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Exploring the Root Causes of Low Household Income among Smallholder Farmers in Kamuli District, Busoga Region, Uganda

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Date Published: ABSTRACT

27 May 2024 This study investigated the root causes of low household incomes among smallholder farmers in Kamuli District, Busoga Region, Uganda.

Keywords: Employing a mixed methods approach, the research integrated quantitative and qualitative data collection methods to comprehensively

Smallholder Farmers, explore the factors influencing household income. The study population comprised 100 smallholder farmers and 20 key informants, totalling 120

Household Incomes, respondents. Simple random sampling and purposive sampling were used to select respondents. Data analysis was conducted using SPSS, and

Agricultural Practices, reliability statistics indicated a high level of internal consistency among survey items. Qualitative data was analysed by using thematic analysis.

Environmental Shocks, The findings revealed significant challenges faced by smallholder farmers in Kamuli District. These challenges were categorized into agricultural

Kamuli District, production practices and technologies, institutional factors and market dynamics, and environmental factors and shocks. Limited adoption of

Busoga Region modern agricultural practices, poor market access, and climate variability emerged as key impediments to income generation. Possible strategies to

address these challenges were identified, including the adoption of modern agricultural practices, investment in training and extension services,

infrastructure improvements, access to credit, and establishment of farmer cooperative associations. These strategies aimed to enhance agricultural

productivity, market access, and resilience to environmental shocks. The study underscored the interconnectedness of challenges faced by

smallholder farmers and emphasized the need for integrated interventions involving technological innovations, institutional reforms, and climate

adaptation measures. Collaboration among stakeholders was essential to implement effective solutions and promote sustainable development in

agricultural communities. By addressing the root causes of low household income, this study sought to contribute to poverty reduction and food

security in Kamuli District and beyond.

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INTRODUCTION

Smallholder farmers play a critical role in agricultural production and food security in many regions of sub-Saharan Africa, including the Busoga region of Uganda. Despite their importance, smallholder farmers in Busoga often face significant challenges in earning adequate household income, perpetuating the cycle of poverty and food insecurity (Nampala et al., 2017). The sustainability of rural livelihoods and the region's overall economic development depend on addressing these challenges and improving the economic well-being of smallholder farmers. Therefore, understanding the root causes of low household incomes among smallholder farmers in the Busoga region is crucial for targeted interventions and policy reforms to improve their livelihoods.

Smallholder farmers in rural Uganda face subsistence economy, with insufficient wages, insufficient returns, and living below poverty. The majority of these households have primary level education, but have not completed the primary section, according to the Uganda National Survey Report. Uganda National Survey Report, (2019/2020).

The Busoga region is characterized by a predominantly agrarian economy, with agriculture being the main source of livelihood for the majority of the population (Nabuuma et al., 2019). Smallholder farmers in the region engage in various agricultural activities, including crop farming, livestock breeding and fishing, to

support their households. However, despite the region's agricultural potential, productivity and income of smallholder farmers in Busoga remain low, further leading to poverty and vulnerability (Okonya & Kroschel, 2017). Factors such as limited access to resources, market restrictions, environmental shocks and inadequate support from government agencies contribute to the ongoing challenges faced by smallholder farmers in the region.

Investigating the root causes of low household income among smallholder farmers in the Busoga region has significant implications for rural development, poverty reduction and food security. By identifying the underlying factors that lead to income disparities and economic vulnerability among smallholder farmers, this study aims to support evidence-based interventions and policy initiatives that address the root causes of poverty and promote sustainable livelihoods. Furthermore, understanding the specific challenges faced by smallholder farmers in Busoga can contribute to broader discussions on agricultural development strategies, rural transformation and inclusive growth in sub-Saharan Africa.

The main objective of this study was to examine the root causes of low household income among smallholder farmers in Busoga region. Specifically, the study aims to identify the key factors that contribute to low household incomes among smallholder farmers in Busoga. Investigate the underlying mechanisms and processes that lead to income disparities and economic

vulnerability among smallholder farmers. Explore possible ways to improve the economic well-being and livelihoods of smallholder farmers in the region. By addressing these research objectives, this study aims to generate empirical evidence and actionable insights that can inform policy, practice and future research aimed at improving the livelihoods of smallholder farmers in the Busoga region.

LITERATURE REVIEW

This literature review critically examines existing research on the factors affecting smallholder household income in similar contexts, focusing on topics such as access to resources, agricultural practices, market dynamics, government policies and environmental factors. By synthesizing and analysing the relevant literature, this review aims to identify the key drivers of low household incomes and provide insights into possible ways to improve farmers' livelihoods in the Busoga region.

The literature on factors affecting household income of smallholder farmers in the Busoga region includes various theoretical perspectives, empirical studies and conceptual frameworks. Several key theories have been proposed to explain the dynamics of agricultural livelihoods, including the Sustainable Livelihoods Framework (SLF), the Agricultural Household Model (AHM), and the Social Capital Theory (SCT).

The Sustainable Livelihoods Framework (SLF) provides a comprehensive framework for understanding the complex interactions between assets, strategies and outcomes in rural livelihood systems (DFID, 1999). According to SLF, household incomes are influenced by a number of factors including human capital (skills and education), social capital (networks and relationships), natural capital (land and resources), physical capital (infrastructure and technology) and financial capital (income and savings). Empirical studies applying the SLF in the context of smallholder agriculture have identified asset depletion, limited access to resources and vulnerability to shocks as key

factors contributing to low household incomes (Ellis, 2000; Bebbington, 1999).

In addition to the SLF, the Agricultural Household Model (AHM) provides insights into the decision-making processes of smallholder farmers and their resource allocation across various livelihood activities (Singh et al., 1986). The AHM assumes that households optimize their utility by allocating labour, land, and other resources to various agricultural and non-agricultural activities based on factors such as market opportunities, risk preferences, and social norms. Empirical studies using the AHM have highlighted the importance of off-farm employment, non-farm income sources and household composition in determining smallholder household income (Doss, 2006; Barrett et al., 2001). Additionally, social capital theory (SCT) emphasizes the role of social networks, trust, and reciprocity in facilitating access to resources, information, and support in rural communities (Putnam, 1993). According to SCT, strong social capital promotes collective action, reduces transaction costs and improves economic outcomes for individuals and households. However, empirical studies have found mixed evidence on the effects of social capital on smallholder farmers' household income. Some studies emphasize its positive effects on agricultural productivity and market access, while others point to limitations such as exclusionary practices and elite capture (Pretty & Ward, 2001; Bebbington, 1999).

Despite the contributions of these theoretical perspectives and empirical studies, the literature on household incomes of smallholder farmers in the Busoga region also has notable gaps, debates and controversies. A major gap is the limited attention paid to gender dynamics and power relations within households that influence access to resources, decision-making processes and income distribution (Quisumbing et al., 2001). Furthermore, debates continue about the effectiveness of market-oriented interventions such as value chain development and contract farming in improving smallholder farmers' incomes. Some studies highlight positive outcomes, while others point to risks of

exploitation and market dependence (Reardon et al., 2001; Key & Runsten, 1999).

While theories such as the Sustainable Livelihoods Framework, the Agricultural Household Model and Social Capital Theory provide valuable insights. There are gaps and debates in the determinants of household income of smallholder farmers in the Busoga region, and controversies in the literature highlight the need for further research and nuanced analysis. By addressing these gaps and addressing ongoing debates, future studies can contribute to a more comprehensive understanding of the factors affecting smallholder farmers' livelihoods and enable targeted interventions to improve their economic well-being.

Agricultural Production Practices and Technologies

Smallholder farmers in the Busoga region face significant challenges in adopting modern agricultural practices and technologies that are critical to increasing productivity and improving household incomes. In this section of the literature review, we review the existing literature and evaluate the implications of the existing knowledge to explain the phenomena.

Several studies have highlighted the impact of high input costs on the adoption of modern agricultural practices among smallholder farmers in Uganda. Nakawuka et al. (2020) found that the high cost of agricultural inputs such as improved seeds, fertilizers and pesticides is a significant barrier to adoption for farmers in Busoga. Limited access to affordable credit exacerbates this problem as farmers often lack the financial resources to invest in costly inputs (Ahebwa et al., 2020). Without access to these inputs, smallholder farmers struggle to increase their agricultural productivity and generate sufficient income to support their households.

Inadequate access to extension services further compounds the challenges faced by smallholder farmers in Busoga. Extension services play a crucial role in disseminating agricultural knowledge, providing technical assistance and

facilitating the adoption of modern agricultural practices and technologies. However, research shows that extension services in Uganda, including the Busoga region, are often limited in terms of coverage, reach and effectiveness (Akullo et al., 2017). Farmers may face challenges in accessing extension resources, receiving timely information and receiving practical training on modern agricultural techniques. As a result, many smallholder farmers continue to rely on traditional farming methods, which result in lower productivity and income.

Limited adoption of modern agricultural practices and technologies due to high input costs and lack of access to extension services are linked. High input costs discourage farmers from investing in new technologies, while inadequate extension services limit their awareness and understanding of these technologies. The combination of these factors creates a vicious circle in which smallholder farmers remain trapped in subsistence farming, unable to break out of poverty and improve their household income.

To promote the adoption of modern agricultural practices among smallholder farmers in the Busoga region, the barriers of high input costs and inadequate access to extension services need to be addressed. Policymakers and stakeholders need to prioritize interventions aimed at reducing input costs, improving access to affordable credit and strengthening extension services. By addressing these systemic challenges, it is possible to unlock the potential of smallholder farmers, increase agricultural productivity and improve rural livelihoods in Busoga.

Access to agricultural inputs such as high-quality seeds, fertilizers and pesticides is crucial for smallholder farmers to improve their productivity and crop yields. However, studies have shown that smallholder farmers in the Busoga region often face difficulties in accessing these inputs. High input costs, inadequate supply chains and limited availability of inputs in rural areas contribute to the obstacles faced by farmers (Nakawuka et al., 2020).

Lack of access to agricultural inputs forces farmers to rely on traditional farming methods that are less efficient and provide lower production volumes. As a result, small farmers struggle to achieve optimal crop yields, leading to lower incomes and increased vulnerability to poverty.

Access to credit is another crucial factor affecting smallholder farmers' ability to invest in improved farming methods. Without access to affordable credit, farmers find it difficult to purchase necessary inputs, invest in irrigation systems or adopt modern agricultural technologies. High interest rates, stringent credit requirements and limited financial knowledge further exacerbate farmers' challenges in accessing credit (Ahebwa et al., 2020).

Lack of access to credit limits farmers' ability to make productive investments in their farms, affecting their ability to adopt improved agricultural practices and technologies. As a result, smallholder farmers remain trapped in a cycle of low productivity and limited income generation, which perpetuates rural poverty in the Busoga region. The interaction between limited access to agricultural inputs and credit further exacerbates the challenges faced by smallholder farmers in Busoga. Farmers who do not have access to inputs often have difficulty obtaining loans because they cannot provide collateral or prove creditworthiness. Conversely, farmers who lack credit may not be able to invest in agricultural inputs.

Traditional farming methods such as monoculture, manual farming and reliance on rainfed farming are widespread among smallholder farmers in Busoga. These methods are often characterized by low productivity, limited diversification and vulnerability to external shocks such as pests, diseases and climate fluctuations (Okonya & Kroschel, 2017).

The Busoga Region is vulnerable to climate variability, including changes in rainfall patterns, temperature fluctuations and extreme weather events. Small farmers who rely on traditional

farming methods are particularly exposed to the effects of climate change. Erratic rainfall, prolonged droughts and unpredictable weather conditions can lead to crop failures, lower yields and loss of income (Nabuuma et al., 2019).

Despite the challenges posed by climate variability, smallholder farmers in Busoga often lack access to appropriate adaptation strategies and technologies. The adoption of climate-smart agricultural practices such as conservation agriculture, agroforestry and drought-resistant crop varieties remains limited among farmers in the region (Nakawuka et al., 2020).

Over-reliance on traditional farming methods has a significant impact on the household income of smallholder farmers in Busoga. Low agricultural productivity, coupled with vulnerability to climate shocks, leads to lower crop yields and income instability. As a result, smallholder farmers struggle to meet their basic needs, invest in their farms, or deal with economic shocks, perpetuating a cycle of poverty in rural communities (Nampala et al., 2017).

Existing studies have delved into the challenges encountered by smallholder farmers in adopting modern agricultural practices and technologies, citing limited access to inputs and knowledge barriers. Mugambe et al. (2019) highlight the struggles faced by smallholder farmers in Uganda, particularly in the Busoga region, where they grapple with restricted access to quality seeds, fertilizers, and agricultural machinery. Similarly, research by Nkonya et al. (2011) emphasizes the knowledge gaps and resource constraints hindering the adoption of improved agricultural technologies among smallholder farmers in Uganda.

However, there is a lack of comprehensive analysis regarding the specific constraints hindering the adoption of modern practices and technologies among smallholder farmers in Kamuli district, Busoga region, Uganda. While existing studies provide valuable insights into the broader challenges faced by smallholder farmers in adopting modern agricultural practices, they

often lack granularity in examining the unique context of Kamuli district. Factors such as socio-economic conditions, local farming traditions, and infrastructural limitations specific to Kamuli district may present distinct barriers to the adoption of modern agricultural practices, which necessitates a focused investigation. Therefore, the identified gap underscores the need for research that offers a nuanced understanding of the challenges faced by smallholder farmers in Kamuli district when it comes to adopting modern agricultural practices and technologies.

Institutional Factors and Market Dynamics

Poor market access due to inadequate infrastructure, particularly a poor road network, has a significant impact on the household income of smallholder farmers in the Busoga region. This literature review examines the diverse challenges faced by farmers and the impact on their economic well-being.

The Busoga region of Uganda is characterized by a lack of adequate infrastructure, particularly in terms of road networks connecting rural areas to markets. Poor road conditions, limited transport options and inadequate storage facilities make it difficult for smallholder farmers to access markets, sell their products and obtain fair prices for their goods (Kwesiga et al., 2019).

Inadequate road network in Busoga limits opportunities. The flow of agricultural commodities to markets leads to inefficiencies in agricultural trade and reduced market integration. Smallholder farmers often face challenges in transporting their products to distant markets, resulting in high transportation costs, post-harvest losses and limited market opportunities (Waiswa et al., 2018).

The poor road network exacerbates market price volatility for smallholder farmers in Busoga. Limited market access and transportation restrictions lead to uneven supply and demand dynamics and cause price fluctuations, which negatively impact farmers' income stability. Without reliable access to markets, farmers struggle to negotiate fair prices for their products,

leading to income insecurity and financial vulnerability (Kwesiga et al., 2019).

In addition to physical barriers, inadequate infrastructure also affects smallholder farmers' access to market information and price transparency. Limited connectivity and communication networks make it difficult for farmers to access timely market information, track price trends and make informed marketing decisions. As a result, farmers may miss profitable market opportunities and struggle to optimize their income-generating activities (Waiswa et al., 2018).

Smallholder farmers in Busoga often face challenges in obtaining timely and accurate market information. Limited connectivity, inadequate communication networks and low literacy levels hinder farmers' ability to access market data, track price trends and make informed marketing decisions (Waiswa et al., 2018). As a result, farmers may miss profitable market opportunities and have difficulty negotiating fair prices for their products.

Market inefficiencies contribute to price volatility and create uncertainty for smallholder farmers in Busoga. Fluctuations in market prices, influenced by factors such as supply and demand dynamics, seasonality and external shocks, make it difficult for farmers to predict their income levels and plan their agricultural activities effectively (Kwesiga et al., 2019). Price volatility can lead to income instability and financial vulnerability, particularly for farmers with limited resources and risk management mechanisms.

The lack of market information and price volatility have a direct impact on the income generation of smallholder farmers in Busoga. Without access to reliable market data, farmers may struggle to optimize their sales strategies, resulting in suboptimal prices and lower profitability. Furthermore, price fluctuations can weaken farmers' purchasing power and reduce the overall value of their agricultural products, further exacerbating income problems (Kwesiga et al., 2019).

Market inefficiencies also impact smallholder farmers' access to market intermediaries such as traders and buyers, who play a crucial role in connecting farmers to markets. Limited competition between intermediaries, asymmetric information and exploitative market practices can disadvantage smallholder farmers and undermine their bargaining power (Waiswa et al., 2018). As a result, farmers may receive lower prices for their products and struggle to secure a fair share of the market value chain.

Government policies and regulations play a critical role in shaping the livelihoods of smallholder farmers in the Busoga region of Uganda. However, inadequate support in key areas such as access to agricultural extension services and credit facilities has a significant impact on farmers' household income.

Agricultural extension services are critical for disseminating agricultural knowledge, providing technical assistance and assisting smallholder farmers in adopting improved agricultural practices and technologies. However, research suggests that smallholder farmers in Busoga often experience difficulty accessing extension services due to limited coverage, inadequate staffing and low funding (Akullo et al., 2017). Without access to extension services, farmers may find it difficult to acquire the necessary skills and information to improve their agricultural productivity, resulting in lower household incomes.

Access to credit is critical for smallholder farmers to invest in agricultural inputs, equipment and technologies that can improve their productivity and income. However, smallholder farmers in Busoga often face difficulties in accessing credit facilities due to strict credit requirements, high interest rates and limited financial literacy (Ahebwa et al., 2020). Lack of access to credit limits farmers' ability to make productive investments in their farms and hinders their ability to adopt improved agricultural practices and technologies.

Government policies and regulations play an important role in shaping the availability and

accessibility of agricultural extension services and credit facilities to smallholder farmers in Busoga. However, the effectiveness of these measures to support farmers' livelihoods varies and there may be gaps in implementation and enforcement. For example, despite policy measures to promote agricultural extension services and rural credit programs, smallholder farmers in Busoga continue to face challenges in accessing these important resources (Nampala et al., 2017).

The inadequacy of government policies and regulations in supporting small farmers have a direct impact on their household income in Busoga. Without access to extension services and credit facilities, farmers may struggle to improve agricultural productivity, adopt modern agricultural practices and cope with economic shocks. As a result, household incomes remain low and farmers face challenges in meeting their basic needs and investing in their farms (Waiswa et al., 2018).

Smallholder farmers in Busoga use various risk management strategies to manage price fluctuations in the market for their products. These strategies may include diversifying crops, engaging in value-added processing, participating in collective marketing initiatives, and accessing market information through mobile platforms or farmer organizations (Nampala et al., 2017). However, the effectiveness of these strategies may be limited by structural constraints such as inadequate infrastructure and market inefficiencies.

To address price fluctuations in the market for agricultural products, a combination of market-based and policy interventions is required. Policymakers can support smallholder farmers by promoting transparent and competitive markets, improving market information systems, strengthening farmer organizations, and supporting value chain development initiatives (Waiswa et al., 2018). In addition, investments in infrastructure, transport networks and storage facilities help reduce transaction costs and improve market access for farmers.

Existing literature emphasizes the significant role played by institutional factors and market dynamics in shaping smallholder farmers' access to markets and support services. Studies by IFAD (2016) and World Bank (2018) underscore the importance of supportive institutional frameworks and conducive market environments in enhancing smallholder farmers' access to markets, inputs, and extension services in Uganda.

However, there is a dearth of research examining the interplay between institutional factors, market dynamics, and their combined impact on household incomes in Kamuli district, Busoga region, Uganda. While existing studies provide valuable insights into the broader role of institutional factors and market dynamics in shaping agricultural livelihoods, they often lack a specific focus on the unique context of Kamuli district. Factors such as the presence of local cooperatives, government support programs, and market infrastructure specific to Kamuli district may significantly influence smallholder farmers' access to markets and ultimately their household incomes.

Therefore, the identified gap highlights the need for research that explores the intricate relationships between institutional factors, market dynamics, and household incomes in Kamuli district. By understanding how institutional arrangements and market conditions interact to influence smallholder farmers' livelihoods in this specific context, policymakers and development practitioners can design targeted interventions that effectively address the underlying constraints and promote inclusive agricultural growth in the region.

Environmental Factors and Shocks

Climate fluctuations and extreme weather events pose significant challenges to smallholder farmers in the Busoga region of Uganda and directly impact their income levels by leading to crop failures or reduced yields. This literature review examines the impacts of climate change on farmers' livelihoods and identifies possible adaptation strategies.

The Busoga Region experiences climate variability characterized by changes in rainfall patterns, temperature fluctuations and extreme weather events such as droughts and floods. These climatic changes have profound impacts on agricultural productivity and food security, as smallholder farmers rely heavily on rainfed agriculture (Nabuuma et al., 2019). Erratic rainfall and prolonged droughts can lead to water shortages, soil moisture stress and crop failure, while floods can lead to soil erosion, waterlogging and crop damage.

Climate fluctuations and extreme weather events directly impact farmers' income levels by causing crop failures and lower yields. When crops fail due to droughts or floods, farmers lose their main source of income and food security, leading to economic hardship and increased vulnerability to poverty (Okonya & Kroschel, 2017). Even in cases where crops survive, reduced yields due to adverse weather conditions can reduce farmers' profitability and income levels, limiting their ability to meet their basic needs and invest in their operations.

The impact of climate variability on smallholder household income in Busoga is significant. Crop failures and lower yields directly lead to loss of income for farmers, making it difficult for them to make a living and feed their families (Nampala et al., 2017). Furthermore, the impacts of climate change extend beyond the agricultural sector and impact other income-generating activities such as livestock, fishing and non-farm employment opportunities.

To overcome the challenges posed by climate variability and extreme weather events, smallholder farmers in Busoga adopt various adaptation strategies. These may include diversifying crops, growing drought-tolerant or flood-resistant varieties, adopting water harvesting and conservation techniques, and adopting climate-smart agricultural practices such as agroforestry and conservation agriculture (Nabuuma et al., 2019). However, the effectiveness of these adaptation strategies can be limited by factors such as resource constraints,

lack of technical knowledge and inadequate support from government authorities and development partners.

The lack of effective coping mechanisms or resilience strategies to significantly mitigate the impact of environmental shocks increases vulnerability and loss of income for smallholder farmers in the Busoga region of Uganda. This literature review examines the challenges farmers face in coping with environmental shocks and identifies potential strategies to enhance their resilience.

Smallholder farmers in Busoga are highly vulnerable to environmental shocks such as droughts, floods, pests and diseases, which can have devastating effects on their agricultural productivity and income levels. These shocks are often unpredictable, recurring and difficult to mitigate, exacerbating farmers' economic distress and food insecurity (Nabuuma et al., 2019). Without effective coping mechanisms, farmers may find it difficult to recover from the effects of environmental shocks and face prolonged loss of income.

The lack of effective coping mechanisms or resilience strategies further compounds the challenges faced by smallholder farmers in Busoga. While farmers may use various traditional coping mechanisms such as: Such as borrowing from informal sources, selling assets, or reducing consumption, these strategies may not be sustainable in the long term and may increase farmers' vulnerability to poverty (Nampala et al., 2017). Furthermore, the adoption of climate-resilient agricultural practices and technologies among farmers remain limited due to factors such as limited access to information, financial constraints and risk aversion.

The lack of effective coping mechanisms or resilience strategies has a direct impact on the household incomes of smallholder farmers in Busoga. Environmental shocks can lead to crop failures, livestock losses, reduced productivity, and increased production costs, resulting in loss of income and economic instability for farmers

(Okonya & Kroschel, 2017). Furthermore, the impact of environmental shocks can extend beyond the agricultural sector and affect other income-generating activities such as fishing, trade and non-agricultural employment opportunities.

Strengthening the resilience of smallholder farmers in Busoga requires a multi-pronged approach that addresses the underlying drivers of vulnerability and strengthens farmers' adaptive capacity. Investments in climate-resilient agriculture, improved water management infrastructure, early warning systems, social protection programs and access to financial services can help strengthen farmers' resilience to environmental shocks (Nabuuma et al., 2019). In addition, promoting diversified livelihood strategies, strengthening social networks and improving farmers' access to information and extension services can enable farmers to better cope with and recover from environmental shocks.

Existing studies have documented the vulnerability of smallholder farmers to environmental shocks such as climate variability and natural disasters, which have been shown to significantly affect agricultural productivity and income (Nkonya et al., 2011; FAO, 2018). These environmental challenges pose significant threats to the livelihoods of smallholder farmers, impacting crop yields, livestock productivity, and overall farm profitability.

However, despite this recognition of vulnerability, there remains a gap in understanding the specific environmental shocks faced by smallholder farmers in Kamuli district and their coping mechanisms in the face of these challenges. While broader studies provide insights into the general impacts of environmental shocks on agricultural systems, there is limited research that focuses specifically on the experiences of smallholder farmers in Kamuli district, Busoga region, Uganda.

Therefore, the identified gap underscores the need for research that investigates the unique environmental shocks faced by smallholder

farmers in Kamuli district and examines their adaptive strategies and coping mechanisms. By gaining a deeper understanding of the specific environmental challenges confronting smallholder farmers in the region, policymakers and development practitioners can design targeted interventions and support mechanisms to enhance resilience and mitigate the impacts of environmental shocks on agricultural livelihoods.

A critical review of the literature reveals the following arguments to validate the existing literature. The introduction of modern agricultural technologies can lead to higher productivity and household income for smallholder farmers in Kamuli district, Busoga region. Technologies such as improved seeds, mechanization and irrigation systems have the potential to increase crop yields and efficiency, thereby increasing farmers' income (Nakawuka et al., 2020). However, the upfront costs associated with adopting new technologies can be a barrier for small farmers, particularly those with limited financial resources. Without adequate access to credit or support mechanisms, farmers find it difficult to invest in and benefit from modern agricultural technologies, limiting their income potential (Ahebwa et al., 2020).

Climate-smart farming practices such as agroforestry, crop diversification and soil conservation can help smallholder farmers in Kamuli district, Busoga region mitigate the impacts of climate change and improve their resilience to environmental stressors. By adopting climate-smart practices, farmers can secure their livelihoods, maintain a stable income and even take advantage of the opportunities presented by sustainable agriculture (Nabuuma et al., 2019). However, adopting climate-smart farming practices require significant investments in time, resources and training. Smallholder farmers in Kamuli district, Busoga region lack the necessary knowledge or support to effectively implement these practices, resulting in limited adoption and minimal impact on household income (Okonya & Kroschel, 2017).

Strengthening market linkages and promoting value addition can improve smallholder farmers' access to higher value markets and increase their income in Kamuli district, Busoga region. By directly connecting farmers with buyers, facilitating aggregation, and supporting value-added processing activities, agricultural interventions can improve farmers' bargaining power and enable them to capture a larger share of the value chain (Waiswa et al., 2018). However, challenges such as poor infrastructure, limited market information and exploitative market dynamics impact smallholder farmers' ability to benefit from improved market linkages. Without addressing these structural constraints, efforts to improve market access and value addition have limited impact on farmers' household incomes (Kwesiga et al., 2019).

Adopting sustainable land management practices can improve soil health, conserve natural resources and increase agricultural productivity, leading to higher incomes for smallholder farmers in Kamuli district, Busoga region. Practices such as conservation agriculture, agroforestry and integrated pest management improve soil fertility, reduce production costs and ensure more resilient agricultural systems (Kikulwe et al., 2016). However, the transition to sustainable land management practices requires significant behavioural changes and technical support through extension services. Smallholder farmers in Kamuli district, Busoga face challenges in accessing training, inputs and incentives to adopt these practices, particularly when they perceive short-term trade-offs in labour or yields (Akullo et al., 2017).

METHODOLOGY

Research Design

The study used a mixed methods approach to examine the root causes of low household incomes among smallholder farmers in Kamuli district, Busoga region. The research design integrates both quantitative and qualitative data collection methods to provide a comprehensive understanding of the factors that influence

household income. In the predominantly rural Busoga region of Uganda, Kamuli district served as a representative setting for examining the causes of low household income among smallholder farmers. Its strategic geographical location bordering Jinja, Buyende, Kaliro and Luuka districts enabled comparative analysis of agricultural dynamics and livelihoods and expanded the understanding of the determinants of household income. Known for its importance in the production of staple crops such as maize, beans, cassava and rice, livestock along the cattle corridor, fresh waters for fishing activities, as well as its historical legacy in the region, Kamuli district provided a focused context to explore specific challenges and opportunities, as well as targeted recommendations to improve smallholder farmers' incomes.

The district's socioeconomic and environmental contexts, including climate variability, market access, institutional support, and infrastructure development, provided valuable insights into the factors that influence household income in rural areas. Leveraging existing literature on agriculture and rural livelihoods in Kamuli District ensured that the study was built on sound knowledge and made a meaningful contribution to addressing gaps in understanding the root causes of low household incomes. A household is defined

as a person or group of related or unrelated persons who live together in the same dwelling unit(s), who acknowledge one adult male or female as the head of the household, who share the same housekeeping arrangements, and who are considered a single unit, Uganda Household Survey, UBOS, – (2019/2020). The inclusion criteria of a smallholder farmer in this study was based on farmer households living on or below United States Dollars 2.00 per day. This category of smallholder farmers are characteristically classified under the subsistence Economy, and majority dwell in rural areas of Kamuli district, Busoga region, Uganda Household Survey, (2019/2020).

Population and Sample Size

According to Census Households counts (2014) by Region, District and Mid-Year Projected Households (2015-2021), there were 95,200 households in Kamuli district by 2021 (Last Updated on 25th June 2023), According to the Productions officer, Kamuli district, there were 1500 small holder farmers in Kamuli district. Most of these smallholder farmers live in rural areas. Based on Krejcie & Morgan (1970), the sample size for population of 1500 is 306 with a 95% confidence level and 5% on error estimate (see page 28).

Figure 1. Formula for determining sample size from Krejcie & Morgan (1970)

Formula for determining sample size

$$s = X^2 NP (1 - P) \div d^2 (N - 1) + X^2 P (1 - P)$$

s = required sample size

X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841)

N = the population size

P = the population proportion (assumed to be .50 since this would provide the maximum sample size)

d = the degree of accuracy expressed as a proportion (.05)

However, due to the constraint of remoteness and inaccessibility of some rural areas, the researcher was able to administer only 100 questionnaires to the small holder farmers. Of these, 90 questionnaires were returned, representing a response rate of 90% due to limitations in terms of remoteness and inaccessibility. For key informants, a purposive sampling method was used to select individuals who have expertise or

experience relevant to the study. Of the 20 key informants identified, 10 were interviewed, representing a sample of 50% of all key informants. Thus, a total of 100 respondents were administered.

Validity and Reliability

Reliability statistics in *Table 1* below indicate a high level of internal consistency between the

items measured in the survey, with a Cronbach's alpha coefficient of 0.835 for 19 items. This coefficient suggests that, as a whole, the items in the study reliably measure an interrelated construct and have strong internal reliability (George & Mallery, 2003). A Cronbach's alpha value above 0.70 is generally considered acceptable for research instruments (Tavakol & Dennick, 2011), indicating that the survey items

in this study are reliable measures of the constructs examined. The high level of internal consistency increases confidence in the validity of the survey results and the conclusions drawn from them, and provides robust evidence for the analysis of the factors affecting household income of smallholder farmers in Kamuli District, Busoga Region, Uganda.

Table 1: Reliability Statistics

Cronbach's Alpha	No. of Items
.835	19

Data Analysis

Data collected using questionnaires were analysed using SPSS. The data was coded and analysed. It included running frequencies and corresponding percentages for all categorical variables examined. Qualitative data was analysed by capturing key quotes from these key informant interviews to provide context and support the findings. This included identifying recurring themes and patterns in responses related to the causes of low household income among smallholder farmers in Kamuli district and strategies to address these challenges.

Demographic Information

The results in *Table 2* above show that the majority of participants 37 (41.1%) are in the age group of 46 to 60 years and 31 (34.4%) are in the

age group of 31 to 45 years, indicating that a significant part of the surveyed population is middle-aged. This is consistent with the findings of Tumwebaze et al. (2019), who found a similar age distribution among smallholder farmers in Uganda. Regarding gender, the sample is predominantly male, accounting for 74 (82.2%) of the respondents, which is in line with the prevailing trend in agricultural activities in the region, as reported by Birner et al., (2020). On average, households consist of 7 members, with a range of 3–12 members and a standard deviation of 2.2, suggesting a relatively stable family size. Education levels vary, with the majority 51 (56.7%) having completed primary education, reflecting the educational landscape in rural Uganda where access to higher education remains limited (Najjingo et al., 2021).

Table 2: Showing Demographic Information of the respondents

Items		f (%)
What is your age?	Under 18	0
	18-30	5(5.6%)
	31-45	31(34.4%)
	46-60	37(41.1%)
	Above 60	17(18.9%)
What is your age?	Male	74(82.2%)
	Female	16(17.8%)
How many members are there in your household?	Mean	7
	Maximum	12
	Minimum	3
	Standard deviation	2.2
What is the highest level of education you have completed?	None	2(2.2%)
	Primary	51(56.7%)
	Secondary	36(40%)
	Tertiary	1(1.1%)

Source: Field Data 2024

Causes of Low House Hold Income among Small Holder Farmers

The results presented in *Table 3* highlight various factors contributing to low household income of smallholder farmers, categorized into agricultural production practices and technologies, institutional factors and market dynamics, and environmental factors and shocks. Agricultural production practices and technologies pose challenges for smallholder farmers: more than half 80(88.9%) report limited uptake due to lack of access to extension services, while 71(78.9%) report limited access to agricultural inputs and credit are faced. Furthermore, there is a worrying trend towards over-reliance on traditional farming methods, with 87(96.7%) resorting to less efficient practices. These results are consistent with existing literature that emphasizes the importance of access to resources, knowledge and technology in increasing smallholder farmers' productivity and income (Reardon et al., 2019; Barrett et al., 2020).

Institutional factors exacerbate these challenges, as respondents reported; Poor market access due to infrastructure deficiencies 86(92.2%) and market inefficiencies 88(97.8%) affects farmers' ability to transport their products and access market information. Furthermore, dissatisfaction with government policy 80(88.9%) highlights the inadequate support for small farmers. These results are consistent with previous research that emphasizes the critical role of supportive institutions and market structures in improving smallholder farmers' incomes and livelihoods (Jayne et al., 2019; Minten et al., 2020).

Environmental factors exacerbate these problems: 78(86.7%) cite climate fluctuations and extreme weather events leading to crop failures, while 61(67.8%) express concerns about the lack of effective coping mechanisms. These results highlight the profound impacts of climate change on agricultural productivity and livelihoods in vulnerable regions, as documented in previous studies (Seo et al., 2019; Lobell et al., 2020).

Table 3: causes of low house hold income among small holder farmers in Kamuli district, Busoga region

Statements	SD	D	N	A	SA
Agricultural Production Practices and Technologies					
Limited adoption of modern agricultural practices and technologies due to high input costs or lack of access to extension services	1 (1.1)	6 (6.7)	3 (3.3)	48 (53.3)	32 (35.6)
Limited access to agricultural inputs and credit to invest in improved farming methods	0	11 (12.2)	8 (8.9)	50 (55.6)	21 (23.3)
Over dependence on traditional farming methods that are less efficient or resilient to climate variability	0	2 (2.2)	1 (1.1)	25 (27.8)	62 (68.9)
Institutional Factors and Market Dynamics					
Poor market access due to inadequate infrastructure such as poor road network.	0	1 (1.1)	6 (6.7)	48 (53.3)	38 (38.9)
Market inefficiencies, such as lack of market information or price volatility	0	1 (1.1)	1 (1.1)	34 (37.8)	54 (60)
Government policies or regulations that do not adequately support smallholder farmers, such as limited access to agricultural extension services or credit facilities	0	4 (4.4)	6 (6.7)	59 (65.6)	21 (23.3)
Environmental Factors and Shocks					
Climate variability and extreme weather events, such as droughts lead to crop failures or reduced yields.	0	7 (7.8)	5 (5.6)	46 (51.1)	32 (35.6)
Lack of effective coping mechanisms or resilience strategies to mitigate the impact of environmental shocks increases vulnerability and income losses for smallholder farmers	1 (1.1)	21 (23.3)	7 (7.8)	41 (45.6)	20 (22.2)

NB: SD-Strongly Disagree D-Disagree N-Neutral A-Agree SA-Strongly Agree

Source: Field Data 2024

In an interview, when asked about the causes of low house hold income among small holder farmers, one of the key informants noted that

“The cost of agriculture (farming) has become costly as farm inputs are expensive, where one needs money to acquire them”. Knowledge about modern agriculture is limited, which has affected production and productivity. A case in point, “A farmer (names withheld) in Bugaya sub county, planted beans, later the garden was attacked by pests that ate the leaves. On buying drugs to spray, he was sold weed killer. On administering the spray, she lost the entire plantation”. As farmers continue using traditional methods of farming, which is labour intensive, costly and does not match the projected production/yield, production will continue to be low, to influence household incomes and sustain markets. There is shortage of land for agricultural production that match commercialization. Increased population has caused land fragmentation, affecting amount of space for commercial agriculture.”

Strategies for Addressing the Challenges Faced by the Small Holder Farmers

The results in Table 4 outlines possible strategies to address the challenges faced by smallholder

farmers and includes agricultural practices, infrastructure improvements, education and access to financial resources. The adoption of modern and sustainable agricultural practices proves to be a crucial approach (51.1% strongly agree, 47.8% agree) and highlights the need for environmentally friendly and efficient agricultural methods. Investments in agricultural training and extension services (56.7% strongly agree, 40% agree) and educational programs tailored to smallholder farmers (56.7% strongly agree, 40% agree) are also highlighted, highlighting the importance of disseminating knowledge and improving skills. Infrastructure development, particularly in transport and distribution networks (58.9% strongly agree, 32.2% agree), is seen as essential to improving market access. Access to credit for the purchase of inputs and the establishment of agricultural cooperative associations for the exchange of information are mentioned as crucial factors (60% strongly agree, 34.4% agree; 53.3% strongly agree, 41.1% agree). Furthermore, irrigated agriculture is suggested as a viable strategy to mitigate the effects of climate variability (58.9% strongly agree, 16.7% agree). These results are consistent with existing literature advocating holistic interventions to address the diverse challenges faced by smallholder farmers (Thapa et al., 2019; FAO, 2021).

Table 4: The possible strategies to address the challenges faced by the small holder farmers in Kamuli district, Busoga region

Statement	SD	D	N	A	SA
Adopt modern and sustainable agricultural practices	0	1	0	43	46
	(1.1)			(47.8)	(51.1)
Investing in agricultural training and extension services	0	1	2	51	36
	(1.1)	(2.2)		(56.7)	(40)
Improving transportation and distribution networks such as roads from rural areas to market centres	0	1	7	53	29
	(1.1)	(7.8)		(58.9)	(32.2)
Investing in the education and skill development and training programs tailored to smallholder farmers	0	1	2	51	36
	(1.1)	(2.2)		(56.7)	(40)
Access to credit in order to purchase agricultural inputs such as fertilizers, irrigation and post-harvest handling equipment.	0	1	4	54	31
	(1.1)	(4.4)		(60)	(34.4)
Establishment farmer cooperative associations access to information about agriculture.	0	3	2	48	38
	(3.3)	(2.2)		(53.3)	(41.1)
Practicing irrigation farming	0	1	15	53	21
	(1.1)	(16.7)		(58.9)	(23.3)

NB: SD-Strongly Disagree D-Disagree N-Neutral A-Agree SA-Strongly Agree

In an interview, when asked about the possible strategies to address the challenges faced by the small holder farmers, one of the key informants said that;

“Transitioning from traditional agricultural practices would be the most ideal to enhance increased agricultural production, eventually influencing Household income, but it is not practiced at all. He added that what is constraining commercialization of agriculture is; lack of knowledge, resources, and skills to plan. Road network and condition is very poor and requires investment and maintenance.”

In the efforts to transition from small to large farms in Developing Economies, experience demonstrates that; Simulations suggest that transitioning from smallholder to commercial farming, where smallholders supply land and labor to commercial farms, can increase farm output and smallholder incomes, Ma et al., (2022). These transitions contribute to economic growth and livelihood improvements for smallholders.

Low rate of adoption of modern farming technology and farming practices also emerged as one of the themes contributing to low household incomes among the smallholder farmers. In addition to the recommendations by literature to design interventions tailored to the unique characteristics of Kamuli district smallholder farmers, Busoga region and beyond, the study highlights experience and best practices from the study on the impact of agricultural modernization on smallholder farmers in Uganda. The findings revealed that, “low adopters of modern agricultural practices were significantly at a disadvantage when it comes to the acquisition of valuable assets compared to high adopters”. Findings further indicated that food security, household income and expenditure were significantly higher among high adopters than low adopters. Promotion of awareness about the benefits inherent in agricultural modernization as a vehicle for improving smallholder farmers’ socio-economic status is recommended, Wamala et al., (2017).

The other emerging theme involved environmental shocks and its contribution to low household incomes. Atube et al., (2021), in his study findings suggest that there are several factors that work together to influence adoption of specific adaptation strategies by smallholder farmers. This calls for more effort from government to strengthen the provision of agricultural extension services by improving its climate information system, providing recommended agricultural inputs and training farmers on best agronomic practices to enhance their holistic adaptation to the effect of climate change.

Inadequate support from government agencies also emerged among the respondents, citing instances of corruption, bribery and exclusion of the targeted beneficiaries as one of the challenges faced by smallholder farmers in Kamuli district, Busoga region. Whereas the literature agrees with the respondents, the study shares one of the experiences and best practice showing the feasibility of the strategies to be adopted by government to assist the small holder farmers. This experience of a success story is from Better Life Farming: The Better Life Farming ecosystem connects smallholder farmers in India, Indonesia, and Bangladesh to the capabilities, products, and services of corporations and NGOs. By adopting sustainable practices and accessing improved inputs, smallholders have increased their productivity and profitability, leading to better household incomes (Dias et al., (2021).

DISCUSSION

The analysis reveals crucial insights into the challenges faced by smallholder farmers in Kamuli District, Busoga Region, of Uganda and sheds light on the factors that influence household income in farming communities. Three main categories of challenges emerge: agricultural production practices and technologies, institutional factors and market dynamics, and environmental factors and shocks.

The data highlights the significant barriers smallholder farmers face in adopting modern

agricultural practices and technologies. High input costs, limited access to extension services and an over-reliance on traditional farming methods contribute to low productivity and income. This highlights the urgent need for interventions that promote the adoption of sustainable farming techniques and facilitate access to resources and knowledge. Research by the Food and Agriculture Organization (FAO) highlights how access to improved seeds, fertilizers, and farming techniques can significantly enhance yields and livelihoods in rural communities

Institutional constraints, including poor market access, market inefficiencies and inadequate government support, pose daunting challenges for smallholder farmers. Infrastructure deficiencies such as poor road networks exacerbate market access problems, while market inefficiencies and policy inadequacies affect farmers' ability to optimize their income. Removing these institutional barriers is critical to creating an enabling environment for agricultural development and income generation. Studies by the International Food Policy Research Institute (IFPRI) emphasize the need for supportive policies and investments in market infrastructure to facilitate smallholders' integration into value chains

Environmental vulnerabilities, particularly climate variability and extreme weather events, pose a significant threat to the livelihoods of smallholder farmers. Crop failures, reduced yields and the lack of effective coping mechanisms exacerbate income volatility and vulnerability. Mitigating the impacts of climate change requires a multifaceted approach that integrates climate-smart agricultural practices, resilience-building strategies and targeted support mechanisms. Research by the Intergovernmental Panel on Climate Change (IPCC) underscores the importance of resilience-building strategies and climate-smart agricultural practices to mitigate the impacts of climate change on rural livelihoods.

The smallholder farmers in Kamuli district, Busoga region are very vulnerable to causes of

low household incomes despite government's intervention with national poverty alleviation strategies. There is need for government to design interventions and policies that uniquely address the key vulnerabilities of the smallholder farmers in Kamuli district, Busoga region and beyond, especially for those households living below the poverty threshold and are classified under the subsistence economy of Uganda.

CONCLUSION

The findings highlight the interconnectedness of challenges faced by smallholder farmers and emphasize the need for integrated interventions that address both immediate constraints and underlying systemic issues. Strategies to improve household incomes should include technological innovations, institutional reforms, infrastructure development and climate adaptation measures. Additionally, empowering smallholder farmers through access to education, training and financial resources is critical to building resilience and promoting sustainable livelihoods.

Collaboration between government agencies, non-governmental organizations, local communities and development partners is critical to implementing effective solutions and promoting positive change in agricultural communities. By addressing the causes of low household income and promoting inclusive and sustainable development, it is possible to unlock the potential of smallholder farmers and contribute to poverty reduction and food security in Kamuli District and beyond.

In addition, the evidence gathered from this study underscores the urgent need for a tailored program specific to Kamuli District, Busoga region, aimed at addressing the root causes of low household incomes among smallholder farmers in the region. Through a comprehensive analysis of the challenges faced by smallholder farmers, including limited access to resources, market restrictions, environmental shocks, and inadequate institutional support, this research has identified critical areas for intervention.

Drawing from empirical evidence and actionable insights generated through qualitative and quantitative data collection methods, it is evident that a one-size-fits-all approach will not suffice in addressing the unique challenges faced by smallholder farmers in Kamuli District. Instead, a targeted program that considers the local context, socio-economic dynamics, and agricultural practices specific to the region is essential.

The program design should focus on enhancing access to resources such as land, agricultural inputs, and credit facilities, thereby empowering smallholder farmers to adopt modern agricultural practices and technologies (Mugambe et al., 2019). Additionally, efforts should be made to improve market access through infrastructure development, market information services, and value chain initiatives (World Bank, 2018). Climate-smart agricultural practices and early warning systems should also be promoted to build resilience to environmental shocks (Nkonya et al., 2011).

Furthermore, institutional reforms aimed at strengthening extension services, facilitating access to markets, and formulating supportive policies are crucial for enabling smallholder farmers to overcome barriers and improve their livelihoods (Mugambe et al., 2019). Collaboration among stakeholders, including government agencies, non-governmental organizations, and local communities, is essential for the successful implementation of the tailored program (IFPRI, 2017).

By addressing the root causes of low household incomes among smallholder farmers in Kamuli District through a tailored program, will not only alleviate poverty and improve food security in the region but also promote sustainable development and inclusive growth for agricultural communities in Busoga and beyond.

REFERENCES

Ahebwa, W. M., Katongole, C. B., & Waiswa, D. (2020). Assessing financial inclusion and its determinants among rural smallholder farmers in Uganda. *African Journal of*

Agricultural and Resource Economics, 15(4), 403-418.

Akullo, G., Mugonola, B., Tenywa, J. S., & Isabirye, M. (2017). Agricultural extension service delivery and farmers' perception: A case study of Busoga region, Uganda. *African Journal of Agricultural Research*, 12(47), 3373-3385.

Atube et al., (2021), "Determinants of smallholder farmers' adaptation strategies to the effects of climate change: Evidence from northern Uganda" *Journal: Agriculture & Food Security* (01) 10

Barrett, C. B., Bevis, L. E., & Blanckenberg, J. (2020). Agricultural Input and Yield Response: A Synthesis of the Evidence. *Annual Review of Resource Economics*, 12, 235-255.

Barrett, C. B., Reardon, T., & Webb, P. (2001). Nonfarm income diversification and household livelihood strategies in rural Africa: Concepts, dynamics, and policy implications. *Food Policy*, 26(4), 315-331.

Bebbington, A. (1999). Capitals and capabilities: A framework for analysing peasant viability, rural livelihoods and poverty. *World Development*, 27(12), 2021-2044.

Bebbington, A. (1999). Capitals and capabilities: A framework for analysing peasant viability, rural livelihoods and poverty. *World Development*, 27(12), 2021-2044.

Birner, R., Anderson, J. R., Beintema, N., Boko, M., Chambers, R., Compagnone, C., & Wijeratne, M. (2020). Agricultural innovation pathways: Bridging the gap between goals and solutions for sustainable development. *Global Food Security*, 24, 100345.

DFID. (1999). Sustainable Livelihoods Guidance Sheets. Department for International Development. Retrieved from <https://www.eldis.org/document/A33712>

Doss, C. (2006). Analysing technology adoption using microstudies: Limitations, challenges,

- and opportunities for improvement. *Agricultural Economics*, 34(3), 207-219.
- Ellis, F. (2000). *Rural Livelihoods and Diversity in Developing Countries*. Oxford University Press.
- Food Agriculture Organisation (2018). *Climate-Smart Agriculture Sourcebook (2nd Edition)*.
- Food and Agriculture Organization of the United Nations (FAO). (2021). *Smallholder and Family Farmers*. Rome.
- George, D., & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference. 11.0 update (4th ed.)*. Allyn & Bacon.
- International Food Policy Research Institute (2017). *Global Food Policy Report*.
- International Fund for Agricultural Development. (2016). *Rural Development Report 2016: Fostering Inclusive Rural Transformation*.
- Jayne, T. S., Chamberlin, J., & Traub, L. (2019). Smallholder Productivity in Africa's Landlocked Countries. *Annual Review of Resource Economics*, 11, 25-49.
- Key, N., & Runsten, D. (1999). Contract farming, smallholders, and rural development in Latin America: The organization of agroprocessing firms and the scale of outgrower production. *World Development*, 27(2), 381-401.
- Krejcie, R.V., & Morgan, D.W., (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement*.
- Kwesiga, B., Mugagga, F., & Kansiime, M. K. (2019). Market access constraints and post-harvest losses among smallholder sweet potato farmers in Uganda. *Cogent Food & Agriculture*, 5(1), 1596288.
- Lobell, D. B., Burke, M. B., Tebaldi, C., Mastrandrea, M. D., Falcon, W. P., & Naylor, R. L. (2020). Prioritizing climate change adaptation needs for food security in 2030. *Science*, 319(5863), 607-610.
- Minten, B., Dereje, M., Engida, E., & Kuma, T. (2020). The Rapid Transformation of Food Systems in Developing Countries: Lessons from Bangladesh, Ethiopia, and Myanmar. *Annual Review of Resource Economics*, 12, 417-442.
- Mugambe, E. K., Kyazze, F. B., & Muzira, R. (2019). Assessment of Factors Affecting Smallholder Farming in Busoga Sub-Region, Uganda: A Case Study of Kaliro District. *Journal of Economics and Sustainable Development*, 10(14), 25-35.
- Nabuuma, R., Birner, R., & Anderson, C. L. (2019). Adoption of climate-smart agricultural practices: Evidence from Southern Malawi. *Land Use Policy*, 83, 426-437.
- Najjingo, C. T., Kanyandago, P., & Maweje, J. (2021). Access to Higher Education in Uganda: A Review of Policy Frameworks and Interventions. *Journal of Education and Human Development*, 10(1), 105-115.
- Nakawuka, P., Mugisa, A., Bashaasha, B., & Wamala, A. (2020). Factors influencing smallholder farmers' decisions to adopt soil fertility management practices in Uganda. *Cogent Food & Agriculture*, 6(1), 1820658.
- Nampala, P., Wamala, A., & Kikulwe, E. (2017). Gender differences in adoption of agricultural technology: The case of improved cassava varieties in Uganda. *African Journal of Agricultural and Resource Economics*, 12(3), 234-245.
- Nkonya, E., Pender, J., & Sserunkuuma, D. (2011). Determinants of the adoption of improved maize varieties for the lowland and mid-altitude zones of Uganda. *Agricultural Economics*, 42(2), 231-242.
- Nkonya, E., Pender, J., & Sserunkuuma, D. (2011). Determinants of the adoption of improved maize varieties for the lowland and mid-altitude zones of Uganda. *Agricultural Economics*, 42(2), 231-242.

- Okonya, J. S., & Kroschel, J. (2017). A cross-sectional study of factors influencing banana production in Uganda. *Agriculture & Food Security*, 6(1), 12.
- Pretty, J., & Ward, H. (2001). Social capital and the environment. *World Development*, 29(2), 209-227.
- Putnam, R. D. (1993). *Making democracy work: Civic traditions in modern Italy*. Princeton University Press.
- Quisumbing, A. R., & Pandolfelli, L. (2010). Promising approaches to address the needs of poor female farmers: Resources, constraints, and interventions. *World Development*, 38(4), 581-592.
- Reardon, T., Barrett, C. B., Berdegue, J. A., & Swinnen, J. F. (2009). Agrifood industry transformation and small farmers in developing countries. *World Development*, 37(11), 1717-1727.
- Reardon, T., Bellemare, M. F., & Zilberman, D. (2019). How to End Hunger by 2030. *Annual Review of Resource Economics*, 11, 455-474.
- Seo, S. N., Mérel, P., & Mendelsohn, R. (2019). Adapting Agriculture to Climate Change: A Review. *Review of Environmental Economics and Policy*, 13(2), 291-308.
- Singh, I., Squire, L., & Strauss, J. (1986). *Agricultural household models: Extensions, applications, and policy*. The World Bank.
- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53-55.
- Thapa, G. B., Paudel, B., & Bhandari, P. (2019). Enhancing Smallholder Farmers' Adaptive Capacity through Participatory Action Research in Nepal. *Sustainability*, 11(3), 785.
- Tumwebaze, K. K., Menya, D., & Norman, D. W. (2019). Gender and Smallholder Farmers' Perceptions of Climate Variability in Uganda. *Climate*, 7(3), 42.
- Waiswa, D., Bahigwa, G., Mugisha, J., & Mugonola, B. (2018). Market participation and rural household income: Evidence from Uganda. *Journal of African Economies*, 27(3), 345-367.
- Wamala, G., Bogere, M., & Angucia, M. (2017, October). Impact of Agricultural Modernization on the Socioeconomic Status of Smallholder Farmers in Luweero and Nakaseke Districts in Uganda. Retrieved from <https://pub.nkumbauniversity.ac.ug/xmlui/handle/123456789/547>
- World Bank. (2018). *Uganda: Country Environmental Analysis*. World Bank.