Discussions

3.1. Climate Smart Agricultural Practices Practiced by Both Men and Women

Table 1. *Climate Smart Agricultural Practices Practiced by both Men and Women.*

Column1	Men	Women	Both
Agroforestry			√
Terraces and bunds			√
Water harvesting	√		
Improved agricultural water management	√		
Planting pits			√
Crop residue mulching			√
Cover cropping			√
Conservation agriculture			√
Efficient use of fertilizer			√
Improved varieties			√
Stress-tolerant varieties			√
Composting			√
Pasture management			√
Manure management			√
Fisheries and aquaculture			√
Improved cooking stoves			√

Source: Field data, 2022.

From the study findings in (Table 1), both men and women were involved in the planting of trees and crops on farms that are typically used for fruit, fodder. Findings from key infants reported that trees can reduce runoff and erosion, enhance soil fertility, and provide shade, all of which are important for climate change adaptation, as well as trap carbon, which helps to alleviate the effects of climate change as in line with Ashebir et al. [21].

Planting trees around homesteads (home gardens), along fences, on farm boundaries, or on crop or grazing land, for example, is something that both men and women can do. Trees and shrubs help to make land usage and the environment more diverse, productive, and ecologically sound. Social, economic, and environmental benefits include enhanced food security, increased income, and improved soil fertility and this agrees with Duyen et al. [22].

It was found out that both men and women were involved in cover cropping, conservation agriculture, and fertilizer application efficiency.

The study from field survey revealed that agricultural terraces are the most visible landscape imprints of old-style acquaintance/knowledge on soil conservation and water management in various zones and this is in line with Soriano and Herath [23]. As a result, these are physical structures placed along contours to delay the flow of water and improve absorption. They can be an important tool for coping with water scarcity brought on by climate change, which is why men and women in southern Uganda are constructing terraces to minimize soil erosion following heavy rains.

Hence, improved cooking stoves, fisheries and aquaculture, pasture management and planting of plant tolerant verities were both practiced by both men and women in Kayonza sub-county, Kanungu district. This has improved on the standards od of living of local people in an area.

3.2. Households' Adoption of Climate Smart Agriculture Practices

Table 2. *Households' adoption of Climate Smart Agriculture Practices.*

Climate Smart Agriculture Practice	Adopters (N=374) %	Non-adopters (N=279) %
Change in planting time	80.6	19.4
Agroforestry	79.3	20.7
Improved crop varieties	78.2	21.8
Crop rotation	68.9	31.1
On-farm water conservation	58.6	41.4
Crop diversification	49.2	50.8
Intercropping	48.0	52.0
Change in crops cultivated	38.8	61.2
Use of manure	31.4	69.6
Integrated nutrient management	29.8	70.2
Irrigation	28.2	71.8
Integrated pest management use	25.9	74.1
Water harvesting techniques	24.4	75.6
Livelihood diversification	17.1	82.9
Conservation tillage	6.1	93.9

Source: Field survey data, 2022.

3.2.1. Farm Production Adaptation Practices

Changes in cultivated crops, crop diversity, manure use, integrated nutrient management, integrated pest control, and the adoption of improved crop varieties were among the agricultural production techniques studied in the research region. According to the findings, only 38.8% of respondents changed the crop varieties they planted owing to a variety of factors, including soil fertility, insect and disease incidence, unpredictable rainfall, and temperature increases.

To cope with climate change, a bigger percentage of the overall response (78.2%) chose better crop types. Some farmers use certified maize as planting seeds from various agro-dealers, while others utilize maize from the previous crop because they believe it is more resistant. In addition, 49.2 percent of respondents in Kayonza sub-county, Kanungu district, varied their crops to protect against crop failure and boost household livelihoods.

It was found out that 31.4% of respondents used manure to their farmland to boost soil fertility and conserve soil moisture. Only 28.7% of all respondents stated that they use integrated nutrient management. The respondents were attributed to the fact that manure from their homestead and livestock is insufficient, that the cost of chemical fertilizers is high, and that the sellers are far away from their location, but that continued use of chemical fertilizers has a negative effect on soil fertility, according to the key informants.

Farmers reported using a combination of different managements and strategies to control pests in maize and beans, for example, the use of insecticides to control pests in maize and beans. Farmers' perceptions and awareness of how to effectively control pests contribute to the poor adoption of integrated pest management strategies.

3.2.2. Change in Land Use Adaptation Strategies

The goal of these adaptation strategies is to move crop throughout production period. Crop rotation was used by 68.9% of the sampled respondents to boost productivity, according to the study's findings. Intercropping is used by 48.0 percent of the sampled respondents in the hopes that if one crop fails, the other will live to increase productivity. Only 6.1 percent of all respondents use conservation tillage to increase soil moisture retention and promote soil health with minimal soil disturbance. The goal of agroforestry methods was to gain stake for climbing beans, source of fuel, lumber, windbreak, fruits from fruits trees (mangoes, avocado, tree tomatoes, and papaya) and woodlots, which were embraced by 79.3 percent of the total sampled respondents. Besides that, the adoption of different agroforestry trees was for organic manure when farmers use tree leaves as manure and soil nitrogen fixation but also as fodder for livestock, source of income through sale of fruits, improved nutrition when fruits are consumed in the household.

Intercropping strategies do not provide good yield, according to key informant interviews and crop growers, which is why few farmers have used them. Agroforestry practices were adopted in response to declining rainfall when a large portion of the study area lacked trees, and with the help of various organizations that raised farmers' awareness of the benefits of trees, they began planting a large number of trees, which is beneficial to productivity.

3.2.3. Water Management and Topography Adaptation Practices

According to the findings, irrigation practices were used by 28.2 percent of the total sampled households. Farmers exclusively cultivate the marsh section of the study area and irrigate crops to increase productivity, which necessitated the use of irrigation practices. Only 21.9 percent of the total studied respondents used rainwater harvesting methods, which involved collecting rainwater from their roofs for domestic use. According to the data, 59.8% of all respondents used on-farm water conservation methods to improve soil moisture (Table 2). Water loss was reduced by using trenches, planting pits, and grasses to cover the soil. According to key informant interviews, many farmers are refusing to participate in the government's irrigation support program, in which farmers are only needed to pay 50% of the cost of irrigation materials. Farmers and key interment interviewed said that having the adequate water tank for water storage was an issue due to a lack of financial resources.

3.2.4. Changing Planting Time Adaptation Practices

Farmers adjust the time they work on their farms to accommodate changes in precipitation and temperature. Changes in rainfall caused 80.6 percent of the total sampled respondents to shift their planting schedule (either early or late) in this study. Due to the delayed onset and poor rainfall distribution (Table 2), most farmers changed to planting crops after the first rain, when they were certain it would rain. Farmers claimed that they heard information from farmers leading champions or over the radio instructing them to plant seeds and wait for rain because the season used to be short.

4. Conclusion and Recommendations

4.1. Conclusion

According to the conclusions of this study, both men and women are active in climate-smart farming methods, which has enhanced Ugandan productivity. Gender analysis, as well as equal participation and engagement of women and men, are critical activities to perform at the commencement of any CSA intervention in order to facilitate women's and men's equal uptake of and benefit from site-specific CSA techniques. Longer-term reforms are required to alleviate the barriers that women and men may have in gaining access to resources, services, and information.

4.2. Recommendations

The Ugandan government should develop a strategy plan for gender quality based on goals that reflect an awareness of the economic and social implications of compromised climate smart agriculture, according to this report. At the community level, specific procedures for gender participation should be implemented. Supporting and enhancing the engagement of local women and men in climate-smart agriculture techniques is one of them.

The problem of irrigation systems is common in the study area, especially during the long dry season and low rainfalls, which result in a lengthy drought in the area. As a result of insufficient water and restricted financial capacity to obtain water, more effort and investment by the government in irrigation infrastructure is required, which should take the shape of dams or irrigation machines to increase irrigation during the dry season.

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