**A**

**RESEARCH PROJECT**

**ON THE TOPIC:**

**GENDER PERCEPTION OF THE EFFECTS OF CLIMATE SMART AGRICULTURAL PRACTICES ON FOOD SECURITY STATUS OF FARMERS IN EKET AGRICULTURAL ZONE, AKWA IBOM STATE, NIGERIA**

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**CHAPTER ONE**

**INTRODUCTION**

* 1. **Background of the Study**

Climate-smart agriculture is an approach to farming that aims at addressing the challenges of climate change while increasing food production and ensuring sustainability and resilience of agricultural systems. Climate change is described as a change in the average conditions – such as temperature and rainfallin a region over a long period of time (FAO, 2021). Climate change is a threat to food security systems and one of the biggest challenges in the twenty-first century. The ability to contain the pace of climate change by keeping temperature rise within 2°C threshold is now curtailed, and the global population will have to deal with its consequences. This is in the context that agricultural production systems are expected to produce food for the global population that is projected to be 9.1 billion people by 2050 and above 10 billion by the year 2100 (FAO, 2021). Agricultural systems should be transformed to increase the productive capacity and stability in the wake of climate change. Climate change has already caused significant impacts on water resources, human health and food security (Unongo and Ijogi, 2018; Ekanem *et al.,* 2020). The steady rise in temperature and irregular rainfall patterns affect agricultural production with the attendant decline in crop and livestock production. Majority of smallholder farmers depend on Agriculture for survival. Building their adaptive capacity and resilience to climate change is key to enable them protect their livelihoods and ensuring their food security. The ability to cope with the impacts of weather shocks and natural disasters brought by the effects of climate change depends largely on the household’s resilience, or its capacity to absorb the impact of, and recover from, a shock. One way of combatting the effects of climate change is through climate-smart agricultural practices (Olaoye *et al.,* 2021). Climate-smart agriculture has the potential to enhance sustainable productivity, increase the resilience of farming systems to climate impacts and mitigate climate change through greenhouse gas emission reductions and carbon sequestration (FAO, 2021). Climate-smart agriculture can have very different meanings depending upon the scale at which it is being applied. For smallholder farmers in developing countries, the opportunities for greater food security and increased income together with greater resilience was more important to adopting climate-smart agriculture than mitigation opportunities (Olaoye *et al.,* 2021). There are a number of household agricultural practices and investments that can contribute to both climate change adaptations for individual benefit and to mitigating greenhouse gases for public good. For instance, a striking feature of these practices may include; crop rotations, greater crop diversity, production of energy plants, improved feeding strategies (cut and carry), fodder crops, improved irrigation (drip), terraces and bunds, contour planting, water storage (water pans), and many more), agroforestry investments, reduced or zero tillage, use of cover crops, and various soil and water conservation structures also decreases green-house gases emission into the environment (WFP, 2020).Thus, there are often long term benefits to households from adopting such activities in terms of increasing yields and reducing variability of yields, making the system more resilient to changes in climate. Promoters of climate mart agricultural practices adoption seek to sustainably increase agricultural productivity and incomes by building resilience through adapting to changes in climate and reducing and/or removing Green House Gases emissions relative to conventional practices (Ekanem *et al.,* 2020). Strengthening Adaptation and Resilience to Climate Change in Nigeria identifies poverty, weak institutions and under-investment in key sectors as the main factors which stifle the Nation ability to cope with climate change. Climate change is a serious threat to local food production and family well-being resulting in malnutrition, hunger and persistent poverty in many regions of the country (Ekanem *et al.,* 2020). Despite the multiple benefits of climate-smart agricultural practices and the deliberate efforts by the government and development partners to encourage farmers to invest in them, there is still a lack of evidence on farmers’ incentives, conditioning factors that hinder or accelerate usage and impact of climate-smart agricultural practices on food security status. Thus, an improved understanding of farmers on climate smart agricultural practices effects in terms of food security is important in informing the strategies policy makers and other development partners base on the socio-cultural characteristics of Gender to enhance the usage and effectiveness of climate smart agricultural practices in smallholder production systems.

* 1. **Problem Statement**

Some of the farmers have already incorporated the concept of climate smart agriculture, however the adoption still remains low which may be due to limited extension and technical services and knowledge on Climate Smart Agriculture. Most studies concentrated on the influence of climate change to food security but none looked at the agricultural practices that can help in addressing climate change with specific interest on small scale farmers. There is little information on the aspects that influences climate-smart practices to ensure food security in Eket and Akwa Ibom State. Thus, this study will look at addressing the gaps in knowledge in order to understand how Gender as a socio-economic characteristics of farmers affect climate smart agricultural practices effect on food security.

**1.3 Justification of the Study**

The findings from this study was of great relevance to a wide group of stakeholders in  
the agriculture sector including; policy makers at the government level, the local farmers, extension officers and Research institutions. The findings and recommendations is a starting point for other researchers interested in this field and builds on the global knowledge on matters of climate smart agricultural practice with focus to farmers practices, knowledge and strategies  
The study provides an in-depth understanding to the policy makers on the best way to promote Climate Smart Agriculture in order to increase levels of adoption in the State and country. It will also be beneficial to the Local Government during preparation of development plan in order to mainstream Climate Smart Agriculture into the zone planning. The study also provides insights and encouragement to the farmers interested in adopting Climate Smart Agriculture which is anticipated to increase adoption hence achieving sustainable crop production which in return will improve food security.

**1.4 Research Questions**

Based on the problems which this research work is aimed at finding solution to the following questions are put forward in finding solutions to the problem;

1. What is the socio-economic characteristic of farming households in the Eket Agricultural zone?
2. What is the level of awareness and utilization of farmers on climate smart agricultural practices in Eket Agricultural zone?
3. What is the food security situation in Eket Agricultural zone?
4. What are the effects of climate smart agricultural practices on food security status of farmers in Eket Agricultural zone?
5. What are the constraints to climate smart agricultural practices adoption in the eket Agricultural zone?

**1.5 Objectives of the Study**

The main objective of the study is to determine gender perception on the effect of the climate smart agricultural practices on food security status of farmers in Eket Agricultural zone, Akwa Ibom State, Nigeria.

The specific objectives are to:8

1. describe the socio-economic characteristic of farming households in the study area
2. identify the level of awareness and utilization of climate smart agricultural practices in the study area
3. examine the food security situation in the study area
4. examine the effects of the climate smart agricultural practices on food security status of farmers in the study area
5. identify the constraints to climate smart agricultural practices adoption in the study area.

**1.6 Research Hypotheses**

**H0**: There is no significant relationship between Gender, climate smart Agricultural practices and food security status of farmer in Eket Agricultaral Zone, Akwa Ibom State.

**1.7 Scope of Study**

This study concerned with gender perception on the climate smart agricultural practices effect on food security status of farmers will make use of primary data. The primary data was collected by using a well-structured questionnaire which was given to the respondents in the study area. It was divided into sections to reflect the specific objectives of the study.

**1.8 Conceptual Definition of Terms**

**Gender:** this refers to the male sex or the female sex, especially when considered with reference to social and cultural differences rather than biological.

**Perception:** this refers to the way in which something is regarded, understood or interpreted

**Climate Smart Agricultural practices:** According to FAO, Climate Smart Agricultural Practices is described as agricultural practices that are efficient and have a positive long term effect to productivity and revenue generation, mitigates Green House Gases emissions and enhances attainment of national food security as well as sustainable development goals (MFP, 2020).  
**Food security:** Food security is defined when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 2019).

**Agricultural Zone:** these are regions of climate which can reliably grow certain crops which depend on a particular climatic condition to successfully mature and produce.

**CHAPTER TWO**

**LITERATURE REVIEW**

**2.1 Conceptual framework**

**2.1.1 An Overview of Food Security in Nigeria**

Food security refers to the availability, accessibility, and utilization of food that meets the nutritional needs of individuals in a country (FAO, 2021). In Nigeria, food security is a pressing issue due to its vast population, growing urbanization, and limited resources. According to the World Food Programme, Nigeria is one of the 36 countries in the world with the highest level of food insecurity, with approximately 21.7 million people experiencing some form of food insecurity. One major contributing factor to food insecurity in Nigeria is poverty. A significant portion of the population lives below the poverty line, making it difficult to access food. Additionally, Nigeria’s agricultural sector, which provides the majority of the country’s food supply, is plagued by several challenges including lack of access to credit, insufficient infrastructure, and limited use of modern farming techniques (Olaoye *et al.,* 2021; Ekanem *et al.,* 2020). This has led to low crop yields and limited food supply. Furthermore, conflict and insecurity in certain regions of Nigeria have led to disruptions in food production and distribution. For instance, insurgency in the northeast region of the country has resulted in the destruction of farms, displacement of farmers and traders, and overall insecurity, thereby negatively impacting food security in the region (Unongo and Ijogi, 2018). Despite the challenges facing Nigeria's food security, several interventions are being taken to improve the situation. These interventions include the government's agricultural transformation agenda, which aims to increase agricultural production and productivity in the country, and partnerships with international organizations such as World Food Programme and UNICEF to provide food assistance in emergencies (WFP, 2020). There has also been an increase in the use of technology in agriculture, as well as the promotion of small and medium-scale businesses in the sector. Achieving food security in Nigeria requires a multifaceted approach that addresses the underlying issues of poverty, insecurity, and underinvestment in the agricultural sector. It is crucial for the government and relevant organizations to prioritize the development of the agricultural sector as it holds the key to improving food security in Nigeria.

**2.1.2 Importance of food security**

Food security is the guarantee of access to sufficient, safe, nutritious, and culturally appropriate food for all individuals, at all times, to meet their dietary needs and preferences for an active and healthy life. The importance of food security can be summarized as follows:

* **Human health:** Food insecurity leads to malnutrition, which can result in adverse health outcomes such as stunted growth, weakened immunity, and chronic disease (FAO, 2021).
* **Social well-being:** Food security is crucial for the social well-being of individuals, communities, and nations. It promotes social and economic development, enabling individuals to pursue education, participate in the workforce, and fulfill their potential (IFPRI, 2021).
* **Poverty reduction:** Food insecurity is often linked to poverty. Achieving food security can help reduce poverty by increasing incomes and ensuring that individuals have access to nutritious food at affordable prices (FAO, 2021).
* **Environmental sustainability:** Sustainable food production and consumption systems can help to ensure that food security is achieved in a way that is environmentally sustainable (IFPRI, 2021).
* **Global stability:** Food security is essential for global stability. Unstable food security conditions can result in social unrest, conflict, and migration (FAO, 2021).

**2.1.3 Factors limiting food security**

There are several factors limiting food security in Nigeria and these includes;

* **Low Agricultural Productivity:** Agricultural productivity in Nigeria is low due to several factors such as inadequate farm inputs, lack of access to finance, and poor extension services (Unongo & Ijogi, 2018). The productivity of Nigerian agriculture is also affected by climate change, soil depletion, and pests and diseases.
* **Land Tenure Systems:** Land tenure systems in Nigeria are fragmented and complex, making it difficult for farmers to obtain secure land tenure and access to credit. This affects agricultural production and food security (Umeh, 2020).
* **Inadequate Infrastructure**: The poor infrastructure in Nigeria, including roads and transportation, power, and water supply, affects both agricultural production and food distribution (Ogundele & Ogunleye, 2018).
* **Insurgency and Conflict:** The ongoing insurgency and conflict in parts of Nigeria, particularly in the northeast region, have resulted in reduced agricultural activities, displacement of farmers, and loss of crops and livestock (Umeh, 2020).
* **Urbanization**: Rapid urbanization in Nigeria has led to the abandonment of rural areas and reduced agricultural activities, leading to food insecurity in urban centers (Ogundele & Ogunleye, 2018).
* **Poor Food Distribution Systems:** The food distribution system in Nigeria is often inefficient and ineffective, leading to post-harvest losses and food waste (Omonona*,* 2018)
* **Poor Government Support:** The lack of government support for the agricultural sector in Nigeria leads to inadequate funding, insufficient extension services, and poor implementation of policies and regulations (Alawode*,* 2019).
* **Poverty and Income Inequality:** High rates of poverty and income inequality in Nigeria limit access to food, particularly for the vulnerable populations (Omonona*,* 2018; IFPRI, 2021).
* **Low Capacity of Small-scale Farmers:** Small-scale farmers in Nigeria face several constraints, including lack of access to credit and limited knowledge about modern farming techniques, which limits agricultural productivity and food security (Alawode*,* 2019).
* **Inadequate Food Processing and Storage Facilities:** The lack of adequate food processing and storage facilities in Nigeria leads to significant post-harvest losses and reduces access to food in certain seasons (Alawode*,* 2019).

Conclusively, the factors limiting food security in Nigeria are complex, diverse, and interrelated. Addressing these challenges requires a multi-sectoral approach that involves government intervention and private sector investment in agriculture.

**2.1.4 Climate Smart Agriculture**

Climate-smart agriculture is an approach to farming that aims to address the challenges of climate change while increasing food production and ensuring sustainability and resilience of agricultural systems. It is a three-fold approach that emphasizes increasing agriculture productivity, adaptation to climate change, and mitigation of greenhouse gas emissions. Climate-smart agriculture includes many practices and strategies that can be deployed at the farm level, landscape level, and institutional level to ensure food and nutrition security, promote climate resilience, enhance carbon sequestration, and reduce greenhouse gas emissions (Oyinbo*,* 2018; Ekanem *et al.,* 2020). At the farm level, Climate-smart agriculture practices focus on soil, water, and nutrient management, conservation agriculture, agroforestry, livestock management, and crop diversification. For instance, the use of drought-tolerant crops, improved irrigation techniques, and the promotion of agroforestry practices can enhance resilience to climate change and build the adaptive capacity of farmers (FAO, 2021). At the landscape level, Climate-smart agriculture strategies involve land-use planning, forest and landscape restoration, and sustainable land management. These practices can help to enhance ecosystem services, improve soil fertility, reduce land degradation, and promote biodiversity conservation. Moreover, sustainable land management practices can enhance carbon sequestration, thus contributing to mitigating climate change. Institutional level, Climate-smart agriculture practices involve policies and programs, farmer training and advisory services, market linkages, and institutional capacity building. These practices can help to create an enabling environment for climate-smart agriculture, promote agricultural finance, and ensure food security for vulnerable communities (FAO, 2021).

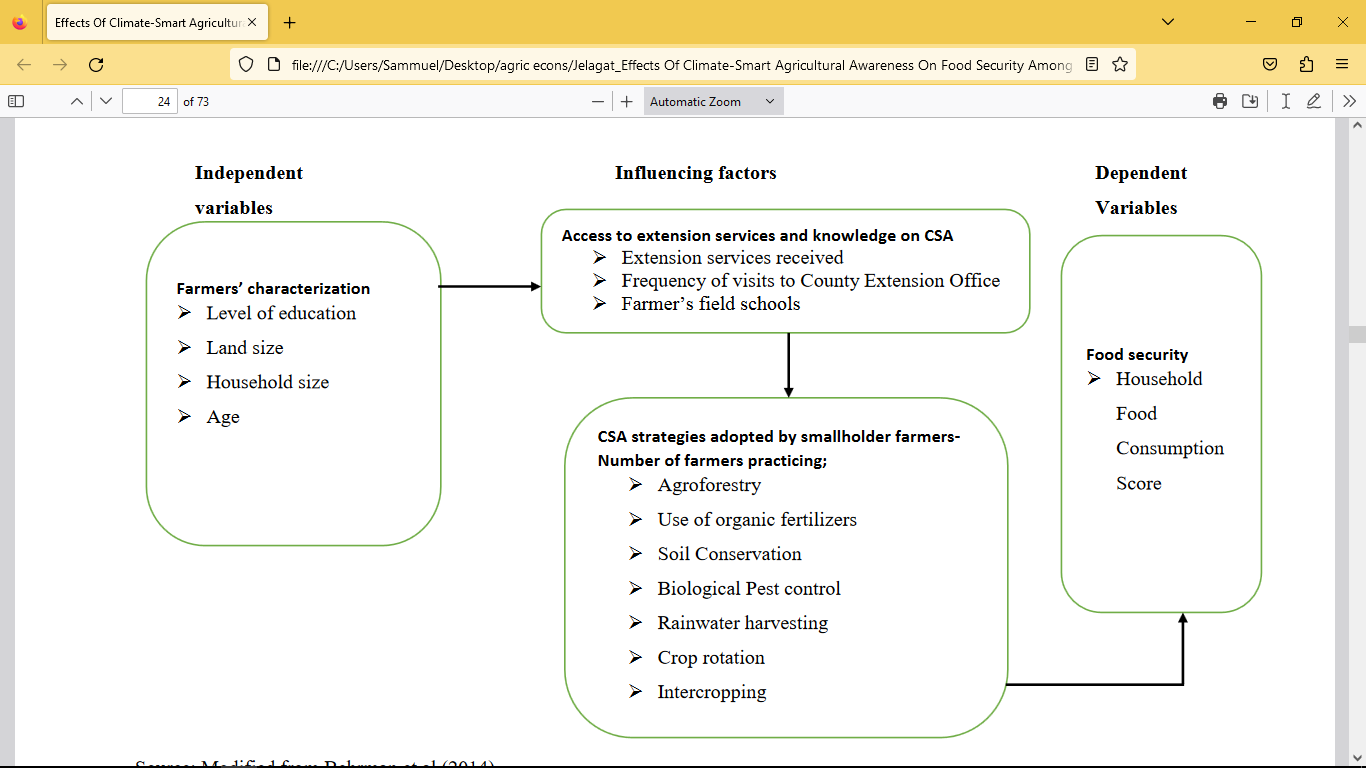
**2.1.5 Climate Smart Agricultural Practices**

Climate-smart agriculture is an approach that aims to increase agricultural productivity, enhance food security, and promote adaptation and mitigation of climate change (FAO, 2021). Climate Smart Agriculture practices are based on three main pillars including increasing productivity, enhancing resilience, and reducing greenhouse gas emissions. The following are Climate-smart agriculture practices:

* **Agroforestry:** This practice involves integrating trees and crops on the same piece of land. Trees provide shade and conserve soil moisture, while crops provide food and income. Additionally, they sequester carbon and promote biodiversity. Studies have shown that agroforestry practices significantly reduce greenhouse gas emissions, enhance soil health, and increase crop yields (Assan *et al*., 2018).
* **Conservation Agriculture:** This is a no-till farming system that incorporates crop rotation, cover cropping, and minimum soil disturbance. Conservation agriculture helps to conserve soil moisture, prevent soil erosion, and enhance soil health. This leads to improved crop yields and enhanced resilience to climate change (Kabir*,* 2019).
* **Integrated Pest Management:** This is a crop management approach that focuses on reducing the use of pesticides and enhancing natural predators such as insects and birds. Integrated pest management helps to reduce greenhouse gas emissions, protect soil health, and enhance food security (Babatunde*,* 2020).
* **Climate-Smart Livestock Production:** This approach involves reducing greenhouse gas emissions from livestock by improving animal health, feed management, and manure management. Additionally, farmers can use low-emission livestock breeds that require less input and provide higher yields (FAO, 2019).
* **Crop Diversification:** This practice involves growing a variety of crops on the same farm. Crop diversification enhances soil health, reduces pests and diseases, and promotes biodiversity. Additionally, it enhances food security and provides farmers with income from a variety of crops (Babatunde*,* 2020).

Climate-smart agriculture practices are essential in promoting sustainable agriculture systems that are resilient to climate change. Adopting these practices can help farmers enhance crop yields, conserve soil and water resources, reduce greenhouse gas emissions, and promote biodiversity generally.

**Figure 1: Conceptual Framework**



**2.1.6 General Effect of Climate Smart Agricultural Practices**

Climate Smart Agricultural practices are agricultural-related approaches, technologies, and practices that synchronize food security with climate change mitigation and adaptation. The increase in global temperature poses overwhelming threats to agricultural productivity worldwide. Climate Smart Agricultural practices help to increase food production while reducing losses, maintaining and enhancing ecosystems, reducing greenhouse gas emissions and enhancing resilience to climate change impacts. Here are some of the effects of Climate Smart Agricultural practices:

* **Increased food security:** Climate Smart Agricultural practices promote sustainable and environmentally friendly agriculture that ensures an adequate supply of food necessary for an increasing population despite environmental challenges related to climate change (FAO, 2019).
* **Increased soil health and biodiversity:** Climate Smart Agricultural practices such as conservation agriculture (CA), agroforestry systems and integrated crop-livestock systems improve soil fertility, facilitate carbon sequestration, and promote biodiversity (FAO, 2019; 2021)
* **Increased income for farmers:** Climate Smart Agricultural practices in ways including establishing new sources of income, improving the productivity of traditional ones, and increasing the efficient use of existing resources by supporting the development of marketing, providing training in better financial management, and improving access to credit (Mercy Corps, 2019; FAO, 2021).
* **Reduction in Greenhouse Gas Emissions:** Climate Smart Agricultural practices such as; agroforestry, integrated crop-livestock farming, and conservation agriculture can reduce greenhouse gas emissions by promoting sequestration and reducing the use of fossil fuels in agriculture (Falaki *et al.,* 2019).
* **Promotion of sustainability:** Climate Smart Agricultural practices ensure that agriculture practices that are sensitive to the environment, socially acceptable, and economically viable. They are a sure way of promoting a sustainable food production system that contributes to food security and livelihoods (FAO, 2019).
* **Reduction in land degradation and soil erosion:** Climate Smart Agricultural practices such as conservation agriculture, agroforestry, and integrated soil nutrient management can help to reduce soil erosion and land degradation (FAO, 2019; 2021).
* **Facilitation of adaptation to climate change:** Climate Smart Agricultural practices can also promote resilience to climatic irregularities by enhancing livelihoods and food security. They can also improve food systems within this context of climate change, such as agroforestry systems for enhancing soil fertility and moderating floods and droughts (FAO, 2021).
* **Improvement in water use efficiency:** Climate Smart Agricultural practices such as use of drought-resistant varieties of crops, conservation tillage, and agroforestry can improve the efficiency of water usage in the field (FAO, 2019).
* **Improvement of livestock management:** The implementation of Climate Smart Agricultural practices such as incorporating forage legumes in mixed crop-livestock systems and genetic improvement of livestock can increase the productivity of livestock while improving soil health and reducing greenhouse gas emissions. (FAO, 2019).
* **Enhanced farmer adaptation capacity:** Through the implementation of Climate Smart Agricultural practices, farmers can learn to better adapt their crops and livestock to climatic changes, improving their ability to cope with floods, droughts, and other climate-associated events (Ekanem *et al.,* 2020).

Conclusively, Climate Smart Agriculture practices have a significant impact on agriculture. They enhance food security, promote sustainability, facilitate climate change mitigation and adaptation, reduce greenhouse gas emissions, and improve soil health, among other benefits. It is, therefore, essential to implement these practices widely to guarantee food security and sustainable agriculture in the face of changing climatic conditions.

**2.1.7 Factors Limiting Climate Smart Agriculture**

Climate Smart Agriculture (CSA) is an approach that aims to help farmers adapt to the impacts of climate change, and to mitigate its effects by reducing greenhouse gas emissions. In Nigeria, there are various factors that affect the adoption of CSA practices, which has hindered its widespread implementation. These factors can be grouped into four main categories: technical, economic, social, and policy-related factors.

* **Technical factors:** Technical factors refer to the availability of resources, information, knowledge and skills necessary for implementing CSA practices. In Nigeria, the implementation of CSA practices is usually limited by inadequate technical capacity. Farmers often lack access to appropriate technology, improved planting materials, and other necessary resources required for implementing CSA practices. Many farmers also lack technical knowledge on how to use and apply these resources effectively. This has significantly hampered the adoption of CSA practices in Nigeria (Mercy Corps, 2019).
* **Economic factors:** Economic factors relate to the cost and profitability of adopting CSA practices. The high cost of inputs and technologies required for implementing CSA practices is a major barrier to their adoption. Farmers are often unable to afford the cost of these inputs due to their low income levels. In addition, the current pricing structure of agriculture produce in the country also does not encourage CSA practices due to low prices of sustainable products (FAO, 2019).
* **Social factors:** Social factors refer to cultural norms, beliefs, and attitudes towards CSA practices. In Nigeria, the cultural preference for traditional agricultural practices, coupled with the belief that CSA practices are unnecessary or unproven, has hindered their adoption. Also, farmers sometimes lack the social networks and relationships necessary for learning about and sharing knowledge and experiences in CSA practices (Ekanem *et al.,* 2020).
* **Policy-related Factors:** Policy-related factors relate to government policies and regulations that affect the adoption of CSA practices. Nigeria has several policy frameworks aimed at promoting sustainable agriculture, including the National Policy on Agriculture, National Agricultural Resilience Framework, among others. However, there is often limited implementation of these policies at the local levels. The lack of coordination in policy implementation has affected its effectiveness in promoting CSA adoption (FAO, 2019; 2020; Assan *et al.,* 2018).

**2.2 Empirical Framework**

**2.2.2 Climate-Smart Agricultural practices and Food Security**

Climate-smart agriculture is a promising approach to address the challenges of climate change and food security. Climate-smart agriculture practices and strategies can enhance productivity, promote resilience, and reduce greenhouse gas emissions in agricultural systems. However, the adoption and scaling up of Climate-smart agriculture practices require supportive policies, increased investment, and institutional capacity building at all levels. Several studies have shown that Climate-smart agriculture practices can enhance food security, increase resilience to climate shocks, and reduce greenhouse gas emissions. (FAO, 2021).

Nkeme, (2021) examined the food security status of the changing climatic conditions of rural farming households in Niger Delta of Nigeria. The findings revealed that majority (77.5%) of household heads were female and were married (88.1%), mean age, household size, educational level, and farming experience of 41 years, 5 persons, 45% and 11years, respectively. Furthermore, the results showed that 73.1% of the farm households were food in-secured with a mean per capita of N2703.31 while 26.9% were food secured with a mean per capita of N5193.71. The study concludes that population were food insecure, and that climate change has effect on food security in the region. Therefore, the need to widen rigorous enlightenment campaign by relevant agencies on how to mitigate against the changing climate situation has been recommended.

Niles, (2018) conducted a systematic review of the benefits and costs of climate-smart agriculture across 16 countries, and found that Climate-smart agriculture practices can enhance food security, increase agricultural productivity and income, and reduce greenhouse gas emissions. Similarly, Thornton, (2018) showed that Climate-smart agriculture can enhance the resilience of farming systems to climate change and variability in sub-Saharan Africa.

Nkeme, (2016) was conducted a study in Uyo Agricultural Zone of Akwa Ibom State, Nigeria in 2014 from where crop farmers participating in Akwa Ibom State Agricultural Development Programme (AKADEP) activities were selected. Findings from this study revealed that out of the 23 climate change mitigation technologies identified, few (5) recorded very high adoption rate. Therefore, the null hypothesis (P= 0.05%) which stated that there was no significant difference between the sample and population means was accepted. The study recommends that Extension contact with farmers should be intensified. Also, general enlightenment campaigns to boost farmers’ participation in the ADP programmes should be sustained.

Oladele and Ojo (2018) in their study on the adoption of CSA practices in Ogun state, Nigeria identified access to inputs as a technical factor limiting the adoption of CSA practices. Oluwasanya and Lawal (2018) in a study on the drivers and barriers of CSA implementation in Nigeria highlight economic factors such as the cost of inputs as a major challenge. Ibrahim *et al.,* (2019) in their study on the adoption and barriers to CSA practices in Bauchi State, Nigeria identified low level of awareness and knowledge of CSA practices among farmers as a social factor hindering the adoption of CSA. Awoke *et al.,* (2018) in their study on the constraints to adoption of CSA practices in Nigeria, found that policy-related factors such as inadequate coordination with local governments and the private sector hindered CSA uptake.

Ubokudom *et al.,* (2017) analyzed the food security status of rural farm households in Akwa Ibom State, Nigeria. The results showed that about 78% of the respondents were married, with mean household size of 6 persons. Most (58%) of the respondents were male, with mean educational level of 11 years. About 91% applied fertilizer, while 60% adopted soil conservation practices. The results further indicated that educational level (p> 0.10), marital status (p> 0.05), use of fertilizer (p> 0.10) and adoption of soil conservation practices (p> 0.10) positively influenced the odd of the households being food secure, while household size (p> 0.05) and dependency ratio negatively influenced to the odd of the household being food secure. The study proffered some policy options such as educating members of the household through seminars and workshops, making available fertilizer to farmers at a subsidized rate, controlling birth rate, disseminating of information to farmers related to soil conservation practices, are required to reduce food insecurity problems in the area.

In a study conducted by the International Maize and Wheat Improvement Center (CIMMYT), it was found that the implementation of Climate Smart Agriculture practices such as conservation agriculture and improved crop varieties led to increased crop yields and improved soil health, resulting in enhanced food security among smallholder farmers in Northern Nigeria (Rashid, 2018). Another study conducted by the International Water Management Institute (IWMI) in northern Nigeria found that improved water management practices, such as rainwater harvesting and irrigation, combined with the use of drought-resistant crop varieties resulted in increased crop yields and improved food security (Andrieu, 2018).

Oladele, (2019), it was found that the adoption of Climate Smart Agriculture practices such as crop rotation, intercropping, and use of organic fertilizers resulted in increased crop yields and enhanced food security among smallholder farmers in southwestern Nigeria.

Adekunle, (2019) showed that the use of Climate Smart Agriculture practices such as agroforestry and use of drought-tolerant crop varieties resulted in increased crop yields and improved soil health, contributing to food security in Nigeria's semi-arid regions.

Akinbile, (2019), found that the use of Climate Smart Agriculture practices such as conservation agriculture and integrated pest management resulted in increased crop yields and improved food security among smallholder farmers in Nigeria's savanna regions.

Mashi, (2019) also found that the adoption of Climate Smart Agriculture practices such as agroforestry and use of improved crop varieties led to increased crop yields and enhanced food security among smallholder farmers in Nigeria's arid regions.

Another study by Abegunde, (2019) showed that the use of Climate Smart Agriculture practices such as crop diversification and integrated pest management resulted in increased crop yields and improved food security among smallholder farmers in Nigeria's wetland regions.

Tanko, (2019), it was found that the adoption of climate smart agriculture practices such as integrated soil fertility management and use of drought-resistant crop varieties resulted in increased crop yields and improved food security among smallholder farmers in Nigeria's semi-arid regions.

Ayoola, (2018) also showed that the use of Climate Smart Agriculture practices such as agroforestry and use of improved crop varieties resulted in increased crop yields and improved food security among smallholder farmers in Nigeria's forested regions.

Overall, these studies demonstrate the positive impact of Climate Smart Agriculture practices on food security in Nigeria. By building resilience to climate change and improving soil health and water management, Climate Smart Agriculture practices are helping smallholder farmers increase crop yields and improve access to diverse and nutritious food crops.

In conclusion, the adoption of CSA practices in Nigeria has been limited due to a combination of technical, economic, social and policy-related factors. For CSA practices to be widely adopted in Nigeria, these factors must be addressed through effective public-private partnerships, policy reforms, and targeted interventions from development partners.

**2.2.3 Social Characteristics on the Effects of Climate Smart Agricultural Practices on Food Security Status of Farmers**

Gender perception can have a significant impact on the adoption and effectiveness of climate-smart agricultural practices (CSAPs) with regards to food security status. In Sub-Saharan Africa, agricultural practices are often gendered, with men and women having different roles and responsibilities. This division of labor can affect the adoption and success of climate-smart agricultural practices, hence influencing food security.

Ekanem *et al.,* (2020) investigated the gender roles in climate change adaptation among arable crop farmers in Abak agricultural zone of Akwa Ibom State. Their findings revealed that female farmers were involved in planting, weeding, application of fertilizer, harvesting, pest management, soil management and conservation, processing procedure and marketing while the male farmers were found to be more proficient in land clearing, land tilling, land stumping and land ridging. The study also showed that climate is changing and has caused increased erosion, excessive flooding and delay in planting time due to fluctuations in rainfall pattern in the study area. Again, female farmers slightly applied adaptation strategies more than the male farmers during crop production. In conclusion, therefore, both men and women farmers had roles in climate change adaptation during crop production. Implications for climate change mitigation and adaptation planning is that, in designing gender-responsive programmes, these roles should be streamlined. Obviously, female arable crop farmers demonstrated greater advocacy for climate change adaptation strategies implying that making gender-responsive programmes more effective towards female farmers and community members in sustainable use of resources could enhance adaptation among households.

A study by FAO, 2020, shows that women farmers in Africa can experience more food insecurity due to lower income and access to information and resources. Women also experience greater exposure to impacts of climate change as they tend to rely more heavily on subsistence agriculture, which is highly vulnerable to weather changes. Additionally, men’s access to credit and technology is better than women, which makes it harder for women farmers to adapt to climate change.

Another study by Ngigi *et al.,* 2019, on gender implications of adopting climate-smart agricultural practices in Kenya show that gender indeed influences access to information and resources for smallholder farmers. Men had better access to land, credit, and extension services which made it easier for them to adopt climate-smart agricultural practices in comparison to women. Whereas women had better access to local knowledge and crop diversity, which made them more inclined to use locally adapted technologies.

One study conducted by Enun *et al.,* (2021) observed that female farmers in Nigeria face significant challenges in accessing resources and implementing climate-smart agricultural practices. They found that female farmers have a lower level of education and access to extension services, leading to a limited understanding of climate-smart agricultural practices and lower adoption rates.

Similarly, Akinnifesi *et al.,* (2019) found that gender biases in Nigerian agricultural policies and programs limit women's access to essential resources such as land, inputs, and credits. This results in women having less productive farms, lower yields, reduced income, and food insecurity.

Another study by Onuoha and Akachukwu (2021) observed that climate-smart agricultural practices such as the use of improved seeds, organic fertilizers, and water conservation techniques have a significant impact on food security. However, they found that women farmers face more challenges in accessing these resources and implementing them due to gender discrimination.

**2.3 Theoretical framework**

**2.3.1 The Random Utility Theory**

The random utility theory is a model of recreation site choice also referred to the random utility maximization (RUM) model. This theory has verified to be useful for gauging access value and the impact of change (for example, increased bag rate for hunting, improved water quality and wider beaches). It has the possibility to easily handle many sites and substitution at simultaneously (McFadden, 1973). The theory suggests that farmer’s choices are influenced by random factors and that utility of choice is encompasses deterministic and mistakes part. This means it’s not possible to envisage farmers’ choices with confidence but can express probability that the adoption of an option is greater than alternatives. If U stand for utility that a person represented as i earn from good consumption, j evident deterministic component, V utility function and E random component.

Utility theory is specified as follows:

Uij = VtJ + Eij

Utility is described as U a dependent of choices taken relies upon on alternatives made from j CSA options is presumed to have a utility function as follows;

Ull = V(Xj,Zi)

McFadden, 1973 further explains that a farmer’s judgment to implement certain CSA practices is mainly based on the handiness and advantage of using that specific practice. If a choice is not convenient for a farmer, then they are unlikely to adopt it. In the case of this study, socio-economic characteristics and awareness are some of the factors that determine the handiness of a specific strategy to a farmer.

**2.3.2 Social perception theory**

Social perception theory, also known as person perception theory or social cognition, is a cognitive theory that focuses on how individuals perceive and interpret the behaviors, intentions, and characteristics of others in social interactions. It seeks to understand how people form impressions of others, make attributions about their behavior, and generate judgments and attitudes based on these perceptions. The process of social perception involves gathering and interpreting information from various sources, including verbal and nonverbal cues, situational factors, and pre-existing cognitive schemas. These perceptions are influenced by factors such as stereotypes, personal experiences, cultural norms, and individual differences. One key concept within social perception theory is attribution theory. Attribution theory explores how people explain the causes of others' behavior. It suggests that individuals tend to attribute others' behavior to either internal factors (e.g., personality traits, character) or external factors (e.g., situational factors, environmental influences). This attribution process can shape the way we perceive and interpret others' actions and can impact subsequent judgments and attitudes towards them. Another important aspect of social perception theory is the formation of first impressions. First impressions are often formed quickly and automatically based on limited information. Research has shown that these initial impressions can have a lasting impact on subsequent interactions, as people tend to seek out information that confirms their initial perceptions and overlook information that contradicts them. Various factors can influence social perception, including nonverbal behavior, facial expressions, body language, and vocal cues. Research has demonstrated that nonverbal cues play a significant role in how we perceive and interpret others' emotions, intentions, and attitudes. For example, studies have shown that individuals are better able to accurately detect deception when they focus on nonverbal cues rather than verbal cues alone. Cognitive schemas, a concept derived from social perception theory, are mental frameworks or structures that organize and guide our perception of the social world. These schemas are acquired through past experiences and socialization processes, and they influence how we process and interpret new information. Schemas can lead to the formation of stereotypes, which are generalized beliefs or assumptions about a particular group of people. Stereotypes can influence social perception and lead to biases and prejudice.

**2.3.3 Information perception theory**

Information Perception Theory (IPT) is a conceptual framework that seeks to explain how individuals perceive and process information in their environment. It posits that humans are active information processors who engage in selective perception, organization, and interpretation of incoming information based on their prior knowledge, beliefs, and goals. IPT was first proposed by Joseph E. McGrath in 1984 as a reconceptualization of the traditional information processing model. It emphasizes the role of the perceiver in the information processing cycle, acknowledging that perception is not simply a passive reception of information but an active construction of a perceptual reality. According to IPT, individuals selectively attend to certain stimuli and filter out others based on their personal relevance and interests. This selectivity is influenced by various factors, including the individual's motivation, expectations, personality traits, and cognitive abilities. This means that people tend to perceive and remember information that aligns with their existing beliefs and preferences, while disregarding or distorting information that contradicts their preconceived notions. The process of organizing information involves categorization, simplification, and chunking. Individuals tend to organize incoming information into meaningful categories or schemas, which help to make sense of the complex world. These schemas act as mental frameworks that guide perception and interpretation, enabling quicker processing of information and reducing cognitive load. Interpretation is a crucial aspect of information perception theory. People interpret information based on their previous experiences, knowledge base, and cultural background. The same piece of information can be interpreted differently by different individuals, leading to different perceptions and understanding of reality. In conclusion, Information Perception Theory provides a valuable framework for understanding how individuals perceive and process information in their environment. When applied to the context of food security, IPT offers valuable insights into how individuals perceive and interpret information about food availability, access, utilization, and stability. Understanding information perception in relation to food security is crucial for developing effective communication strategies, policies, and interventions to address global food challenges.

**2.3.4 Risk Perception theory**

Risk perception theory, also known as the risk perception paradigm, focuses on understanding how individuals perceive and evaluate risks. It seeks to explain why people perceive certain risks as more significant or threatening than others, even in the face of scientific evidence or statistical data. By examining the cognitive and emotional factors that influence risk perception, researchers aim to shed light on how individuals make decisions concerning risks and how they respond to them.

One of the most prominent approaches within risk perception theory is the psychometric paradigm, which suggests that risk perception is influenced by two main factors: cognitive evaluations and affective reactions. Cognitive evaluations refer to how individuals assess risks based on factors like knowledge, expertise, and familiarity. Affective reactions, on the other hand, involve emotional responses such as fear, dread, or perceived lack of control. Cultural Theory takes a sociological perspective on risk perception and suggests that people's views on risks are shaped by their cultural backgrounds and social contexts. It argues that individuals perceive risks differently based on their adherence to particular cultural biases or worldviews, such as egalitarian, individualistic, hierarchical, or fatalistic perspectives. Prospect theory, developed by Kahneman and Tversky, suggests that individuals' decisions about risks are influenced by the framing of choices and the potential gains or losses involved. It argues that people tend to be more risk-averse when making decisions about potential gains and more risk-seeking when making decisions about potential losses. Drawing on cultural theory and the constructivist perspective, some researchers argue that risk perception is not solely based on individuals' cognitive or emotional processes but is also socially constructed through various discourses, beliefs, and social interactions. It suggests that risks are shaped by power dynamics, social institutions, and communication processes. Understanding risk perception theory is crucial in various domains, including public health communication, environmental decision-making, and risk management. By acknowledging the diverse perspectives and factors that shape risk perceptions, policymakers, researchers, and communicators can develop more effective strategies to address public concerns, engage communities, and promote informed decision-making in risk-related contexts.

**2.3.5 Gender Role Theory**

Gender role theory is a sociological and psychological perspective that examines how society assigns and regulates behaviors, roles, and expectations based on an individual's gender. This theory posits that these roles and expectations are not biologically determined but are rather socially constructed and reinforced through various social institutions such as family, education, media, and culture. The origins of gender role theory can be traced back to the 1950s and 1960s, when feminist scholars challenged the prevailing notion that gender differences were purely biological. They argued that gender roles were shaped by socialization processes and power dynamics, thus paving the way for the emergence of gender role theory. According to this theory, societies define and prescribe specific behaviors, attributes, and responsibilities for individuals based on their gender. For example, traditional gender roles have often assigned men with qualities such as being assertive, dominant, and independent, while women have been expected to be nurturing, submissive, and caregiving. These roles often lead to the perpetuation of gender stereotypes and inequality. Gender role theory also asserts that these roles are learned through socialization processes from a young age. Children are socialized within their families, peer groups, schools, and media to conform to societal expectations regarding appropriate gender behavior. Reinforcement of gender roles occurs through rewards and punishments, both explicit and implicit, which serve to enforce conformity to societal norms. It is important to note that gender role theory does not view gender roles as fixed or unchangeable. Rather, it recognizes that gender roles are subject to historical, cultural, and social variations. As societies evolve, so do the expectations and constructs of gender roles, leading to shifts in societal norms and expectations. In summary, gender role theory is a sociological and psychological framework that recognizes the social construction of gender roles and the influence of societal norms and expectations on individuals' behavior and identity. It highlights the importance of understanding the multidimensional nature of gender roles and recognizing the potential for change and transformation in societal norms.

**2.4 GAP OF LITERATURE REVIEW**

In this empirical analysis, quite several scholarly works have given consistent results of inverse relationship on results of study autonomous variables in regard to climate smart agriculture on reliant variable which is food security; others have also shown positive relationship on same phenomenon. The impact of socio-economic factors on food security situation has been established by quite several studies. However, many studies exist on how socio-economic aspects influence farmers’ adoption of climate smart agriculture. Gender also has significant impact on the adoption and effectiveness of climate-smart agricultural practices with regard to food security status. Women farmers are more vulnerable to the impacts of climate change while men have an advantage in accessing resources and technology. However, women farmers play a critical role in enhancing food security through adopting climate-smart practices. It is therefore important for policymakers to put in place mechanisms to ensure equal access to resources and opportunities for men and women farmers in the adoption of climate-smart practices, hence the need to evaluate this context in Eket Agricultural Zone, Akwa Ibom State, Nigeria. In terms of CSA awareness and its adoption by small scale farmers, their gender and it effect on their household food security. This research will provide further information on the influence of CSA awareness, CSA adoption and it effect on farmers’ household in terms of food security. The reviewed literature on CSA strategies shows there is a strong relationship involving CSA practices adoption on food security. The development can be enhanced by employing various CSA practices thus increasing the food production.

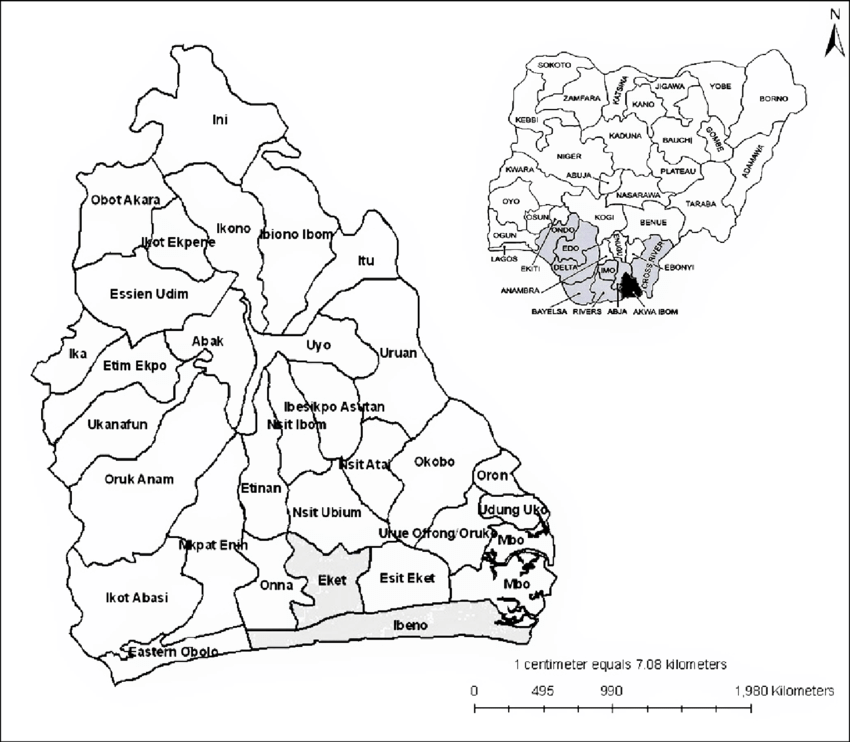
**CHAPTER THREE**

**RESEARCH METHODOLOGY**

**3.1** **Study Area**

The study was conducted in Eket agricultural zone of Akwa Ibom State, Nigeria. The main economic activities of the people are farming, trading, fishing from riverine and coastal dwellers and white-collar services. Akwa Ibom State is made up of 31 local government areas (LGAs) with six (6) agricultural zones namely: Uyo, Oron, Ikot Ekpene, Eket, Abak and Etinan. Eket Agricultural Zone consists of five (5) Local Government Area, which are: Eket, Esit Eket, Onna, Ikot Abasi, Mkpat Enin, Ibeno and Eastern Obolo. Eket as the headquarter of the zone is located at latitude 4039’N and longitude 7056’E with a population of over 250,000 in 2019 but updated using 2.50% annual growth rate. The annual rainfall ranges between 2000mm and 3000mm with a temperature between 27 and 28 degrees Celsius. Some of the common food crop cultivates in the area are maize, cassava, cocoyam, okra, plantain, banana, waterleaf, fluted pumpkin, white yam and melon. In addition, some micro-livestock are usually raised at backyard of most homesteads and others fishermen in the riverine areas.

**3.2 Map of Study Area**

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* **Eket Agricultural Zone**

**Fig 3.1**: Map of Nigeria Showing Akwa Ibom State and Akwa Ibom State Map Showing Eket Agricultural Zone

**Source:** [www.researchgate.com](http://www.researchgate.com)

**3.3** **Sampling Techniques and Sampling Size**

**3.3.1 Sampling Procedure**

A Two-stage sampling procedure was deployed in the selection of the respondents. At first stage, simple random sampling (by balloting) was used to select five (5) blocks (each LGA represent a block) which makes up Eket Agricultural Zone and two (2) cells (villages representing a cell) each of five (5) blocks selected in the zone. The rationale here is to ensure that response of farmers from all the blocks (local Government Area) was represented.

**3.4 Method of data collection**

The study was made use of primary data. The primary data was collected by using a well-structured questionnaire which was given to the respondents. It was divided into sections to reflect the specific objectives of the study. Data to be collected included personal and socioeconomic characteristics such as educational and religious backgrounds, extension contact, years of experience, farm size and membership of cooperatives. Information was also obtain on agricultural smart practices employed by the farmers awareness and utilization and constraints to the adoption of these practices. Oral interview involving face to face questioning of the respondents in order to further extract more information or if a farmer cannot read or write was used to affirm opinion where need arises.

The awareness and utilization of climate smart agricultural practices were established with a 3 –point rating scale of 1- 3 of Always Utilized=3, Often Utilized=2 and Utilized=1 and a benchmark of 2.0 was used. Variables with mean scores of 2.0 and above were adjudged to have severe influence while scores below 2.0 was adjudged as not severe effect.

To obtain information on perceived effect of Climate Smart Agricultural Practices, the effects were presented with a four points likert-type scale of Strongly Agreed=4, Agreed=3, Disagreed=2 and Strongly Disagreed=1 and a benchmark of 2.5 was used. Variables with mean scores of 2.5 and above were adjudged to have severe influence while scores below 2.5 was adjudged as not severe effect.

Information on constraints to Climate Smart Agricultural Practices adoption was obtained and established with a three points likert-type scale of Very Serious=3, Serious=2 and Not Serious=1 and a benchmark of 2.0 was used. Variables with mean scores of 2.0 and above were adjudged to have severe influence while scores below 2.0 was adjudged as not severe effect.

**3.6 Analytical Techniques**

Descriptive statistics such as frequency count and percentage was used to describe socio-economic characteristics of the respondents, sources of information and identification of barriers to farmers. Likert rating scale was used to ascertain the level of adoption and utilization of climate-smart agricultural practices. Food security was estimated from farmers’ monthly expenditure on food items. Food security index estimation, using the expenditure method as used by Haddabi *et al.,* (2019) was used to classify the respondents into food secure and food insecure households in a bid to establish the food security status of the individual households. Food security was adopted for the study due to its ease of computation.

It is given by;

𝐹1 = per capita food expenditure for the ith household

2/3 mean per capita food expenditure of all households

Where;

Fi = food security index

When Fi ˃ 1 = food secure ith household.

Fi<1 = food insecure ith household.

Per capita food expenditure was derived by summing up all monthly expenses on food, dividing by the household size. A household whose per capita monthly food expenditure is above or equal to two-thirds of the mean per capita food expenditure was classified as being food secured. On the other hand, a food insecure household was that whose per capita food expenditure fell below two-thirds of the mean monthly per capita food expenditure.

**CHAPTER FOUR**

**RESULTS AND DISCUSSION**

**4.1 Social–Economic Characteristics of the Respondents**

The result as shown in Table 4.1 reveals that the age distribution of farmers in the study area according to the age range presented revealed that 73.3% of the male respondent were above 40 years whereas 66.7% of the female respondents were above 40 years while 3.4% of both the male and female respondents were below 30 years respectively. The mean age of the male and female respondents are 49.12 and 46.30 years respectively which is an indication that the respondents are still very active to engage in agricultural production that will contribute to household food security and utilization of CSAP’s. The result is in line with the findings of Haddabi *et al*. (2019) and Yusuf *et al*. (2015) who claimed that at the active working age, household heads adopt innovations that positively affect their productivity and income. The results as shown in

Table 4.1 revealed that the majority of the male (76.7%) and female (80%) respondents were married, while 2% were divorced. The findings revealed that most of the respondents were married, and it implies that farming is a stable job in the region. The result is in line with the findings of Households where the respondents are married and both the spouses are working are expected to be more food secure than single households, widowed or divorced. Most rural farmers will prefer to marry to have cheap labour for agricultural activities to enable their household to be food secure (Kirwan & Maye, 2013).

Table 4.1 also showed that about 46.7% of the male respondents had tertiary education and 38.3% of the female respondents had secondary education. The high literacy level in the area could suggest a better awareness, adoption and utilization of Climate Smart Agricultural practices. Educated farmers adopt agricultural innovations easier, and this could improve their agricultural productivity and ensure food security. This finding agrees with that of Haddabi et al. (2019) and Olayemi (2012) but is contrary to the findings of Ademola and Abang (2015) and Agom *et al.,*

Table 4.1 also showed that about 66.6% of the male respondents have household sizes of 5 - 10 persons, whereas 60% of the female respondents have household sizes of 5 - 10 persons. The mean household size for both male and female respondents were about 7 and 8 persons. Farm households with larger household sizes tend to have more labour from the family for farming activities even though the dependency ratio will be high. Lager household size tends to reduce per capita food expenditure and per capita household income, thus increasing their likelihood of being food insecure. The findings correspond with that of Olayemi (2012) who asserted that the larger the family size the lesser the food availability to each person within the household and also nutritional status will be affected.

Table 4.1 also showed that majority of both the male (75%) and female (78.3%) respondents are primarily engaged in farming, hence farming their primary occupation which may suggest a stable food security and utilization Climate Smart Agricultural Practices in the area. This findings is in line with

The distribution of monthly income of farming households shown in Table 4.1 revealed that the majority of the male (61.7%) and female (53.3%) earned ₦50,000-₦100,000 monthly from Cassava production. Additionally, majority of the male (46.7%) and female (38.3%) earned ₦50,000-₦100,000 monthly from non-farming activities. The result also showed that 51.7% and 66.7% of the male and female respondents respectively received lower than N50,000 from family and friends as source of income The result indicates that the farming households had numerous streams of income and they would be able to afford their basic needs.

The distribution shown in Table 4.1 revealed that the majority of the female (73.3%) and male (65%) respondents are members of cooperative and 87.9% & 83.3% of male and female respondents respectively have been a member of the cooperative below 5 years. Being a member of cooperative is an indication of access to information and resources.

The result also showed that the male (50%) and female (55%) respondents source of credit comes from families and friends, hence they have no access to credit facilities from any financial institution or cooperative. Access to credit is an important factor that can influence the likelihood of adoption of new technologies by farmers to augment their income level and attain food security. Farm credit plays an intermediate role between the adoption of farm technology and the increase in farm output vis-á-viz their income level (Jeiyol *et al.,* 2013). This finding corroborates that of Haddabi et al. (2019) who asserted that farmers cannot expand their production activities due to limitations to finance.

The distribution shown in Table 4.1 revealed that the majority of the female (71.7%) respondents had access to extension agents in contrast to the male (66.7%) respondents that had no access to extension agent. Access to an extension agent of the female respondents is an indication of access to information and resources. Additionally, the female (60%) respondents were visited bi-weekly compared to the male (33.3%) respondents who were visited weekly. This is in-line with….

The distribution shown in Table 4.1 revealed that the majority of the female (50%) respondents land acquisition is by Rent/leased compared to the male (26.7%) respondents that on their lands. Land acquisition is major determining factor in terms of the Climate Smart Agricultural practices employed by the farmers.

Table 4.1 showed that revealed that the majority of the female (38.3%) and male (41%) respondents had farm sizes less than 2.0 hectares. The finding revealed that food crop farmers in the study area are mainly small-scale farmers, hence food production is at a subsistence level which could lead to diversification of income sources by farmers to food secure. This finding corresponds with the finding of Haddabi et al. (2019) and Oyebanjo et al. (2013) that the majority of Nigerian farmers are small-scale farmers who cultivate less than 5 hectares.

**Table 4.1: Distribution of Respondents Based on their Socio-economic Characteristics**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variables** | **Male** | **Percentage (%)** | **Female** | **Percentage (%)** |
| **Age** | **(Mean = 49.12 years)** |  | **(Mean = 46. 30 years )** |  |
| Below 30 | 2.0 | 3.4 | 2 | 3.4 |
| 30 - 40 | 14.0 | 23.3 | 18 | 30.0 |
| Above 40 | 44.0 | 73.3 | 40 | 66.6 |
| **Total** | **60** | **100** | **60** | **100.0** |
| **Marital Status** |  |  |  |  |
| Single | 8 | 13.3 | 5 | 8.3 |
| Married | 46 | 76.7 | 48 | 80.0 |
| Divorced | 2 | 3.3 | 2 | 3.3 |
| Widow | 0 | 0.00 | 5 | 8.3 |
| Widower | 4 | 6.7 | 0 | 0 |
| **Total** | **60** | **100** | **60** | **100** |
| **Education** |  |  |  |  |
| Primary | 5 | 8.3 | 18 | 30.0 |
| Secondary | 27 | 45.0 | 23 | 38.3 |
| Tertiary | 28 | 46.7 | 19 | 31.7 |
| **Total** | **60** | **100.0** | **60** | **100.0** |
| **Household Size** | **(Mean = 8 persons)** |  | **(Mean = 7 persons)** |  |
| Below 5 | 18 | 30.1 | 20 | 33.3 |
| 5 - 10 | 40 | 66.6 | 36 | 60.0 |
| Above 10 | 2 | 3.3 | 4 | 6.7 |
| **Total** | **60** | **100** | **60** | **100.0** |
| **Primary Occupation** |  |  |  |  |
| Farming | 45 | 75.0 | 47 | 78.3 |
| Civil Services | 4 | 6.7 | 9 | 15.0 |
| Trading | 8 | 13.3 | 2 | 3.3 |
| Teaching | 3 | 5.0 | 2 | 3.3 |
| Others | 0 | 0 | 0 | 0 |
| **Total** | **60** | **100** | **60** | **100** |
| **Monthly Income from Cassava farming** |  |  |  |  |
| Below ₦50,000 | 15 | 25.0 | 17 | 28.3 |
| ₦50,000- ₦100,000 | 37 | 61.7 | 32 | 53.3 |
| ₦100,000- ₦300,000 | 8 | 13.3 | 11 | 18.3 |
| Above ₦300,000 | 0 | 0 | 0 | 0 |
| **Total** | **60** | **100** | **60** | **100.0** |
| **Monthly Income from non- farming** |  |  |  |  |
| Below ₦50,000 | 23 | 38.3 | 22 | 36.7 |
| ₦50,000- ₦100,000 | 28 | 46.7 | 23 | 38.3 |
| ₦100,000- ₦300,000 | 8 | 13.3 | 11 | 18.3 |
| Above ₦300,000 | 1 | 1.7 | 4 | 6.7 |
|  | **60** | **100** | **60** | **100.0** |
| **Source of Income from Family members** |  |  |  |  |
| Below ₦50,000 | 31 | 51.7 | 40 | 66.7 |
| ₦50,000- ₦100,000 | 22 | 36.7 | 15 | 25.0 |
| ₦100,000- ₦300,000 | 5 | 8.3 | 5 | 8.3 |
| Above ₦300,000 | 2 | 3.3 | 0 | 0 |
| **Total** | **60** | **100** | **60** | **100.0** |
| **Farming Experience** |  |  |  |  |
| Below 5 years | 10 | 16.7 | 21 | 35.0 |
| 5-10 years | 19 | 31.7 | 21 | 35.0 |
| Above 10 years | 31 | 51.6 | 18 | 30.0 |
| **Total** | **60** | **100** | **60** | **100** |
| **Membership of Cooperative** |  |  |  |  |
| Yes | 21 | 65.0 | 44 | 73.3 |
| No | 39 | 35.0 | 16 | 26.7 |
| **Total** | **60** | **100** | **60** | **100.0** |
| **Years in Cooperative** |  |  |  |  |
| Below 5 years | 53 | 87.9 | 50 | 83.3 |
| 5-10 years | 6 | 9.9 | 8 | 13.3 |
| Above 10 years | 1 | 1.7 | 2 | 3.3 |
| **Total** | **60** | **100** | **60** | **100.0** |
| **Sources of Credit** |  |  |  |  |
| Families/Friends | 30 | 50.0 | 33 | 55.0 |
| Banks | 11 | 18.3 | 7 | 11.7 |
| Cooperative | 8 | 13.3 | 10 | 16.7 |
| None | 11 | 18.3 | 10 | 16.7 |
| **Total** | **60** | **100** | **60** | **100.0** |
| **Access to Extension Service** |  |  |  |  |
| Yes | 20 | 33.3 | 43 | 71.7 |
| No | 40 | 66.7 | 17 | 28.3 |
| **Total** | **60** | **100** | **60** | **100.0** |
| **Times visited** |  |  |  |  |
| Weekly | 20 | 33.3 | 13 | 21.7 |
| Bi-weekly | 12 | 20.0 | 36 | 60 |
| Monthly | 13 | 21.7 | 5 | 8.3 |
| Yearly | 15 | 25.0 | 6 | 10.0 |
| **Total** | **60** | **100** | **60** | **100.0** |
| **Mode of Land Acquisition** |  |  |  |  |
| Owned | 16 | 26.7 | 15 | 25.0 |
| Rent/leased | 14 | 23.3 | 30 | 50.0 |
| Inherited | 15 | 25.0 | 13 | 21.7 |
| Communal | 6 | 10.0 | 2 | 3.3 |
| Family | 9 | 15.0 | 0 | 0 |
| **Total** | **60** | **100.0** | **60** | **100.0** |
| **Type of Labor** |  |  |  |  |
| Family | 28 | 46.7 | 18 | 30.0 |
| Hired | 26 | 43.3 | 34 | 56.7 |
| Grouped | 6 | 10.0 | 8 | 13.3 |
| **Total** | **60** | **100** | **60** | **100.0** |
| **Farm Size** | **(Mean = 3.43ha)** |  |  |  |
| Below 2ha | 25.0 | 41.7 | 23 | 38.3 |
| 2ha - 4ha | 12.0 | 20.0 | 15 | 25.0 |
| Above 4ha | 23.0 | 38.4 | 22 | 36.7 |
| **Total** | **60** | **100** | **60** | **100.0** |

**Source:** Computed using field survey Data (2023)

**4.2 Food Security Status of Respondents**

Table 4.2 a and 4.2b present the summary statistics of the food security indices among the sampled households. For the male respondents, based on the food security line (2/3MPCFDE = ₦15982.64), it was observed that 63.3% of the households were food insecure and 36.7% were food secure as shown in Table 4.2a. For the female respondents, based on the food security line (2/3MPCFDE = ₦6268.11), it was observed that 48.3% of the households were food insecure and 51.7% were food secure as shown in Table 4.2b. this implies that the household of the female respondents are food secured than the male respondents. This could be due to the high accessibility of extension officer for information, high income level and small household size (7). The implication is that 51.7% and 36.7% of the female and male respondents respectively who were food secure had physical, social and economic access to food while the remaining 48.3% and 63.3% of the male and female respondents respectively who were food insecure had limited access to food due to physical, social and economic constraints towards accessing food in the study area. Similar results were obtained by Haddabi et al. (2019), Otunaiya and Ibidunni (2014) and Oyebanjo et al. (2013). The average household size for the male and female respondent were 8 and 7 respectively. For the female respondents, 8 and 7 persons were food insecure and food secure households respectively. For the male respondents, 10 and 8 persons were food insecure and food secure households respectively. The female respondents in the study area could therefore be regarded as more food secure than the male respondents.

**Table 4.2a Indices of Male Respondent Household Food Security Status**

|  |  |  |  |
| --- | --- | --- | --- |
| **Food Security Indices** | **Food Insecure Household** | **Food Secured Households** | **All** |
| Percentage of Household (%) | 63.3% | 36.7% | 100% |
| Number of Household | 38 | 22 | 60 |
| Mean of Household size | 10 | 8 | 8 |
| Mean of Household Expenditure | ₦57,530.21 | ₦33,354.80 | ₦90,885 |
| Mean per capita Household food Expenditure | ₦15,175.52 | ₦8,798.44 | ₦23,973.96 |
| 2/3 mean per capita Household food expenditure = ₦15,982.64 | | | |

Source: Computed using field survey Data (2023)

**Table 4.2b Indices of Female Respondent Household Food Security Status**

|  |  |  |  |
| --- | --- | --- | --- |
| **Food Security Indices** | **Food Insecure Household** | **Food Secured Households** | **All** |
| Percentage of Household (%) | 48.3% | 51.7% | 100% |
| Number of Household | 29 | 31 | 60 |
| Mean of Household size | 8 | 7 | 7 |
| Mean of Household Expenditure | ₦26,370.99 | ₦28,227.34 | ₦54,598.33 |
| Mean per capita Household food Expenditure | ₦4,541.25 | ₦4,860.92 | ₦9,402.17 |
| 2/3 mean per capita Household food expenditure = ₦6268.11 | | | |

Source: Computed using field survey Data (2023)

**4.3 Awareness and Utilization of Climate Smart Agricultural Practices**

Table 4.3a and Table 4.3b shows the awareness level and utilization of climate Smart Agricultural Practices among male and female respondents in Eket Agricultural zone. The findings revealed that majority of the male (90%) and female (88.3%) respondents were highly aware of Climate Smart Agricultural Practices. From the results as shown in Table 4.3a, the male respondents always utilize the following Climate Smart Agricultural practices; agroforestry (68.3%), Crop Rotation (55%), Mixed Cropping (61.7%), Intercropping (50%), Compost Making (41.7%), Improved fallowing (46.7%), Organic Manure (70%), Mulching (51.7%), Cover Crops (53.3%), Mixed Farming (53.3%) and Improved Crop Variety (43.3%) was often Utilized and Irrigation (53.3%) was Never Utilized. For the female respondents as shown in Table 4.3b, majority always utilize most of these Climate Smart Agricultural Practices; agroforestry (53.3%), Crop Rotation (45%), Mixed Cropping (56.7%), use of improved crop variety (78.3%), Organic Manure (56.7%), Mulching (40%) and Mixed Farming (43.3%). Additionally, Cover Crops (45%), mixed farming (43.3%) and Intercropping (48.3%) was often Utilized whereas Irrigation (83.3%), Compost Making (45%), Improved fallowing (43.3%) was Not Utilized by the female respondents in the study area. This finding is in line with Assan *et al.,* (2018) who reported that male heads of farm households were generally more engaged and aware in adaptation practices than females.

**Table 4.3a: Awareness and Utilization of Climate Smart Agricultural Practice for Male Respondents**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Awareness Question** | | | **Yes** | **No** | **Remarks** |
| Are you aware of climate smart agricultural practices? | | | 54(90%) | 6(10%) | Mostly Aware |
| **Climate Smart Agricultural Practices** | **A.U.** | **O.U.** | **N.U.** | **Means** | **Remarks** |
| Agro-forestry | 41(68.3%) | 16(26.7%) | 3(5.0%) | **2.63** | **Always Utilized** |
| Crop Rotation | 33(55%) | 23(38.3%) | 4(6.7%) | **2.48** | **Always Utilized** |
| Mixed Cropping | 37(61.7%) | 19(31.7%) | 4(6.7%) | **2.55** | **Always Utilized** |
| Improved Crop Variety | 25(41.7%) | 26(43.3%) | 9(15%) | **2.27** | **Often**  **Utilized** |
| Intercropping | 30(50%) | 21(35%) | 9(15%) | **2.35** | **Always Utilized** |
| Compost Making | 25(41.7%) | 15(25%) | 20(33.3%) | **2.08** | **Always Utilized** |
| Improved fallowing | 28(46.7%) | 22(36.7%) | 10(16.7%) | **2.30** | **Always Utilized** |
| Organic Manure | 42(70%) | 14(23.3%) | 4(6.7%) | **2.63** | **Always Utilized** |
| Mulching | 31(51.7%) | 25(41.7%) | 4(6.7%) | **2.45** | **Always Utilized** |
| Cover Crops | 32(53.3%) | 18(30.0%) | 10(16.7%) | **2.37** | **Always Utilized** |
| Mixed Farming | 32(53.3%) | 21(35.0%) | 7(11.7%) | **2.42** | **Always Utilized** |
| Irrigation | 22(36.7%) | 6(10%) | 32(53.3%) | **1.83** | **Not Utilized** |

**\*A.U. – Always Utilized, O.U. –Often Utilized, N.U. – Not Utilized**

Source: Computed using field survey Data (2023)

**Table 4.3b: Awareness and Utilization of Climate Smart Agricultural Practice for female Respondents**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Awareness Question** | | | **Yes** | **No** | **Remarks** |
| Are you aware of climate smart agricultural practices? | | | 53(88.3%) | 7(11.3%) | Mostly Aware |
| **Climate Smart Agricultural Practices** | **A.U.** | **O.U.** | **N.U.** | **Means** | **Remarks** |
| Agro-forestry | 32(53.3%) | 10(16.7%) | 18(30%) | **2.23** | **Always Utilized** |
| Crop Rotation | 27(45%) | 23(38.3%) | 10(16.7%) | **2.28** | **Always Utilized** |
| Mixed Cropping | 34(56.7%) | 22(36.7%) | 4(6.7%) | **2.50** | **Always Utilized** |
| Improved Crop Variety | 47(78.3%) | 11(18.3%) | 2(3.3%) | **2.75** | **Always Utilized** |
| Intercropping | 22(36.7%) | 29(48.3%) | 9(15%) | **2.22** | **Often Utilized** |
| Compost Making | 24(40%) | 9(15%) | 27(45%) | **1.95** | **Not**  **Utilized** |
| Improved fallowing | 24(40%) | 10(16.7%) | 26(43.3%) | **1.97** | **Not**  **Utilized** |
| Organic Manure | 34(56.7%) | 21(35%) | 21(35%) | **2.48** | **Always Utilized** |
| Mulching | 24(40%) | 20(33.3%) | 16(26.7%) | **2.13** | **Always Utilized** |
| Cover Crops | 12(20%) | 27(45%) | 21(35%) | **1.85** | **Often Utilized** |
| Mixed Farming | 23(38.3%) | 26(43.3%) | 11(18.3%) | **2.20** | **Often Utilized** |
| Irrigation | 5(8.3%) | 5(8.3%) | 50(83.3%) | **1.25** | **Not**  **Utilized** |

**\*A.U. – Always Utilized, O.U. –Often Utilized, N.U. – Not Utilized**

Source: Computed using field survey Data (2023)

**4.4 Perceived Effects of Climate Smart Agricultural Practices (CSAPs) on Food Security**

Analysis was done to identify the observed perceived effects of Climate Smart Agricultural Practices on farming activities by the respondents in the study area as shown in Table 4.4a and Table 4.4b. Effort was also made to diagnose these observations according to gender. From Table 4.4a and Table 4.4b, the adoption was perceived to cause increased farm productivity (male =3.50, female =3.60), increase food security (male =3.40, female =3.57), improve household’s welfare (male = 3.45, female =3.53), increase in farm income (male =3.42, female =3.27), provide efficient techniques to control pest and diseases (male =3.03, female =3.48), enhance resilience and sustainability of our food system (male =2.90, female =3.00), ensure a stable and consistent food supply (male =3.33, female =3.23) and preservation of biodiversity and ecosystem (male =3.15, female =3.12). From this findings, it indicates that the perceived effect in both gender is strongly agrred and this finding agrees with the work of Oladele, (2019), Adekunle, (2019) and Akinbile, (2019) who found that the use of Climate Smart Agriculture practices increased crop yields and improved food security among smallholder farmers in Nigeria's savanna regions. Additonally, Mashi, (2019) also found that the adoption of Climate Smart Agriculture practices such as agroforestry and use of improved crop varieties led to increased crop yields and enhanced food security among smallholder farmers in Nigeria's arid regions.

**Table 4.4a: Perceived Effects of Climate Smart Agricultural Practices (CSAPs) on Food Security by the Male Respondents**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Perception Statement** | **S.A.** | **A.** | **D.** | **S.D.** | **Means** | **Remark** |
| Increased farm productivity | 39(65%) | 16(26.7%) | 1(1.7%) | 4(6.7%) | **3.50** | **Strongly Agreed** |
| Potential to increase food security | 38(63.3%) | 14(23.3%) | 5(8.3%) | 3(5.0%) | **3.40** | **Strongly Agreed** |
| Improved farming Household’s welfare | 38(63.3%) | 12(20%) | 6(10%) | 4(6.7%) | **3.45** | **Strongly Agreed** |
| Increased farm Income | 37(61.7%) | 15(25%) | 4(6.7%) | 4(6.7%) | **3.42** | **Strongly Agreed** |
| Pest and Disease Control | 19(31.7%) | 28(46.7%) | 9(15%) | 4(6.7%) | **3.03** | **Agreed** |
| Enhances Resilience and sustainability of our food systems | 20(33.3%) | 24(40%) | 6(10%) | 10(16.7%) | **2.90** | **Agreed** |
| Stable and consistent food supply | 27(45%) | 28(46.7%) | 3(5.0%) | 2(3.3%) | **3.33** | **Agreed** |
| Preservation of biodiversity and ecosystem services | 25(41.7%) | 22(36.7%) | 10(16.7%) | 3(5.0%) | **3.15** | **Strongly Agreed** |

**\*S.A. – Strongly Agreed, A. – Agreed, D. – Disagreed, S.D. – Strongly Disagreed**

Source: Computed using field survey Data (2023)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Perception Statement** | **S.A.** | **A.** | **D.** | **S.D.** | **Means** | **Remark** |
| Increased farm productivity | 37(61.4%) | 16(26.6%) | 4(6.8%) | 3(5.2%) | **3.60** | **Strongly Agreed** |
| Potential to increase food security | 32(53.4%) | 25(41.6%) | 2(3.3%) | 1(1.7%) | **3.57** | **Strongly Agreed** |
| Improved farming Household’s welfare | 32(53.4%) | 26(43.2%) | 1(1.7%) | 1(1.7%) | **3.53** | **Strongly Agreed** |
| Increased farm Income | 20(33.2%) | 30(50%) | 7(11.7%) | 3(5.1%) | **3.27** | **Agreed** |
| Pest and Disease Control | 33(55%) | 20(33.2%) | 4(6.7%) | 3(5.1%) | **3.48** | **Strongly Agreed** |
| Enhances Resilience and sustainability of our food systems | 23(38.3%) | 22(36.7%) | 7(11.7%) | 8(13.3%) | **3.00** | **Strongly Agreed** |
| Stable and consistent food supply | 18(30%) | 36(60%) | 4(6.7%) | 2(3.3%) | **3.23** | **Agreed** |
| Preservation of biodiversity and ecosystem services | 29(48.3%) | 19(31.7%) | 2(3.3%) | 10(16.7%) | **3.12** | **Strongly Agreed** |

**Table 4.4b: Perceived Effects of Climate Smart Agricultural Practices (CSAPs) on Food Security by the Female Respondents**

**\*S.A. – Strongly Agreed, A. – Agreed, D. – Disagreed, S.D. – Strongly Disagreed**

Source: Computed using field survey Data (2023)

**4.5: Constraints to Climate Smart Agricultural Practices Adoption**

As shown on Table 4.5a and Table 4.5b, the constraints to climate Smart Agricultural Practices Adoption was examined. The constraints that limits it adoption includes; lack of awareness (male =2.58, female =2.22), poor extension service (male =2.30, female =2.07), low dissemination of information (male =2.30, female =2.18), limited availability of equipment (male =2.68, female =2.13), illiteracy of farmers (male =2.22, female =2.30), limited availability of inputs (male =2.58, female =2.30), inadequate financial resource (male =2.55, female =2.53), poor technical capacity of farmers (male =2.55, female =2.40), lack of access to agricultural credit (male =2.50, female =2.63), high cost of improve crop variety (male =2.53, female =2.37), non-availability of farm labor (male =2.43, female =2.08), lack of inadequate government policy (male =2.63, female =2.15), high cost of production (male =2.47, female =2.55), pest and disease (male =2.40, female =2.43), shortage of labor (male =2.43, female =2.27), high cost of input (male =2.48, female =2.08) and lack of improved storage facilities (male =2.50, female =2.42). From this findings, it indicate that the constraints affecting the adoption of Climate Smart Agricultural Practices Adoption in the study area is serious among the male and female respondents and this findings is in line with Onuoha and Akachukwu, (2021), Akinnifesi *et al.,* (2021) who found out that the challenges affecting the adoptin of climate smart agricultural practices includes majority of the abovementioned constraints among the male and female farmers.

**Table 4.5a: Constraints to Climate Smart Agricultural Practices Adoption by the male Respondents**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Constraints** | **V.S.** | **S.** | **N.S.** | **Means** | **Remark** |
| Lack of Awareness of CSA | 36(60%) | 23(38.3%) | 1(1.7%) | **2.58** | **Very Serious** |
| Poor Extension Services | 28(46.7%) | 22(36.7%) | 10(16.7%) | **2.30** | **Very Serious** |
| Low Information Dissemination | 28(46.7%) | 22(36.7%) | 10(16.7%) | **2.30** | **Very Serious** |
| Limited Availability of Equipment | 41(68.3%) | 18(30%) | 1(1.70%) | **2.68** | **Very Serious** |
| Illiteracy of farmers | 22(36.7%) | 29(48.3%) | 9(15%) | **2.22** | **Serious** |
| Limited availability of inputs | 39(65%) | 17(28.3%) | 4(6.7%) | **2.58** | **Very Serious** |
| Inadequate financial resource | 35(58.3%) | 23(38.3%) | 2(3.3%) | **2.55** | **Very Serious** |
| Poor technical capacity of farmers | 36(60%) | 21(35%) | 3(5.0%) | **2.55** | **Very Serious** |
| Lack of access to agricultural credit | 30(50%) | 28(46.7%) | 2(3.3%) | **2.47** | **Very Serious** |
| High cost of improved crop variety | 34(56.7%) | 24(40%) | 2(3.3%) | **2.53** | **Very Serious** |
| Non-availability of farm labor | 29(48.3%) | 28(46.7%) | 3(5%) | **2.43** | **Very Serious** |
| Lack of inadequate government policy | 39(65%) | 20(33.3%) | 1(1.7%) | **2.63** | **Very Serious** |
| High cost of production | 30(50%) | 28(46.7%) | 2(3.3%) | **2.47** | **Very Serious** |
| Pest and Diseases | 29(48.3%) | 26(43.3%) | 5(8.3%) | **2.40** | **Very Serious** |
| Shortage of labour | 28(46.7%) | 30(50%) | 2(3.3%) | **2.43** | **Serious** |
| High cost of input | 31(51.7%) | 27(45%) | 2(3.3%) | **2.48** | **Very Serious** |
| Lack of improved storage facilities | 34(56.7%) | 22(36.7%) | 4(6.7%) | **2.50** | **Very Serious** |

**\*V.S. – Very Serious, S. – Serious, N.S. – Not Serious**

Source: Computed using field survey Data (2023)

**Table 4.5b: Constraints to Climate Smart Agricultural Practices Adoption by the female Respondents**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Constraints** | **V.S.** | **S.** | **N.S.** | **Means** | **Remark** |
| Lack of Awareness of CSA | 27(45%) | 19(31.7%) | 14(23.3%) | **2.22** | **Very Serious** |
| Poor Extension Services | 14(23.3%) | 36(60%) | 10(16.7%) | **2.07** | **Serious** |
| Low Information Dissemination | 27(45%) | 17(28.3%) | 16(26.7%) | **2.18** | **Very Serious** |
| Limited Availability of Equipment | 23(38.3%) | 22(36.7%) | 15(25%) | **2.13** | **Very Serious** |
| Illiteracy of farmers | 31(51.7%) | 16(26.7%) | 13(21.7%) | **2.30** | **Very Serious** |
| Limited availability of inputs | 23(38.3%) | 32(53.3%) | 5(8.3%) | **2.30** | **Serious** |
| Inadequate financial resource | 34(56.7%) | 23(38.3%) | 3(5%) | **2.53** | **Very Serious** |
| Poor technical capacity of farmers | 26(43.3%) | 32(53.3%) | 2(3.3%) | **2.40** | **Serious** |
| Lack of access to agricultural credit | 42(70%) | 13(21.7%) | 5(8.3%) | **2.63** | **Very Serious** |
| High cost of improved crop variety | 30(50%) | 22(36.7%) | 8(13.3%) | **2.37** | **Very Serious** |
| Non-availability of farm labor | 23(38.3%) | 19(31.7%) | 18(30%) | **2.08** | **Very Serious** |
| Lack of inadequate government policy | 19(31.7%) | 31(51.7%) | 10(16.7%) | **2.15** | **Serious** |
| High cost of production | 37(61.7%) | 19(31.7%) | 4(6.7%) | **2.55** | **Very Serious** |
| Pest and Diseases | 35(58.3%) | 16(26.7%) | 9(15%) | **2.43** | **Very Serious** |
| Shortage of labour | 27(45%) | 22(36.7%) | 11(18.3%) | **2.27** | **Very Serious** |
| High cost of input | 17(28.3%) | 31(51.7%) | 12(20%) | **2.08** | **Serious** |
| Lack of improved storage facilities | 33(55%) | 19(31.7%) | 8(13.3%) | **2.42** | **Very Serious** |

**\*V.S. – Very Serious, S. – Serious, N.S. – Not Serious**

Source: Computed using field survey Data (2023)

**TEST FOR HYPOTHESIS**

**CHAPTER FIVE**

**SUMMARY, CONCLUSION AND RECOMMENDATION**

**5.1 SUMMARY**

The study stud analyzed the technical, economic and allocative efficiency among cassava farmers in Abak Local Government Area, Akwa Ibom State, Nigeria. The specific objectives were to; describe the socioeconomic characteristics of cassava farmers in the study area; determine the technical, economic and allocative efficiency of cassava farmers in the study area; analyze the profitability of cassava farming in the study area; estimate the determinants of technical and economic efficiency among cassava farmers in the study area; and examine constraints militating against cassava production in the study area.

The result of socioeconomic characteristics showed that greater proportion (51.7%) of the sampled respondents in the study area were male. The mean age, household size, farming experience, and farm size of the sampled respondents were 39 years, 4 persons, 6 years and 1.9 hectares, respectively.

The mean, maximum and minimum technical efficiency were 0.73, 0.95 and 0.38 while the mean, minimum and maximum economic efficiency for cassava production were 0.72, 0.35 and 1.00 respectively. The ratios of the marginal value product to marginal factor cost of labour (16.867) and cassava cutting (3.369) were greater than 1, signifying under-utilization of resources while farm size (0.190), and herbicide (-0.545) were over utilized.

The result shows that the total variable cost was estimated to be ₦147,947 per farmer. The total revenue was valued at ₦535,288.33 per farmer. The gross margin was calculated by subtracting the total variable cost from total revenue which gave ₦387,341.25 per farmer while the gross margin per hectare was ₦261,717.25 indicating cassava production was profitable.

The results of the estimated stochastic production function and the determinants of technical inefficiency showed that farm size (p<0.01), cuttings (p<0.01) and labour (p<0.01) were found to be significant inputs in cassava production while household size (p<0.1), education (p<0.01), monthly income (p<0.01), membership of cooperative (p<0.01), access to credit (p<0.01), access to extension services (p<0.1), and (p<0.05) were the determinants of technical inefficiency of cassava production in the study area.

The results of the estimated stochastic production function and the determinants of economic inefficiency showed that labour (p<0.01) was found to be significant input in cassava production while age (p<0.01), household size (p<0.05), education (p<0.01), farming experience (p<0.05), and access to extension (p<0.01) were the determinants of economic inefficiency of cassava production in the study area.

Based on constraints militating against cassava production, the result showed that high cost of fertilizer (13.7%), theft (13.7%), lack of access to credit (13.7%), inadequate access to land (13.7%), and poor road network (13.7%) were the major constraints militating against cassava production while poor extension services (9.3%) and high cost of labour (8.5%) were the least constraints militating against cassava production in the study area.

**5.2 Conclusion**

The study investigated the technical, economic and allocative efficiency of cassava production in Abak Local Government Area, Akwa Ibom State, Nigeria. The result showed that cassava farmers in the study area were moderately technically and economically efficient but were allocatively inefficient. The result of the allocative efficiency showed that none of the respondents achieved absolute efficiency of resource use as they either underutilized or over utilized the farm resources. The over utilized resources were herbicide, and farm size, while the underutilized resources were cuttings and labour. This showed that none of the production inputs was optimally allocated and utilized. In spite of the constraints faced by farmers in the study area, the result from the analysis of this study showed that the cassava farming was profitable, although farmers still have the potential to improve their performance in the study area.

**5.3 Recommendations**

Based on the findings of the study, the following recommendations are suggested;

1. Effective agricultural policies and programmes should focus on granting farmers improved access to farm credit and subsidized inputs as these would enable them increase their production efficiencies positively in the area.
2. There is need therefore for training and re-training of extension agents on improved production and management practices to enable them disseminate same to farmers on the need to use available resources efficiently.
3. Cassava farmers should be assisted to organize themselves into groups/ cooperatives in order to access credit facilities and land for cultivation.

**REFERENCES**

Abegunde, A. A. (2019). Adoption of climate-smart agriculture practices and food security among smallholder farmers in Nigeria. *Sustainable Agriculture Research*, 8(2), 1-16.

Adekunle, A. A., (2019). Climate-smart agriculture practices and food security in the arid

Akinnifesi, F.K., Mekonnen, K., and Mulugeta, G. (2019). Gender Policy Analysis of Agricultural Policies and Programs in Nigeria: Implications for Women Farmers*. Journal of Agricultural Extension,* 23(2), 17-32.

Akinwumi, I.A., Adegboye, M.A., and Adeboye, A.O. (2020). Gender Perspective and Adoption of Climate-Smart Agriculture Practices among Smallholder Farmers in Southwestern Nigeria. *Journal of Agricultural Extension*, 24(1), 70-86.

Alabi, A.O., Togun, A.O., and Olukole, S.G. (2020). Determinants of Climate-Smart Agricultural Practices among Farmers in Oyo State, Nigeria. *Journal of Agricultural Extension*, 24(1), 87-101.

Alawode, O., Adepoju, A. O., & Taiwo, O. A. (2019). Assessing the Agricultural Development and Food Security Policies in Nigeria. *Journal of Contemporary Research in Social Sciences*, 1(2), 1-11.

Andrieu, N. (2018). *Climate-smart agriculture and rural livelihoods: Synthesis of seven country case studies.* International Water Management Institute.

Assan, E.1, Murari Suvedi, I.D, Olabisi, L.S and Allen, A. (2018). Coping with and Adapting to Climate Change: A Gender Perspective from Smallholder Farming in Ghana.

Awoke, U.G., Ogundari, K., Adeyemo, R., Ndubuisi, E.C. and Alimi, T. (2018). Constraints to the Adoption of Climate Smart Agriculture Practices in Nigeria: Evidence from a Survey of Farmers. *Interdisciplinary Journal of Agricultural and Food Sciences,* 4(1), pp.44-53.

Ayoola, G. B., (2018). Climate smart agriculture and food security in Nigeria’s forested regions. *Natures Sciences Societies,* 26(1), 41-54.

Babatunde, O. M., Akinpelu, O. A., & Adejobi, K. B. (2020). Climate-smart agriculture as a tool for enhancing crop diversification in Nigeria. *Environmental Science and Pollution Research,* 27(19), 24387-24399.

Bem, S. L. (1981). Gender schema theory: A cognitive account of sex typing. Psychological Review, 88(4), 354-364.

Chukwuji, C. N.; Tsafe, A. G.; Sayudi, S.,; Yusuf, Z.; and Zakariya, J.(2019). "Awareness, Access and Utilization of Information on Climate Change by Farmers in Zamfara State, Nigeria". Library Philosophy and Practice (e-journal). 2106. <https://digitalcommons.unl.edu/libphilprac/1771>

Ekanem J., Ekerete & Umoh I. (2020). Gender Role Analysis in Extent of Climate Change Adaptation among Arable Crop Farmers in Abak Agricultural Zone, Akwa Ibom State, Nigeria. Journal of Community & Communication Research, Vol. 5 No.2

Enun, D.I., Ugbogu, A.E., Alamba, C.A., and Okwara, U.E. (2021). Gender Disparities in Access to Extension Services and Climate-Smart Agricultural Practices: Evidence from Nigeria. *Journal of Agricultural Extension,* 25(1), 72-84.

Falaki, S. A., Atekwana, E. A., & Olaleye, A. O. (2019). Climate-Smart Agriculture and Extension Delivery in Nigeria: Opportunities and Challenges. *Journal of Agricultural Extension and Rural Development,* 11(7).

FAO. (2019). *Climate-smart livestock production: A toolkit for estimating greenhouse gas emissions from tropical livestock systems.* Rome: FAO.

FAO. (2020). *The State of Food and Agriculture 2020*. https://doi.org/10.4060/ca9692en

Food and Agriculture Organization of the United Nations (FAO). (2021*). Food security. Retrieved from http://www.fao.org/food/food-security/en/*

Gerbner, G., Gross, L., Morgan, M., & Signorielli, N. (1986). Living with television: The dynamics of the cultivation process. Perspectives on media effects, 17(2), 17-40.

Ibrahim, Y.B., Babatunde, R.O., Adol, S.M. and Amusa, O.O. (2019). Barriers to adoption of climate smart agricultural practices in the northern Guinea savanna of Nigeria. *Journal of Agricultural Extension and Rural Development,* 11(3), pp.43-54.

International Food Policy Research Institute (IFPRI). (2021). *Food Security. Retrieved from https://www.ifpri.org/topic/food-security*

Kabir, P. H., Shahid, S. A., & Huq, S. M. I. (2019). Ecological sustainability of conservation agriculture in Bangladesh: A review. *Agricultural and Forest Meteorology*, 264, 63-74.

Lorber, J. (1994). Paradoxes of gender. Yale University Press.

Mashi, S. A. (2019). Climate-smart agriculture and food security in Nigeria's arid region. *Journal of Agricultural and Environmental Sciences,* 8, 117-130.

Mercy Corps. (2019). *Promoting Climate Smart Agriculture in Nigeria: Adopting Innovative Approaches to Build Resilience and Improve Livelihoods.*

Mukoya W, 1 and Mulinya C.1 (2018). Gender Roles in Climate Change Adaptation of Crop Production in Vihiga Sub-County, Kenya. *IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT) Volume 12, Issue 9 Ver. III*

Ngigi, M., Mwai, M., Beyene, S., & Kariuki, J. (2019). Gender implications of adopting climate smart agricultural practices in smallholder farming systems: the case of Embu, Kenya. *Environmental Development,* 31, 92–103. *https://doi.org/10.1016/j.envdev.2019.02.003*

Nkeme, K. K. (2016). Assessment of Farmers’ Adoption of Climate Change Mitigation Technologies in Uyo Agricultural Zone of Akwa Ibom State, Nigeria. *JAERI, 7(3): 1-9.*

Nkeme, K. K. (2021). Food Security and Changing Climatic Condition of Rural Farming Households in Niger Delta, Nigeria. AKSU Journal of Agriculture and Food Sciences 5 (2): 49-59.

Niles, M.T., Lubell, M., and J. King. (2018). What are the barriers and incentives for the adoption of climate smart agriculture in sub-Saharan Africa and South Asia? *Agriculture and Food Security,* 7(1), 61.

Odeyemi, O., and Ogungbade, S. (2019). Gender Differences in Adoption of Climate-Smart Agricultural Practices among Smallholder Farmers in Nigeria. *African Journal of Agriculture,* 14(1), 22-32.

Ogundele, O. O., & Ogunleye, A. O. (2018). The Effect of Infrastructure on Agricultural Output in Nigeria. *Global Journal of Management and Business Research: E-Marketing,* 18(3), 1-9.

Oladele, O. I. (2019). Climate-smart agriculture and food security in southwestern Nigeria. *Journal of Agriculture and Rural Development in the Tropics and Subtropics,* 120(2), 109-118.

Oladele, O.I. and Ojo, T.M (2018). Factors influencing adoption of climate-smart agricultural practices in Ogun State, Nigeria. *African Journal of Agricultural Research,* 13(34), pp.1734-1741.

Olaoye, O. A., Olaleye, S. A., & Adekunjo, O. A. (2021). Food Insecurity Amidst COVID-19 Pandemic in Nigeria: Impacts, Drivers, and Strategies for Mitigation. International *Journal of Sociology and Anthropology Research,* 6(1), 1-11.

Oluwasanya, O.A. and Lawal, B.A., (2018). Drivers and barriers of climate smart agriculture implementation in Nigeria. *Journal of Agricultural Extension,* 22(1), pp.73-85.

Omonona, B. T., Fabiyi, Y. L., Amodu, O. S., & Ogunleye, A. J. (2018). Poverty and Food Insecurity in Rural Nigerian Households: A Case Study of Oyo State. *Journal of Development and Agricultural Economics,* 10(6), 178-189.

Onuoha, C.C., and Akachukwu, E.N. (2021). Assessment of Climate-Smart Agriculture Practices and Household Food Security Status of Women Farmers in Southeast Nigeria. *Journal of Agricultural Extension,* 25(1), 18-30.

Oyinbo, O., Adetunji, O., Okafor, C., & Afolayan, O. (2018). Agricultural transformation agenda in Nigeria: Policies, actions and results. *Agricultural Sciences,* 9(3), 332-346.

Rashid, M. (2018). Conservation agriculture intensification and smallholder farmers’ livelihood: Evidence from northern Nigeria. *Land Use Policy,* 72, 391-399.

Sugihardjo I, Sutrisno J, Setyono P. and Suntoro I. (2018). Climate change and farmers’ cropping patterns in Cemoro watershed area, Central Java, Indonesia. *IOP Conference Series: Earth and Environmental Science; Earth Environ. Sci*. 129 012033.

Thornton, P.K., Whitbread, A.M., Baedeker, T., Cairns, J., Claessens, L., Baethgen, W., , (2018). A framework for priority-setting in climate-smart agriculture research*. Agricultural Systems,* 167, 161-175

Ubokudom E Okon, Namso N Frank, Egbe B Etowa, Kesit K Nkeme (2017). Household level food security status and its determinants among rural farmers in Akwa Ibom State, Nigeria. Agricultural Science Research Journal 7 (10), 297-303.

Umeh, J. C. (2020). Insurgency and Agricultural Productivity in Nigeria: A Review. *Arabian Journal of Business and Management Review,* 10(6), 1-9.

Unongo, E. J., & Ijogi, A. N. (2018). Agricultural Productivity in Nigeria: Trends, Determinants, and Challenges. *International Journal of Development and Economic Sustainability,* 6(1), 13-24

Wekesa, B., Oscar I. and Job K. (2018). Effect of climate‑smart agricultural practices on household food security in smallholder production systems: micro‑level evidence from Kenya. *Agric & Food Secur (2018) 7:80*

West, C., & Zimmerman, D. H. (1987). Doing gender. Gender & Society, 1(2), 125-151.

WFP (2020). World Food Programme Nigeria. *Retrieved from https://www.wfp.org/countries/nigeria*