ACCESS TO INFORMATION AND ADOPTION OF COFFEE POST-HARVEST MANAGEMENT PRACTICES AMONG SMALLHOLDER FARMERS IN BULAMBULI DISTRICT IN EASTERN UGANDA

BY

WASIKE JEREMIAH

22/U/GAEE/777/PE

A DISSERTATION SUBMITTED TO THE DIRECTORATE OF RESEARCH AND GRADUATE TRAINING IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF A MASTER DEGREE IN AGRICULTURAL EDUCATION AND EXTENSION OF KYAMBOGO UNIVERSITY

OCTOBER, 2025

DECLARATION

I hereby declare that this dissertation is my own work and has not been presented or submitted to any other University or institution for any academic purpose.

Wasike Jeremiah

22/U/GAEE/777/PE

Signature _____Date: _____

APPROVAL

We confirm that the student has prepared this dissertation titled "Access to Information and Adoption of Coffee Post-Harvest Management Practices among Smallholder Farmers in Bulambuli District in Eastern Uganda**"** and is done under our guidance as supervisors and it is ready for examination.

Supervisors

1: Dr. Tamubula Bulenzibuto Irene

Signature……date…….

2: Dr. Makosa Dan

Signature……. date…….

DEDICATION

This research dissertation is dedicated to my dear parents; late Welishe Wilson and Mrs. Nambuya Mary, my beloved wife Manakhe Rebecca and my children, Desire, Esther, Tracy, Joshua and Jotham for their moral and financial support they rendered to me during my academic journey.

To all smallholder coffee farmers, whose resilience and dedication to their craft serve as a reminder of the importance of agricultural development in transforming lives and communities.

ACKNOWLEDGEMENTS

My gratitude is firstly directed to God, the sustainer of my life, the family throughout my academic journey.

I extend my genuine recognition to my academic supervisors Dr. Tamubula Bulenzibuto Irene and Dr. Makosa Dan for their invaluable guidance, constructive feedback and support throughout this research process. Your insight and expertise were instrumental in shaping this study.

I express my special thanks to Dr. Tinzaara William programme the Graduate coordinator, Faculty of Agriculture. You have been tremendous mentor for me. I would like to thank you for encouraging me during my research. I am also grateful to the entire academic staff of the Faculty of Agriculture, whose advice on both research and on my career have been invaluable.

I am also grateful to my beloved friends Mr. Maena Boniface and Mr. Opio Francis for their tireless support, encouragement, prayers throughout my studies. Lastly, I extend my gratitude to all individuals that contributed directly or indirectly to the successful completion of this research. Your efforts and kindness are greatly appreciated.

TABLE OF CONTENTS

DECLARATION ii

APPROVAL iii

DEDICATION iv

ACKNOWLEDGEMENTS v

TABLE OF CONTENTS vi

LIST OF TABLES x

LIST OF FIGURES xi

LIST OF ABBREVIATIONS xii

ABSTRACT xiii

CHAPTER ONE: INTRODUCTION 13

1.1 Background to the Study 13

1.2 Problem Statement 4

1.3 General Objective 5

1.4 Specific Objectives 5

1.5 Research Questions 6

1.6 Scope of the Study 6

1.7 Significance of the Study 7

1.8 Theoretical and Conceptual Framework 8

CHAPTER TWO: LITERATURE REVIEW 11

2.1 Coffee Post-Harvest Management Practices 11

2.1 Meaning of farmers' access to agricultural information 13

2.2 Sources of information and access to agricultural information 14

2.3 Farmers' socio-economic characteristics and access to agricultural information 17

2.4 Factors that influence smallholder coffee farmers' adoption of post-harvest management practices. 20

2.5 Overview of literature reviewed 24

CHAPTER THREE: RESEARCH METHODOLOGY 26

3.1 Study area 26

3.2 Research design 26

3.3 Study population 27

3.4 Sample size and sampling procedure 27

3.5 Data collection methods and tools 28

3.5.1 Questionnaires for coffee farmers 28

3.6 Measurement of variables 29

3.7 Data quality control 30

3.7.1 Data validity 30

3.7.2 Reliability 31

3.8 Data analysis 32

3.8.0 Assumptions of binary logistic regression 33

3.8.1 Sources of information and access to post harvest management information 33

3.8.2 Socio-economic characteristics and access to coffee post-harvest management information 34

3.8.3 Factors that influence smallholder coffee farmers' adoption of post-harvest management practices 35

3.9 Ethical considerations 36

CHAPTER FOUR: PRESENTATION AND INTERPRETATION OF RESULTS 37

4.0 Introduction 37

4.1 Response rate 37

4.2 Socio-demographic characteristics of smallholder farmers 38

4.3 Sources of Information and Access to Coffee PHM Information 40

4.4 Socio-economic characteristics and access to PHM information 44

4.5 Factors influencing farmers' adoption of coffee post-harvest management practices 46

4.6 Constraints to access and adoption of PHM practices 47

CHAPTER FIVE: DISCUSSION OF FINDINGS AND RECOMMENDATIONS 49

5.1 Introduction 49

5.2 Discussion of findings 49

5.2.1 Sources of information and access to PHM information 49

5.2.2 Socio-economic factors and access to PHM information 51

5.2.3 Factors influencing farmers' adoption of coffee post-harvest management practices 53

5.3 Conclusion 54

5.4 Recommendations 55

5.5 Areas for future research 56

REFERENCES 58

APPENDICES 67

Appendix I: Questionnaire for farmers 67

Appendix II: Garden size 72

Appendix III: Introductory Letter 73

LIST OF TABLES

Table 4. 1: Socio-demographic characteristics of respondents 39

Table 4. 2: Sources of post-harvest coffee management information 40

Table 4. 3: Sources of information and access to PHM information 42

Table 4. 4: Socio-economic characteristics and access to PHM information 44

Table 4. 5: Factors influencing the adoption of coffee PHM practices 46

Table 4. 6: Constraints to access and adoption of PHM practices 47

LIST OF FIGURES

Figure 1.1: Conceptual framework of the study 9

LIST OF ABBREVIATIONS

NPHC	National Population Housing Census
PHH	Post Harvest Handling
PHL	Post Harvest Loss
PHM	Post-Harvest Management
PHMP	Post Harvest Management Practices
UBOS	Uganda Bureau of Statistics
UCDA	Uganda Coffee Development Authority

ABSTRACT

This study explored the determinants of access to post-harvest management (PHM) information and the adoption of improved PHM practices among smallholder coffee farmers in Bulambuli District, Uganda. Specifically, it examined the influence of socio-demographic characteristics and information sources on information access and adoption. A cross-sectional design with a quantitative approach was employed, focusing on 318 smallholder coffee farmers selected through stratified random sampling from Buginyanya and Namisuni sub-counties. Data were collected using structured questionnaires and analyzed using SPSS Version 20. Binary logistic regression was used to assess the effects of socio-demographic factors and information sources on access to PHM information, as well as the determinants of adoption of improved PHM practices. Findings revealed that conventional information sources, including radio, fellow farmers, print media, extension agents, and agro-input dealers, significantly influenced farmers' access to PHM information. Socio-economic characteristics such as education, farming experience, group membership, and garden size also influenced information access. Adoption of improved PHM practices was influenced by access to PHM information, age, gender, and group membership. Recommendations include strengthening rural radio programs, expanding and professionalizing extension services, promoting farmer group participation, facilitating structured peer-to-peer learning, and targeting youth engagement in adoption initiatives.

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

Globally, agriculture remains the backbone of many economies, particularly in developing countries, where it is the primary source of livelihood for the majority of rural households. In this context, agricultural information plays a crucial role in enhancing productivity, improving food security, and supporting sustainable rural development (Ansah et al., 2018; Jimoh et al., 2023; Klink, 2020; Osei et al., 2018). Access to relevant and timely agricultural information enables farmers to make better decisions regarding production, marketing, and adoption of new technologies, thereby reducing risks and improving farm incomes. For instance, in countries such as Brazil, Vietnam, and Ethiopia, who are among the world's leading coffee producers, the successful adoption of improved post-harvest handling practices has been attributed to the availability and accessibility of agricultural information through extension services, cooperatives, and farmer associations (International Coffee Organization [ICO], 2022)

In Sub-Saharan Africa, however, many smallholder farmers continue to face challenges in accessing accurate and reliable agricultural information. Although knowledge exists in research institutions, universities, libraries, and agricultural organizations, it is often not adequately disseminated to reach the intended beneficiaries (Sigigaba et al., 2022). Typically, farmers access agricultural information from diverse sources including extension agents, farmer groups and cooperatives, mass media, electronic media (radio, mobile phones, and internet platforms), non-governmental organizations, agro-input dealers, and fellow farmers (Bonephace et al., 2022). Despite these multiple channels, smallholder farmers often experience barriers such as limited coverage of extension services,

poor infrastructure, low literacy levels, and weak linkages among key actors, which restrict their ability to fully benefit from available knowledge.

Coffee is one of the most traded agricultural commodities worldwide, and its quality and market value depend significantly on post-harvest management (PHM) practices. Globally recognized PHM practices in coffee include timely harvesting of ripe cherries, proper sorting and grading, pulping, fermentation control, washing, drying, storage, and transportation (International Coffee Organization [ICO], 2022). Adoption of these practices ensures that coffee maintains high quality, reduces post-harvest losses, and fetches better prices in local and international markets. In Uganda, however, adoption of improved PHM practices among smallholder coffee farmers remains limited due to poor access to information, inadequate extension support, and resource constraints (Mukasa et al., 2025).

Uganda is Africa's leading exporter of Robusta coffee and also produces significant quantities of Arabica coffee, which is mainly grown in the highland regions of Eastern Uganda (Uganda Coffee Development Authority (UCDA), 2023). Coffee contributes substantially to the country's foreign exchange earnings and supports the livelihoods of over 500,000 households. Robusta coffee accounts for about 80% of total production, while Arabica contributes around 20% (Uganda Coffee Development Authority [UCDA], 2019). In the Bugisu sub-region, particularly Bulambuli district, smallholder farmers predominantly grow Arabica coffee on small plots of land, typically less than three acres, and depend heavily on family labor. Their productivity and incomes are strongly influenced by their access to reliable agricultural information and their ability to adopt recommended PHM practices.

Despite coffee's importance, smallholder farmers in Uganda often lack sufficient information on modern PHM technologies, which undermines quality, reduces competitiveness, and ultimately affects household welfare. Insufficient agricultural information has been cited as a critical factor hindering adoption of improved practices, leading to persistent low yields and incomes (Wambua et al., 2021). Access to agricultural information that is accurate, timely, reliable, and relevant would empower smallholder farmers to make informed decisions regarding harvesting, processing, and marketing, thereby improving productivity and reducing uncertainty (Luzinda, Nelima, Wabomba, Musoli, & Kakuru, 2018).

It is against this backdrop that this study investigates the sources of agricultural information available to smallholder coffee farmers, the factors influencing their access to such information, and the extent to which access affects the adoption of improved coffee post-harvest management practices in Bulambuli district, Eastern Uganda.

1.2 Problem Statement

Smallholder coffee farmers, having access to agricultural information is crucial since it directly affects farm output, productivity, and livelihoods (Luzinda, Nelima, Wabomba, Musoli, & Kakur, 2018). According to the (Annual Agricultural Survey (AAS) 2019., 2019), about 80% of Ugandan households were involved in agriculture but only 38% of them had access to agricultural extension in 2019, and only 18% accessed agricultural information through radio., The limited access to agricultural extension services affect farmers' ability to adopt best practices and cope with the challenges that they face such

as weather variability, pests and diseases, and market fluctuations (Nestle, 2022). Even the few farmers that access agricultural information face challenges of irrelevance, inadequacy, poor usability, and untimeliness of the information.

Several interventions have been implemented to improve the access to quality agricultural information for smallholder coffee farmers, for instance through training programs, radio talk shows, farmer groups, and mobile applications (Uganda Coffee Development Authority, 2022). However, the effectiveness and usefulness of these interventions have not been adequately evaluated and documented as highlighted by (Luzinda, Nelima, Wabomba, Musoli, & Kakur, 2018). This leaves a gap in the empirical evidence on smallholder coffee farmers' sources of information, and their ability to access and use of information on post-harvest management practices of coffee, in particular in Bulambuli district. Accordingly, the study aimed to address the existing information gap by examining the factors that influenced smallholder farmers' access to and use of information concerning coffee post-harvest management practices.

1.3 General Objective

This study's general objective was to assess the factors that influence smallholder coffee farmers' access to and use of information on coffee post-harvest management practices in Bulambuli District.

1.4 Specific Objectives

The specific objectives of the study were:

(i) To assess how the sources of information influence smallholder coffee farmers' access to information on post-harvest coffee management practices.

(ii) To determine the influence of smallholder coffee farmers' socio-economic characteristics on access to information on post-harvest coffee management practices

(iii) To assess the factors that influence smallholder coffee farmers' adoption of post-harvest management practices.

1.5 Research Questions

This study sought to answer these research questions:

(i) What is the influence of sources of information on smallholder coffee farmers' access to information on post-harvest coffee management practices?

(ii) What is the influence of smallholder coffee farmers' socio-economic characteristics on access to information on post-harvest coffee management practices?

(iii) What are the factors that influence smallholder coffee farmers' adoption of post-harvest management practices?

1.6 Scope of the Study

The results of this study mainly focused on how smallholder coffee farmers in Bulambuli District access the agricultural information to help them adopt improved post-harvesting management (PHM) practices of coffee. Specifically, the study identified the different kinds of agricultural information regarding coffee management available to the farmers, the sources for accessing

agricultural information used by smallholder coffee farmers, the relevance, ease of use, timeliness and adequacy of information accessed by smallholder Coffee farmers' access to post-harvest management practices. This study also assessed how the accessed information influences coffee farmers' adoption of proper coffee post-harvesting management (PHM) practices. The study was carried out from 2023 to 2024. This offered sufficient time to the researcher to gather and analyze all the relevant information pertaining to the study.

The Bulambuli District in the Bugisu Sub-region in Eastern Uganda served as the study's site. In Bulambuli district, coffee is grown in at least one out of ten households. This demonstrates that people are motivated to grow coffee, which makes it a good study topic for the study's topic.

1.7 Significance of the Study

Smallholder coffee farmers, extension agents, the community development officers the Uganda Coffee Development Authority, and the District local government may all profit from the study's conclusions. The findings of this study could raise awareness of smallholder coffee farmers' access of agricultural information in the value coffee chain for improving coffee productivity. The results of this study could be used by agricultural extension agents to develop a more effective strategy for smallholder coffee producers to share agricultural knowledge. The results of this study could help the Uganda Coffee Development Authority, local government, and Ministry of Agriculture, Animal Industry, and Fisheries by bringing to light the efficacy of the extension education and training programs provided to smallholder growers. Finally, the results of this study may serve as a body of literature for future researchers and scholars.

1.8 Theoretical and Conceptual Framework

Rogers' diffusion of innovation theory (Rogers, 1962), guided the conceptualization of this study. The theory aims to explain how, why, and how quickly new knowledge and technology proliferate within a community. According to the theory, adoption of an innovation depends on the sources of information used to create awareness about the innovation, the attributes of the innovation, the characteristics of the adopters, and the social system (Rogers, 1962; Zhang et al., 2015). This study focused on the sources of information and the characteristics of the smallholder coffee farmers. People get information about an innovation through different sources within a social system (Rogers, 1962). Hence, the study examined the different sources of information that enabled smallholder coffee farmers to access information on post-harvest management practices of coffee. The theory also underscores the importance of the characteristics of adopters in determining adoption of an innovation. According the study assessed how the socio-economic characteristics of smallholder coffee farmers influenced their access to information regarding post-harvest management practices of coffee. Finally, the study assessed how access to information and the socio-demographic characteristics of smallholder coffee farmers influenced their use of appropriate post-harvest handling management practices of coffee.

It is important to note that the type of media used for disseminating the information and other factors such as the political and geographical location not factored in this study could as well have influence on smallholder coffee farmers' access to information for coffee production and their ability to use it.

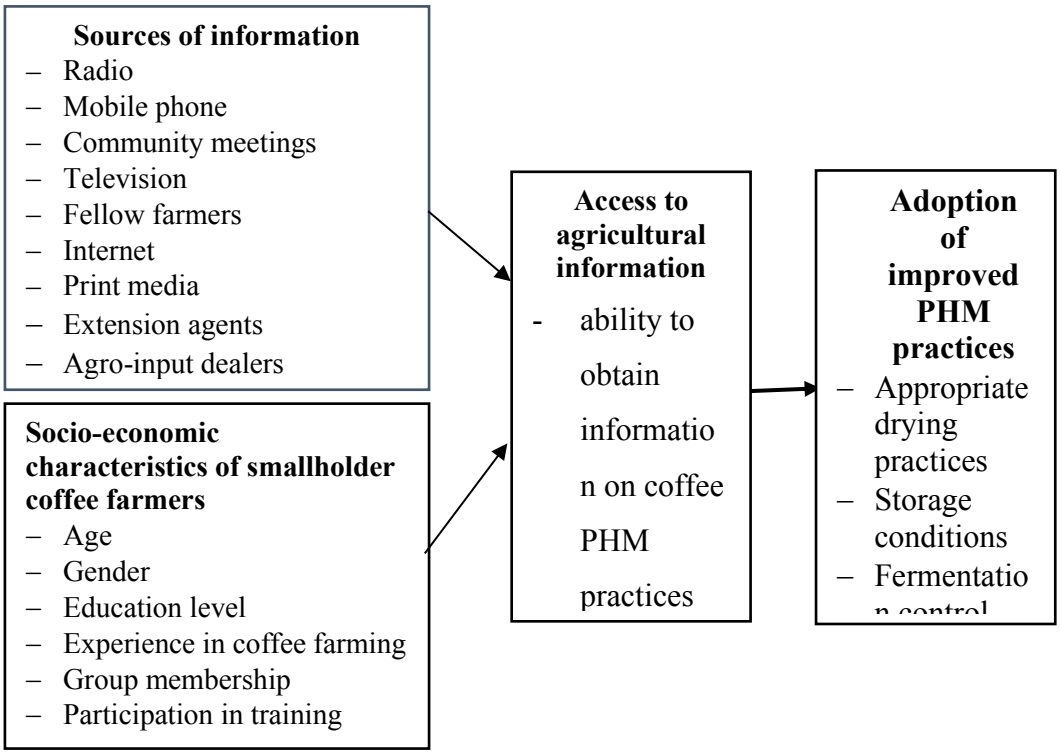

Figure 1.1: Conceptual framework of the study

The conceptual framework shows that socio-economic characteristics and sources of information affect smallholder coffee farmers' access to post-harvest management (PHM) information. The access to PHM information in turn influence smallholder coffee farmers' decisions to adopt appropriate coffee post-harvesting management practices.

The impact of socioeconomic characteristics on information access has been the subject of numerous researches. For example, Ahmad & Xu (2023) discovered that factors such as farm size, age, and education influence smallholder farmers' access to official and informal information sources. Furthermore, Anaglo et al. (2018) contend that gender and access to essential agricultural resources are significantly correlated, which is consistent with the framework's emphasis on taking socioeconomic factors into account in the research.

The role of sources of information in facilitating information access is supported by the diverse literature. (Nnamulondo, 2019) emphasis on aligning communication methods with local languages and visual aids resonates with the framework's recognition of the importance of communication sources. Furthermore, experiences documented in studies from Nigeria, Kenya, and Ethiopia underscore the positive influence of diverse channels, such as radio and mobile phones, on farmers' knowledge and practices ((Langat et al., 2018); (Lemma et al., 2019).

Summarily, the conceptual framework posits that the access to information as well as smallholder coffee farmers' socio-economic characteristics influences the adoption of improved coffee post-harvest management practices. This proposition finds substantial backing in the literature. Research by Ansah et al. (2018) and Luzinda et al. (2018) emphasizes the significance of relevant and enough information in influencing coffee growers' adoption of appropriate post-harvest management practices.

CHAPTER TWO: LITERATURE REVIEW

2.1 Coffee Post-Harvest Management Practices

Post-harvest management (PHM) refers to the sequence of practices and technologies applied to coffee cherries immediately after harvest to preserve quality, reduce losses, and ensure that the beans meet market and safety standards. These practices are critical because coffee quality and value are not determined by production alone but largely by how well cherries are handled after picking. According to the International Coffee Organization (ICO, 2022), PHM encompasses all processes from harvesting to transportation, with each stage influencing the physical, chemical, and sensory qualities of the beans.

Globally recognized coffee post-harvest management (PHM) practices include the timely harvesting of ripe cherries, proper sorting and grading, pulping, fermentation control, washing, drying, storage, and transportation, all of which are aimed at minimizing defects, enhancing flavor, and maintaining bean integrity (International Coffee Organization [ICO], 2022). Timely harvesting ensures that only fully ripe cherries are picked, while sorting and grading remove underripe, overripe, and defective cherries that compromise quality. In wet processing systems, pulping and controlled fermentation are critical for removing mucilage and enhancing desirable flavor attributes, with studies showing that optimized fermentation also reduces environmental impacts such as water use and effluent pollution (Martins et al., 2024). Drying is equally important, as research in Brazil demonstrated that the use of mechanical and solar dryers helps preserve phenolic compounds, maintain safe moisture levels, reduce fungal growth, and improve sensory quality compared to traditional sun drying (da Silva et al., 2024; Monitor Reporter, 2024). In Uganda, the Uganda

Coffee Development Authority (UCDA) has further promoted these practices through the provision of dryers, warehouses, and equipment to support selective harvesting, grading, and proper fermentation techniques (UCDA, 2022).

Drying is one of the most critical PHM steps, as it reduces bean moisture content to a safe level for storage and transport, generally between 10-12% (Sandeep et al., 2021; Uganda Coffee Handbook, 2022). Traditional sun drying on patios or raised beds remains common, but studies increasingly highlight the benefits of raised beds, solar dryers, and mechanical drying, which improve uniformity, reduce contamination, and help preserve desirable cup characteristics (Sandeep et al., 2021; Uganda Coffee Handbook, 2022). Storage conditions also play a key role: beans must be kept in cool, dry, and pest-free environments to prevent re-absorption of moisture, mould growth, or insect damage. The use of hermetic packaging materials such as GrainPro or PICS bags, and well-ventilated, clean warehouses with solid floors and distance from walls, have been shown to protect coffee quality and reduce post-harvest losses (Physicochemical Stability Study, Ethiopia, 2023; Uganda Arabica & Robusta Coffee Handbooks, 2022). Finally, proper transportation and handling ensure that the beans are not contaminated, mixed with lower-quality lots, or physically damaged before reaching buyers (Uganda Coffee Handbook, 2022).

The adoption of improved PHM practices has been consistently associated with higher bean quality, reduced losses, and better prices in both local and international markets. In countries such as Brazil, Vietnam, and Ethiopia, who are the leading global coffee producers, widespread use of improved practices has been attributed to the availability of agricultural information through extension services, cooperatives, and farmer associations (ICO, 2022).

Conversely, in many Sub-Saharan African countries, including Uganda, adoption remains limited due to poor access to information, inadequate infrastructure, and resource constraints.

In Uganda, coffee is the leading export crop and a major source of livelihood, particularly for smallholder farmers. However, limited knowledge and weak adoption of improved PHM practices undermine the country's ability to compete in global specialty markets. Research shows that while some farmers harvest coffee selectively and practice basic drying, more advanced practices such as fermentation control, the use of improved dryers, and hermetic storage are less common (Mukasa et al., 2025). Smallholders often rely on sun drying on bare ground, which exposes beans to contamination and quality deterioration. These gaps highlight the importance of strengthening farmers' access to agricultural information and technologies that promote proper PHM.

The literature clearly demonstrates that adoption of improved practices such as selective harvesting, controlled fermentation, raised-bed or solar drying, and proper storage leads to higher-quality coffee and improved incomes for farmers. However, in Bulambuli district, the adoption of such practices is constrained by information gaps, limited infrastructure, and resource challenges, underscoring the relevance of this study in exploring the relationship between access to agricultural information and the adoption of coffee PHM practices.

2.1 Meaning of farmers' access to agricultural information

The productivity and profitability of smallholder farmers in Africa are significantly affected by their ability to access agricultural information. Numerous studies have explored this topic across various African nations, crop

types, and farming contexts. According to Birch (2018), accessing agricultural information involves farmers being able to acquire and apply information that supports their farming and marketing efforts. Similarly, Tekinerdogan et al. (2020), defined access to agricultural information as the degree to which farmers are conscious of, have access to, and make usage of various sources and channels of information. Maake and Atwi (2022) defined access to agricultural information as the extent to which farmers have the opportunity and capability to access, understand, and apply information that can improve their farming practices and livelihoods. They measured access to agricultural information by using indicators such as frequency, diversity, and satisfaction of information sources and channels. Therefore, the ability of smallholder coffee farmers to get timely and pertinent agricultural information will be referred to as access to agricultural information in this study.

2.2 Sources of information and access to agricultural information

Communication plays a pivotal role in defining how effectively farmers can access, disseminate, and utilize agricultural information. One key factor shaping this relationship is the availability and accessibility of communication sources. In Eastern Uganda, where smallholder coffee farming is prevalent, the nature and extent of communication infrastructure can significantly impact farmers' access to information, as pointed out by Dagne and Oguamanam (2018), who found that the presence of reliable and widespread communication networks, such as mobile phone coverage and internet accessibility, facilitate timely and efficient information dissemination.

The effectiveness of communication sources, clear and easily understandable communication methods are essential for smallholder coffee farmers with

diverse educational backgrounds and linguistic variations (Nnamulondo, 2019).When information is communicated in a manner that aligns with local languages and visual aids, it enhances comprehension and utilization, thereby improving overall access. For this study, the sources of information will be conceptualized in terms of interactions and group discussions by fellow farmers, radio, mobile phone, television, community meetings, internet, print media, and extension agents.

Furthermore, a number of researchers have studied how mobile phones affect smallholder coffee farmers' access to agricultural information. Kumar (2023), for example, carried out a research looking at how Haryana farmers utilize their mobile phones to obtain agricultural information. With the use of an interview schedule and a standardized questionnaire, information was obtained from a sample of 300 respondents. According to the study, all farmers regularly use YouTube and WhatsApp to obtain the information they need, and they view mobile phones as helpful for expanding their agricultural expertise and raising awareness of emerging technology. Vargas et al. (2022) also discovered that farmers generally held a favorable view of using social media platforms to enhance their agricultural knowledge. Their research, conducted in the Philippines, examined how social media facilitated the exchange of information among farmers and how this shared knowledge supported farm productivity.

Langat et al. (2018) investigated the impact of television on Kenyan smallholder farmers' access to agricultural information and concluded that there was no meaningful correlation between television usage and the farmers’ ability to access relevant information. However, Butt et al. (2017) conducted a cross-sectional study on 120 smallholder farmers in Pakistan, , and found that age,

education, farm size, and income had significant positive effects on access to agricultural information through television, while gender and farming experience had no significant effects. They also found that television was the most favorite source of agricultural information among the respondents, followed by fellow farmers then extension agents. Similarly, Lemma et al. (2019) conducted a study in Ethiopia, and employed a participatory action research approach to facilitate community conversations among 212 male and female participants in four villages in the Ethiopian highlands, and found that community conversations improved women's awareness and knowledge on livestock and human health issues, increased their access to extension services and market information, and empowered them to voice their needs and preferences. But according to a study by Sigigaba et al. (2022), which evaluated how extension agents and community libraries provided smallholder farmers with agricultural information, the information dissemination services provided by extension officers were inadequate.

Numerous researches on the impact of print media on agricultural information access have been undertaken, and it has been discovered that print media affects smallholder coffee farmers' access to agricultural information worldwide. For instance, a study evaluating the use of print media in agricultural technology transfer was carried out in Pakistan by Farooq et al. (2018). All respondents cited print media and other farmers as their primary sources of agricultural information, according to the data, with pamphlets being the most popular type of print media. Posters, magazines, newspapers, books, and journals were also used by extension organizations to educate the farming community.

Finally, a study by Philipos et al. (2017) in Ethiopia examined the relationship between extension agents and access to agricultural information. Data was gathered through structured interviews with twenty-eight extension workers who were chosen at random from the Sidama zone of SNNPRs.

2.3 Farmers' socio-economic characteristics and access to agricultural information

Socio-economic characteristics of smallholder coffee farmers, such as their income, productivity, education, gender, and empowerment influence their access to agricultural information. This study sought to examine the extent to which socio-economic factors affect the type of information accessed and the adoption of coffee post-harvest handling practices among smallholder farmers in Bulambuli District.

The socio-economic characteristics of smallholder coffee farmers, such as age, gender, education level, experience in coffee farming, and group membership, affect their access to agricultural information, which in turn influences their adoption of improved technologies, productivity, and profitability of coffee production (Fidelugwuowo, 2022). In a survey conducted in Northern Pakistan, Ahmad and Xu (2023) found that socioeconomic variables such as family size, land ownership, government subsidies, livestock rearing, energy sources, and household income had a significant positive impact on farmers' decisions to plant trees on their farmland. However, age was negatively associated with accessing information from formal institutions like government bodies and research centers, while it positively influenced the use of informal sources such as friends, family, and neighbors. Similarly, a study by Maake and Atwi (2022) in South Africa revealed that age, plot size, and education level were positively

and significantly linked to farmers' access to agricultural information. This study also examined farmers' views on the effectiveness of public extension and advisory services. Despite these findings from other regions, there is limited research in Uganda regarding the factors that influence smallholder farmers' adoption of post-harvest management practices for coffee and their access to relevant information.

The relationship between gender and access to agricultural information of smallholder coffee farmers is a complex and context-specific issue that may affect the productivity, income, and empowerment of the farmers according to some studies. Godwin (2018) examined how often male and female farmers in Pakistan use different agricultural information sources and their preferences, aiming to understand gender-based disparities in access. The study found notable differences: women rarely relied on formal channels for agricultural information, favoring informal communication, while men tended to utilize and place greater value on official sources. In a related study, Lecoutere et al. (2020) explored how gender-sensitive ICT-based extension services impacted women's empowerment among maize-farming households in eastern Uganda. Their findings indicated that although women generally have less access to agricultural information than men, targeted information delivery can significantly enhance their agricultural performance.

Furthermore, several researchers have conducted studies on the role of education on access to agricultural information of smallholder farmers worldwide. For example, Phiri, (2018) conducted a study to investigate information seeking conduct of rural smallholder farmers in Malawi, and found that education level had a positive effect on the access to information from

formal sources, such as research institutions and government agencies, but a negative effect on the access to information from informal sources, such as friends, relatives, and neighbours.

Numerous scholars have looked into how farming experience affects smallholder farmers' access to agricultural information globally. For instance, a research by Mensah et al. (2023) examined how maize farmers in the Ashanti Region's Ejura-Sekyedumase Municipality accessed and used agricultural information. The study found a substantial association between accesses to credit, educational level, farming experience, extension visits, farm ownership type, with access to agricultural information.

Membership to a farmer association is also key factor that has been found to affect the access on agricultural information. In order to determine farmers' gratification with the quality of agricultural information and their preferences among the different sources, Wale and Mkuna (2023) performed a survey in KwaZulu-Natal, South Africa. The findings demonstrated that the primary factors influencing their satisfaction with the caliber of agricultural information were group participation, community gatherings, credit availability, occupation, gender, and influence from other farmers. In a related study, Fidelugwuowo (2022) examined the impact of smallholder farmers' socioeconomic characteristics on their access to agricultural information in south-eastern Nigeria. According to the study, access to agricultural information was positively and significantly correlated with farmer association membership, age, average yearly income, farmland size, and gender, education, farming experience, and farming type.

2.4 Factors that influence smallholder coffee farmers' adoption of post-harvest management practices.

The adoption of improved agricultural practices is critical for enhancing productivity, quality, and profitability in coffee farming. Age is often considered a factor that may influence farmers' decisions to adopt such practices Luzinda, Nelima, Wabomba, Musoli, and Kakuru (2018) carried out a cross-sectional survey involving 252 coffee-growing households to investigate the determinants of adopting improved Robusta coffee production technologies. Their study revealed that institutional factors—including access to credit, off-farm income, educational attainment, labor availability, and extension services—had a significant influence on the adoption of post-harvest management practices. However, age, gender, and landholding size were found to have no statistically significant influence. While Luzinda et al. (2018) focused exclusively on Robusta coffee farmers, this study focused on Arabica coffee farmers in Bulambuli District. In contrast, Million et al. (2020), examined the adoption of various coffee technologies among smallholder farmers in Jimma Zone, Ethiopia, a region renowned for its coffee production potential, and found that age significantly and negatively influenced the adoption of improved coffee varieties. This result suggests that older farmers are less likely to adopt advanced coffee technologies compared to their younger counterparts.

Education level is another widely studied factor affecting the adoption of agricultural technologies. Numerous studies have demonstrated its critical importance to farmers to effectively adopt and implement innovative farming practices. Both Luzinda et al. (2018) and Million et al. (2020) identified

education as a significant factor positively influencing the adoption of coffee technologies. Despite these valuable insights, the existing studies were conducted in distinct contexts and the study by Luzinda, Nelima, Wabomba, Musoli, and Kakuru (2018), focused on Robusta coffee farmers. This study sought to bridge the gap by examining the role of education in the adoption of improved coffee post-harvest management practices across all coffee farmers in Bulambuli District, Uganda.

Gender is another crucial factor influencing the adoption of improved agricultural practices, with studies highlighting disparities in access to resources and opportunities between male and female farmers. Tufa et al. (2022), examined gender differences in technology adoption and agricultural productivity in Malawi, and found that there was a significant relationship between gender and the use of improved technology practices. While Tufa et al. (2022), focused on general agricultural systems in Malawi, this study addresses that gap by exploring gender differences in the adoption of improved coffee post-harvest management practices among farmers in Bulambuli District. Contrary to these findings, Luzinda et al. (2018) reported no significant relationship between gender and the adoption of improved Robusta coffee production technologies in Uganda.

Membership in coffee farming groups is another important factor influencing the adoption of improved coffee management practices. Bravo-Monroy et al. (2016), examined the drivers influencing farmers' decisions to adopt organic or conventional coffee management practices in Colombia and highlighted the significance of membership in community organizations. Their findings showed that participation in these groups plays a critical role in shaping farmers'

decisions, as these organizations often provide access to technology, information, and training on best practices.

Farming experience is another well-established factor in influencing the adoption of agricultural technologies. Ainembabazi and Mugisha (2014), investigated this relationship among smallholder farmers in Uganda, focusing on banana, coffee, and maize production. Their study revealed an Inverted-U relationship, where farming experience positively affects the adoption of agricultural technologies during the early stages but loses significance as farmers become accustomed to the practices. However, there is a notable gap in recent studies addressing the evolving role of farming experience in the context of modern agricultural technologies.

Similarly, Luzinda et al. (2020) examined the role of farming experience in the adoption of improved agricultural technologies among smallholder farmers. Their findings indicated that farmers with moderate levels of experience were more likely to adopt new technologies compared to those with minimal or extensive experience. Despite these insights, there is a notable gap in recent studies addressing the evolving role of farming experience in the context of modern agricultural technologies. Given the advancements in farming practices and the increasing influence of digital tools and data-driven approaches, it is essential to revisit the role of experience in shaping adoption decisions.

Participation in training programs plays a pivotal role in preparing farmers with the knowledge and skills necessary for adopting improved agricultural practices. Midamba and Kizito (2022), investigated the determinants of access to training on post-harvest loss (PHL) management among maize farmers in Uganda and found that participation in training significantly influenced the adoption of

improved practices, thereby minimizing losses. Farmers who accessed training, primarily through extension workers, farmer groups, and farmer-to-farmer interactions, were more likely to implement better PHL management practices, resulting in reduced losses during the production stage. While Midamba and Kizito (2022), focused on maize farming, the importance of training in minimizing losses through improved practices is equally relevant to coffee farming. Similarly, in a study conducted in Temanggung Regency on Java Arabica Sindoro-Sumbing coffee farmers by Royan (2024), it was found that farmer-to-farmer training played a pivotal role in promoting the uptake of good agricultural practices. This mode of training fosters trust and understanding as farmers share practical experiences and context-specific knowledge, making the practices more relatable and easier to implement.

Access to agricultural information can also influence smallholder farmers' adoption of improved post-harvest management practices, which are essential for ensuring high quality and reducing losses of coffee beans. Access to agricultural information, according to Luzinda, Nelima, Wabomba, Musoli, and Kakur (2018), influences smallholder farmers' adoption of appropriate drying practices, which are essential for preserving the flavor and quality of coffee beans. The adequacy and relevance of the information sources, ease of use of the accessed information, and timely access of information influence farmers' intention and behavior towards adopting new practice (Kapgen & Roudart, 2023; Narine et al., 2019). Ansah et al. (2018), conducted a cross-sectional study in Ghana and found that one of the issues causing farmers to use poor post-harvest management methods is a lack of information. In a related study, Tibagonzeka et al. (2018) examined post-harvest handling procedures and losses for starchy

staples and legumes in Uganda. The findings showed that while 54% of farmers received sufficient information, fewer than 20% of them actually used it.

2.5 Overview of literature reviewed

This literature review was focused on the determinants of access to information and adoption of PHM among farmers. Within the empirical literature reviewed, an exploration of socio-economic characteristics of the smallholder farmers reveals nuanced effects of variables such as age, gender, education, farming experience, and association membership on farmers' access to information. The examination of sources of information including radio, mobile phones, the Internet, television, print media, fellow farmers, community meetings, and extension agents show the diverse sources of information that influence farmers' access to agricultural information. The examined studies repeatedly showed a strong correlation between farmers' adoption of enhanced post-harvest handling (PHH) methods and their access to agricultural information. The adoption of post-harvest management practices among smallholder coffee farmers was also found to be influenced by factors such as education, gender, farming experience, training, group membership, and access to information. Education consistently enhances adoption, while gender disparities limit women's access to resources. Farming experience shows mixed results, with moderate experience often leading to higher adoption rates. Training and access to relevant, timely information significantly improve the uptake of practices, but gaps in information usage and accessibility remain. However, existing studies often focus on specific coffee types or regions, leaving gaps in understanding adoption across diverse contexts and demographics. These gaps underscore the need for broader and more inclusive research to address varying adoption

dynamics. However, most of the reviewed studies were conducted outside Uganda and the variables were not conceptualized in the same way as the proposed study does. The proposed study, therefore aims to fill these gaps by conducting a related study among smallholder coffee farmers in Bulambuli district.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Study area

The research was carried out in Uganda's Bulambuli district. Bulambuli is situated 32 kilometers (20 miles) northeast of Mbale and 280 kilometers (170 miles) northeast of Kampala, the capital and largest city of Uganda The (Wikipedia, 2014) terrain consists of farmed regions, grasslands, and montane forests.

The study was conducted in Buginyanya and Namisuni sub-counties, Bulambuli District. The sub-counties of Buginyanya and Namisuni are renowned for coffee production. Beyond coffee, other economic activities include subsistence agriculture, livestock rearing, and small-scale trade. According the 2014 National population and Housing census, Namisuni has 2,155 households and Buginyanya has 1,855 households (UBOS, 2014). More so, according to the 2014 National Population and Housing Census (UBOS, 2014), about 38.7% of the households in Bulambuli district are engaged in coffee growing. Based on the above statistics, about 1,552 households in Namisuni and Buginyanya sub-counties are engaged in smallholder coffee growing and thus 1,552 household heads formed the target population for this study. Buginyanya and Namisuni were deliberately selected to provide a representative understanding of smallholder coffee farming practices within the broader context of the district.

3.2 Research design

Data on the factors influencing smallholder coffee farmers in Bulambuli District, Eastern Uganda, to adopt post-harvest management methods and obtain information were gathered using a cross-sectional survey methodology. In order

to investigate the factors influencing smallholder coffee farmers in Bulambuli district, Eastern Uganda, to obtain and use post-harvest management information, the study used a quantitative research approach that includes the collection and analysis of numerical data. This was appropriate for the study's goals, which included evaluating the connections between the variables. In addition to being more practicable and feasible, a cross-sectional design offered a sizable and representative sample of the population while requiring less time and resources than a longitudinal approach.

3.3 Study population

The proposed study was conducted on the smallholder coffee farmers in Buginyanya and Namisuni sub-counties, Bulambuli District. Namisuni has 2,155 household and Buginyanya also has 1,855 households as per the (NPHC, 2014), thus the target population was the 1552 coffee farmers from these households. The researcher considered only the household heads when selecting the coffee farmers to include in this study.

3.4 Sample size and sampling procedure

The sample size was determined using the Yamane formula for sample size calculation in populations:

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

Where:

n is the sample size, N is the population size, e is the margin of error, which was 0.05 for this study.

Thus $n = \frac{1,552}{1+1,552(0..05)^2}$

$$n = \frac{1,552}{3.88}$$

n = 318 smallholder farmers

This study therefore used a sample of 318 smallholder coffee farmers from Buginyanya and Namisuni sub-counties, Bulambuli District.

Stratified random sampling method was used to select the smallholder coffee farmers that were involved in the study. Initially, smallholder coffee farmers in Bulambuli district were divided into strata by sub-counties. The two sub-counties of Buginyanya and Namisuni sub-counties with the most coffee farmers were chosen. Then, 159 smallholder coffee farmers were randomly selected within each sub-county to ensure representation across the population. This method improved the accuracy and generalizability of research findings by accounting for variations within different geographical locations.

3.5 Data collection methods and tools

The study employed a quantitative approach, employing structured questionnaire for smallholder coffee farmers. The structured questionnaire was efficient for collecting data from a relatively larger sample of smallholder farmers, contributing to resource efficiency.

3.5.1 Questionnaires for coffee farmers

Structured questionnaires were administered to coffee smallholder farmers within the study area. Participants responded to closed-ended categorical questions and Likert scale statements, provided quantitative data on their

demographics, sources of information, and perceptions of the quality and accessibility of agricultural information.

To determine the influence of the socio-demographic characteristics of the farmers on the access to post harvest management information, data was collected on variables including the age, gender, education level, experience in coffee farming, group membership, as well as data on the relevance of the information, ease of access, timeliness, and the adequacy of the information.

To examine the influence of sources of information on access to agricultural information on harvesting and post-harvest management practices, data was collected on the use of sources of information including radios, mobile phones, community meetings, television, internet, print media, and extension agents.

For the third objective on the influence of access to information and the adoption of improved post management practices, data was collected on the use of fermentation control, appropriate drying practices, and storage conditions.

3.6 Measurement of variables

The study operationalized key variables based on the conceptual framework and supported by existing literature. For socio-economic characteristics, the age, gender, education level, experience in coffee farming, group membership was categorized and measured to understand their influence on information access, aligning with findings from Ahmad and Xu (2023). Sources of information considered for this study included radio, mobile phones, and community meetings, in line with (Nnamulondo, 2019) emphasis on these sources of communication.

Relevance, timeliness, ease of use, and adequacy were the criteria used to measure the dependent variable, access to agricultural information. Studies by Luzinda et al. (2018) and Ansah et al. (2018), support these characteristics, which measure the quality of information availability while taking into account how it affects farmers' decision-making processes. Participants responded to closed-ended categorical questions and Likert scale statements, providing quantitative data on their demographics, sources of communication, and perceptions of the quality and accessibility of agricultural information. Furthermore, the study evaluated the influence of access to information on the adoption of improved post handling practices, and collected Likert data on the use of processing practices, appropriate drying practices, and storage.

3.7 Data quality control

To ensure data quality, the questionnaire was pre-tested, and the content validity index calculated as below;

3.7.1 Data validity

According to (Ragin, 2011), validity is the degree to which the instrument is relevant in measuring what it is intended to measure or the veracity of the results. The Content Validity Index (CVI) was used to statistically assess the instrument's validity. This involved the expert assessment of the instrument's questions based on their applicability to the research variables. Index (CVI) was calculated using the following formula:

$$CVI = \ (Number\ of\ relevant\ items)/(Number\ of\ total\ items) \ \times 100$$

A CVI value of 0.94 was attained and this was considered acceptable since it was greater than the 0.7 threshold (Amin, 2005). The CVI results are presented below;

Variable	**Number of Items**	**CVI**
Sources of Information	9	0.89
Access to PHM information	4	0.92
Adoption of improved PHM practices	4	0.94
Overall CVI (Average)	**17**	**0.92**

Source: Primary Data (2025)

3.7.2 Reliability

Reliability refers to the degree of consistency and reproducibility of the data collected. To assess the dependability of the questionnaire, both internal consistency and test-retest reliability were examined. Internal consistency was measured using Cronbach's alpha coefficient to determine how effectively the items under each construct measured the same concept and the extent to which they were correlated. Cronbach's alpha values range from 0 to 1, with higher values indicating greater reliability. A coefficient of 0.7 or above is considered acceptable (Dalawi et al., 2023). The coefficients obtained were Sources of Information ($\alpha = 0.81$), Access to PHM Information ($\alpha = 0.85$), and Adoption of Improved PHM Practices ($\alpha = 0.88$), with an overall Cronbach's Alpha of 0.86. Since all values were above the acceptable cut-off of 0.70, the instrument was deemed reliable for data collection.

A sub-sample of 20 respondents completed the instrument twice at a two-week interval, and Pearson's correlation coefficients were computed between the two sets of responses. The results showed satisfactory stability across the constructs, with Sources of Information (r = 0.79), Access to PHM Information (r = 0.83), and Adoption of Improved PHM Practices (r = 0.85). The overall test-retest reliability coefficient was r = 0.82, which is above the acceptable threshold of 0.70 ((Matheson, 2019). These findings indicate that the instrument produced consistent results across time and can therefore be considered reliable for the study.

3.8 Data analysis

Data collected in this study were analyzed using descriptive and inferential statistics in SPSS Version 20. Descriptive statistics were used to summarize respondents' demographic and socioeconomic characteristics, while binary logistic regression was employed to examine associations between independent variables and the binary dependent variables. The significance threshold for all statistical tests was set at 0.05. Binary logistic regression was considered appropriate because the dependent variables in the study, access to post-harvest management information and adoption of improved post-harvest management practices, were measured as binary outcomes. This method allows estimation of the probability of the outcome based on both continuous and categorical predictors without assuming a linear relationship between predictors and the dependent variable.

3.8.0 Assumptions of binary logistic regression

Before fitting the regression models, the key assumptions of binary logistic regression were assessed. The linearity of continuous predictors with the logit of the dependent variables was tested using the Box–Tidwell procedure, and all interaction terms were found to be non-significant, indicating that the assumption of linearity was satisfied.

Multicollinearity among predictors was evaluated using Variance Inflation Factor (VIF) and Tolerance values. For this assessment, a placeholder dependent variable was used in linear regression, since VIF measures the correlation among predictors and is independent of the dependent variable. All predictors had VIF values below 5 and Tolerance values above 0.2, confirming the absence of significant multicollinearity. Independence of observations was ensured through the study design, as each respondent represented a unique case, with no repeated measurements or clustering.

In addition, the sample size provided more than ten events per predictor variable, satisfying the recommended threshold for stable coefficient estimation. Collectively, these tests confirmed that the data were appropriate for binary logistic regression and that the resulting estimates could be interpreted reliably.

3.8.1 Sources of information and access to post harvest management information

The first objective of the study was to determine the influence of the different sources of information on the access to post-harvest management information. The sources of information considered for this study were Radio, Mobile phone,

Community meetings, Television, Fellow farmers, Internet, Print media, and Extension agents. Information on the different sources of communication were measured on a binary scale (yes/no) showing whether the farmer accesses the information using the given sources or not. The dependent variable was the access to post-harvest management information, measured on a binary scale. The association between the different sources of information and access to PHM information was tested using binary logistic regression model as shown below:

$$Logit\ (p) = a + b_1x_1 + b_2x_2 + b_3x_3 + \ldots\ldots\ldots\ldots\ldots\ldots + b_nx_n + e$$

Where; p = is the probability of access to PHM information

α = is the coefficient on the constant term

b_1= is the coefficient(s) on the independent variable(s)

x_1= independent variables (Radio, Mobile phone, Community meetings, Television, Fellow farmers, Internet, Print media, and Extension agents).

e = is the error term

3.8.2 Socio-economic characteristics and access to coffee post-harvest management information

The socioeconomic traits of the farmers served as the independent variables. The socioeconomic factors taken into account in this study included group membership, age, gender, education level, and coffee farming experience. The dependent variable was the access to post-harvest management information, measured on a binary scale. The binary logistic regression model used for this study is shown below:

$Logit\ (p) = a + b_1x_1 + b_2x_2 + b_3x_3 + . \ldots\ldots\ldots\ldots\ldots\ldots + b_nx_n + e$

Where; p = is the probability of access to PHM information

α = is the coefficient on the constant term

b_1 = is the coefficient(s) on the independent variable(s)

x_1 = independent variables (age, gender, education level, experience in coffee farming, and farmers group membership).

e = is the error term.

3.8.3 Factors that influence smallholder coffee farmers' adoption of post-harvest management practices

Adoption of post-harvest management (PHM) practices was the dependent variable for this objective. It was measured using a five-point Likert scale across multiple items and then categorized into a binary variable, where 1 = adopters (responses "Agree" and "Strongly Agree") and 0 = non-adopters (responses "Strongly Disagree," "Disagree," and "Not Sure"), following common practices in agricultural adoption research (Kirimi et al., 2021; Martínez-García et al., 2016).

The relationship between the independent variables and adoption of PHM practices was analyzed using a binary logistic regression model, as shown below:

$Logit\ (p) = a + b_1x_1 + b_2x_2 + b_3x_3 + . \ldots\ldots\ldots\ldots\ldots\ldots + b_nx_n + e$

Where; p = is the probability of adoption of PHM practices

α = is the coefficient on the constant term

b_i = is the coefficient(s) on the independent variable(s)

x_i = independent variables (access to PHM information, age, gender, education level, experience in coffee farming, and group membership).

e = is the error term.

3.9 Ethical considerations

The researcher made sure that the research was carried out in an ethical and responsible manner by adhering to the rules and principles that govern research. All participants gave their informed consent after being fully told about the study's goals, methods, risks, rewards, and participants' freedom to discontinue participation at any moment.

The researcher promised to protect the participants' and their data's privacy and confidentiality. Participants' names and contact information, among other personal information, were guaranteed to be kept private and not disclosed to other parties without their permission. After being anonymized and coded, the information gathered from the survey was safely kept on a password-protected computer. Only the objectives of the study were served by the data, which was deleted.

The researcher also minimized the potential harm or distress to the members. The questionnaire did not contain any sensitive or violent questions, and the members were free to skip any questions that they do not wish to answer. The study provided the participants with contact information of the researcher and the supervisor, in case they have any questions or concerns about the study. The

researcher also sought ethical approval from Kyambogo University directorate of graduate training before conducting the data collection.

CHAPTER FOUR: PRESENTATION AND INTERPRETATION OF RESULTS

4.0 Introduction

This chapter presents and interprets the findings of the study based on the data collected from smallholder coffee farmers in Bulambuli District, Eastern Uganda. The objectives of the study were to: to assess the influence of sources of information on smallholder coffee farmers' access to information on post-harvest coffee management practices; to determine the influence of smallholder coffee farmers' socio-economic characteristics on access to information on post-harvest coffee management practices; and to assess the factors that influence smallholder coffee farmers' adoption of post-harvest management practices. The chapter covers the socio-demographic characteristics of the respondents, descriptive statistics, and the interpretation of the findings based on the study objectives.

4.1 Response rate

A total of 318 questionnaires were administered to smallholder coffee farmers in Bulambuli District, of which 290 were fully completed and returned, yielding a response rate of 91.2% (290/318 × 100). As recommended in survey methodology literature, response rates above 80% are generally acceptable for analysis, while rates above 90% are considered excellent, particularly for face-to-face or researcher-administered surveys (Dillman, 2014; Van Velthoven et al., 2018). Therefore, the response rate achieved in this study was deemed sufficient

for data analysis and statistical inference. Furthermore, the sample size of 290 respondents was considered adequate for generalization to the population of 1,552 smallholder coffee farmers. According to Mugenda and Mugenda (2003), a sample size of at least 10% of the accessible population is generally acceptable for studies involving large populations. Since the current study sample represents approximately 18.7% of the total population, it meets and exceeds this threshold, thereby providing a reliable basis for generalizing the study findings to the entire population.

4.2 Socio-demographic characteristics of smallholder farmers

The socio-demographic characteristics of the respondents were analyzed to understand the background of the smallholder coffee farmers in Bulambuli District, and the results presented in Table 4.1.

The majority of the respondents were male, accounting for 70.7%. This gender distribution indicates a predominance of male involvement in coffee farming activities in the district, which reflects the traditional gender roles and possibly influence on access to resources and information. A considerable proportion (about 59%) of the respondents had attained at least secondary education and only a few had no formal education (4.8 %,). The education levels suggest that a considerable number of farmers have at least basic education, which could facilitate their ability to seek for information and adoption of improved farming practices and technologies. The majority of the respondents were above 36 years of age. The age distribution shows a mature farming population, with a significant proportion of middle-aged and older farmers who may have extensive experience but might also be more resistant to change compared to younger farmers.

Table 4. 1: Socio-demographic characteristics of respondents

Characteristics (N=290)	Frequency	Percent (%)
Sex		
Male	205	70.7
Female	85	29.3
Level of education		
No formal education	14	4.8
Primary level	105	36.2
Secondary	128	44.1
Tertiary	43	14.8
Age (Years)		
18 - 35	61	21.0
36 - 50	156	53.8
Over 50	73	25.2
Experience in coffee farming		
Less than 5 years	32	11.0
6 to 10 years	87	30.0
Over 10 years	32	11.0
Membership to a coffee farmers' group		
Yes	51	17.6
No	239	82.4

The majority of the respondents (89%) had over 6 years of experience in coffee farming. The extensive experience among the majority of farmers indicates a deep understanding with coffee farming, which could positively impact the adoption of post-harvest management practices, since experienced farmers may better appreciate the benefits of such practices. Further, the majority of the respondents (82.4 %,) were not members of any coffee farmers' group. This suggests limited collective action, which might limits sharing of information

and farmers' access to shared resources or support systems that could enhance adoption of coffee post-harvest management practices.

The size of coffee gardens ranged from a minimum of 0.3 acres to a maximum of 10 acres, with a mean size of 1.422 acres and a standard deviation (SD) of 1.3822 acres (Appendix III). This indicates that majority of farmers have less than 3 acres of land therefore categorized as smallholders. There is a considerable variability in farm sizes given the SD, suggesting diverse scales of coffee farming operations among the smallholder farmers. The variation could affect resource availability and the ability to adopt post-harvest management practices, with larger farms potentially having more capacity to implement improved techniques compared to smaller farms.

4.3 Sources of Information and Access to Coffee PHM Information

The first objective sought to determine the influence of the different sources of information on access to information on post-harvest coffee management practices. The sources of post-harvest management (PHM) information utilized by smallholder coffee farmers in Bulambuli District were identified in Table 4.2.

Table 4. 2: Sources of post-harvest coffee management information

Sources of post-harvest management practices information	Frequency	Percentage (%)
Radio	261	90.3
Mobile phones	147	50.9
Community meetings	233	80.6
Television	49	17.0
Fellow farmers	225	77.9
Internet	51	17.6
Print media (Fliers, newspapers, manuals)	60	20.8

Extension agents	233	80.6
Agro-input dealer	211	73.0

The data on sources of post-harvest management practices (PHMP) information utilized by smallholder coffee farmers in Bulambuli District revealed important insights into the preferred sources of information in the region. Radio was the most widely used source, with 90.3% of farmers relying on it for information on PHM practices of coffee. This high percentage underscored the importance and accessibility of radio as a means to access agricultural information in rural areas, where other forms of media were less available. Community meetings also played a significant role, with 80.6% of farmers obtaining crucial information on PHM practices from them. This indicated the importance of social interactions and communal learning in spreading agricultural practices and knowledge. Extension agents were key sources of PHMP information, utilized by 80.6%. Extension agents provided expert advice and training, which was essential for improving agricultural practices and productivity.

Fellow farmers were also a critical source of PHM information, with 77.9% of respondents indicating they relied on peer interactions for learning about post-harvest practices. This highlighted the value of experiential learning and the sharing of practical knowledge within farming communities. Agro-input dealers were also a main source of information on PHM practices of coffee utilized by 73.0% of the farmers. The significant reliance on agro-input dealers indicated that these dealers not only supplied necessary agricultural inputs but also served as important information hubs for farmers seeking guidance on post-harvest

management. The dual role of these dealers enhanced their importance in the agricultural information network.

Mobile phones were another notable source, used by 50.9% of the farmers. This suggested that mobile technology was a significant tool for information dissemination, through calls, SMS, or mobile applications that delivered timely and relevant agricultural advice. The widespread use of mobile phones reflected their increasing penetration in rural areas and their potential to enhance communication and access to information.

In contrast, less than a quarter of the farmers relied on television (17.0%), the internet (17.6%), and print media (20.8%) as sources of information for coffee PHM practices. The limited access to these media forms, can be explained by infrastructural challenges such as lack of electricity, and poor internet connectivity. Despite, their lower usage, these sources still contributed to the overall access to information on PHM practices of coffee information.

A binary logistic regression analysis was performed to establish the influence of the source of information on the likelihood that smallholder coffee farmers' access PHM information as seen in table 4.3.

Table 4. 3: Sources of information and access to PHM information

Variables in the Equation				
	Exp(B)	S.E.	Wald	Sig.
Radio (Yes)	2.236	1.283	1.268	0.001*
Mobile phones (Yes)	1.965	0.659	1.052	0.350
Community meetings (Yes)	2.805	0.664	2.411	0.084
Television (Yes)	1.502	1.115	0.133	0.453
Fellow farmers (Yes)	1.305	1.168	1.035	0.000*
Internet (Yes)	2.688	1.187	0.694	0.316
Print media (Fliers, newspapers, manuals)	2.429	1.096	0.656	0.032*

[yes]				
Extension agents (Yes)	8.406	0.621	11.767	0.001*
Agro-input dealer (Yes)	1.073	0.755	0.009	0.047*
Constant	0.002	1.750	12.444	0.000

**p < 0.05; -2loglikelihood = 68.527; Cox and Snell R Square =0.099; Nagelkerke R square = 0.280*

It was established that radio, fellow farmers, print media, extension agents and agro-input dealers, were found to have a significant influence on smallholder coffee farmers' accessing information on PHM practices of coffee.

Farmers who used the radio were found to be 2.236 times more likely to access coffee PHM information compared to those who did not use the radio (Exp(B) = 2.236, Sig. = 0.001). This substantial increase underscored the radio's critical role in enabling smallholder coffee farmers' access to essential post-harvest management practices information. Similarly, farmers who interacted with fellow farmers were 1.305 times more likely to access coffee PHM information compared to those who did not engage with their peers (Exp(B) = 1.305, Sig. = 0.000). This finding highlighted the importance of peer interactions in facilitating the exchange of information on post-harvest management practices of coffee.

The use of print media, including fliers, newspapers, and manuals, increased the likelihood of accessing PHM information by a factor of 2.429 (Exp (B) = 2.429, Sig. = 0.032). This demonstrated that traditional print media remains a valuable source of information for smallholder coffee farmers. Extension agents had a particularly strong effect, with farmers who received information from them being 8.406 times more likely to access coffee PHM information compared to those who did not interact with them (Exp(B) = 8.406, Sig. = 0.001).

Interacting with agro-input dealers increased the likelihood of accessing coffee PHM information by a factor of 1.073 (Exp (B) = 1.073, Sig. = 0.047). Although the effect was relatively modest, it indicated that agro-input dealers contributed to smallholder coffee farmers' accessing information on post-harvest management practices of coffee.

In contrast, mobile phones (Exp (B) = 1.965, Sig. = 0.350), television (Exp (B) = 1.502, Sig. = 0.453), and the internet (Exp (B) = 2.688, Sig. = 0.316) did not have a statistically significant influence on smallholder coffee farmers' access to coffee PHM information. Despite the higher odds ratios for these digital communication channels, they did not show a substantial effect on improving access to post-harvest coffee management information.

4.4 Socio-economic characteristics and access to PHM information

The second objective sought to determine the influence of smallholder coffee farmers' socio-economic characteristics on access to information on post-harvest coffee management practices. A binary logistic regression results are presented in table 4.4.

Table 4. 4: Socio-economic characteristics and access to PHM information

	Exp(B)	**S.E.**	**Wald**	**Sig.**
Gender	0.596	0.629	0.679	0.410
Education	1.303	0.397	9.051	0.003*
Age	1.825	0.510	1.390	0.238
Experience	1.427	0.485	3.078	0.039*
Membership of coffee farming group	2.952	0.722	0.005	0.046*

Garden size	1.565	0.137	10.687	0.001*
Constant	1.848	1.758	0.122	0.727

**p < 0.05, -2loglikelihood = 99.147, Cox and Snell R Square =0.082, Nagelkerke R square = 0.235*

It was established that age, experience in farming, membership in a coffee farming group, and garden size had a significant influence on access to post-harvest management (PHM) information.

Education was a significant predictor of access to PHM information (Sig. = 0.003). Farmers with higher levels of education were 1.303 times more likely to access information PHM practices of coffee compared to less-educated farmers. This indicates that education increases farmers' likelihood of seeking and accessing relevant agricultural information, probably because it enhances their capacity to understand and engage with information sources effectively.

Experience in coffee farming also significantly influenced access to PHM information (Sig. = 0.039). The odds of accessing this information increased by a factor of 1.427 for farmers with greater experience. This finding suggests that experienced farmers are better positioned to recognize the value of appropriate PHM practices and are therefore more proactive in seeking information to optimize their farming activities.

Membership in coffee farming groups was another significant factor (Sig. = 0.046). Farmers who were members of such groups were 2.952 times more likely to access PHM information compared to non-members. This highlights the importance of social networks and collective participation in promoting

information sharing, as group members often benefit from shared knowledge resources and organized training sessions.

Garden size was significantly associated with access to PHM information (Sig. = 0.001), with an odds ratio of 1.565. This means that farmers managing larger coffee gardens are more inclined to seek PHM information, possibly due to the greater economic stakes involved in their farming operations. Larger-scale farmers may also have more resources to invest in acquiring and applying information obtained to improve productivity of their coffee plantations.

On the other hand, gender and age were not significant predictors of access to PHM information, suggesting that both male and female farmers and those across different age groups have comparable levels of access to information on PHM of coffee.

4.5. Factors influencing farmers' adoption of coffee post-harvest management practices

The third objective sought to determine the factors that influence smallholder coffee farmers' use of post-harvest coffee management practices. A binary logistic regression results are presented in table 4.5.

Table 4. 5: Factors influencing the adoption of coffee PHM practices

Variable	Exp(B)	**S.E.**	**Wald**	**Sig.**
Age	0.929	0.032	5.45	0.020*
Access to PHM Information	1.421	0.043	67.65	0.000*
Gender	1.088	0.041	4.88	0.027*
Education level	0.991	0.024	0.26	0.610
Experience in coffee farming	1.022	0.033	0.48	0.490

Membership to coffee farming group	1.184	0.050	12.25	0.000*
Size of coffee garden (acres)	1.002	0.015	0.19	0.660

**p < 0.05; Cox & Snell R^2 = 0.325; Nagelkerke R^2 = 0.436; and McFadden R^2 = 0.281*

The Nagelkerke R^2 = 0.436 indicates that 43.6% of the variation in the adoption of improved post-harvest management (PHM) practices among smallholder coffee farmers is explained by the combined effects of age, access to PHM information, gender, and membership in coffee farming groups. This shows a moderate explanatory power of the model, consistent with the recommendation by Hair et al. (2014) and Kock (2013) that R^2 values above 0.20 are acceptable in social science research.

The logistic regression results revealed that age (Exp(B) = 0.929, p = 0.020), access to PHM information (Exp(B) = 1.421, p = 0.000), gender (Exp(B) = 1.088, p = 0.027), and membership in a coffee farming group (Exp(B) = 1.184, p = 0.000) significantly influence the likelihood of adoption of improved PHM practices.

4.6 Constraints to access and adoption of PHM practices

Table 4. 6: Constraints to access and adoption of PHM practices

Constraints to access to harvest management practices information	Frequency	Percentage (%)
I find it difficult to contact an extension agent	72	25.3
I am not able to read and write (illiteracy) relevant print materials	54	18.9
Poor radio and television signals	146	51.2
Timing of agricultural programs on radio and	152	53.3

television is not suitable for me		
The telecommunication signals are not good making it difficult to use phones	180	63.2
Lack of money to purchase newspapers or manuals with relevant information,	236	82.8

The study identified various constraints that hinder smallholder coffee farmers in Bulambuli District from accessing and adopting improved post-harvest management (PHM) practices, thereby limiting their ability to enhance productivity and quality in coffee cultivation.

As per Table 4.6 above, poor radio and television signals were reported by 51.2% of respondents, limiting access to agricultural programs that are crucial for disseminating information on PHM practices. As radio and television are important communication sources of information in rural areas, unreliable signals disrupt farmers' ability to receive timely updates, affecting their capacity to adopt improved practices.

Inconvenient timing of agricultural programs on radio and television was cited by 53.3% of respondents as another barrier. Agricultural programs often air at times that overlap with farmers' work hours or other responsibilities, preventing them from accessing vital information on PHM practices.

Telecommunication signal issues were highlighted by 63.2% of respondents as a major constraint. Poor mobile network signals impede farmers' ability to communicate with extension agents, access online resources, and participate in mobile-based agricultural initiatives, thus restricting their opportunities for learning and implementing PHM practices.

Financial constraints were the most prevalent issue, affecting 82.8% of respondents. A lack of funds to purchase essential resources, such as

newspapers or manuals containing PHM information, limits farmers' access to the necessary materials and knowledge required to improve coffee quality and productivity.

CHAPTER FIVE: DISCUSSION OF FINDINGS AND RECOMMENDATIONS

5.1 Introduction

The chapter is organized into the following sections: discussion of findings, conclusions, recommendations, and areas for future research.

5.2 Discussion of findings

5.2.1 Sources of information and access to PHM information

The first objective of the study aimed to determine the influence of different sources of information on smallholder coffee farmers' access to post-harvest coffee management (PHM) information. Findings indicate that radio, peer interactions, print media, extension agents, and agro-input dealers significantly influence smallholder coffee farmers' access to post-harvest management (PHM) information. Having a radio increased the smallholder coffee farmers' access PHM information on coffee by 2.236 times. This is consistent with Mwombe et al. (2014) who established farmers often accessed information about banana growing from radios. Further, interacting with fellow farmers increased the smallholder coffee farmers' access PHM information on coffee by 1.305 times. Print media increased smallholder coffee farmers' access to PHM information on coffee by 2.429 times. The effectiveness of print media in disseminating agricultural information is corroborated by Farooq et al. (2018), who found that

pamphlets, posters, and newspapers are widely used and effective in educating farmers about agricultural technologies. Extension agents had the strongest influence of increasing smallholder coffee farmers' access to PHM information on coffee by 8.406 times. This is consistent with the findings of Philipos et al. (2017), who concluded that extension services are a primary source of agricultural information for farmers, which significantly enhances their knowledge and practices. Agro-input dealers also had a modest but significant influence. Agro-input dealers' influence on farmers' access to PHM information on coffee aligns with Butt et al. (2017), who indicated that such interactions play a role in providing essential agricultural information. These results highlight the importance of both non-interpersonal and interpersonal communication sources of information in enabling smallholder coffee farmers accessing information on coffee post-harvest management.

However, some findings contrast with existing literature. Mobile phones not having a significant influence on smallholder coffee farmers' access to PHM information on coffee is contrary to Kumar (2023), who found that farmers in Haryana frequently used mobile platforms like WhatsApp and YouTube to access agricultural information. This discrepancy could be due to different levels of mobile phone penetration and usage patterns between the study regions as well as differences in digital literacy of farmers. Similarly, the non-significant influence of television in this study contrasts with Butt et al. (2017), who found that television was a preferred source of agricultural information in Pakistan. The divergence might be attributed to differences in television accessibility and viewing habits across regions. Additionally, the non-significant influence of the internet to smallholder coffee farmers' access to

PHM information contrasts with Dagne and Oguamanam (2018), who emphasized the important role of internet accessibility in efficient information dissemination. This discrepancy could be due to infrastructural challenges limiting internet use among smallholder farmers in the study area.

5.2.2 Socio-economic factors and access to PHM information

The second objective of this study was to determine how smallholder coffee farmers' socio-economic characteristics influence their access to information on post-harvest coffee management (PHM) practices. The findings from the binary logistic regression model indicated that education level, experience in coffee farming, group membership, and garden size significantly influenced access to PHM information, while gender and age were not significant predictors. Specifically, farmers with higher education levels were 1.303 times more likely to access PHM information (Sig. = 0.003). Similarly, those with greater farming experience had a 1.427 times higher likelihood (Sig. = 0.039), and group members were 2.952 times more likely to access PHM information (Sig. = 0.046). Garden size also played a role, with an odds ratio of 1.565 (Sig. = 0.001), highlighting the role of economic stakes in information access.

These findings align with existing literature on socio-economic determinants of access to agricultural information. Fidelugwuowo (2022) emphasized that factors such as education, experience, group membership, and garden size positively influence access to agricultural information. Similarly, Maake and Atwi (2022) found a positive relationship between education level, experience, and farm size on access to agricultural information in South Africa. Wale and Mkuna (2023) highlighted the importance of group membership in

strengthening access, noting that farmers in organized groups benefit from shared knowledge and resources. These studies corroborate the importance of education, experience, and social networks as facilitators of information access, consistent with this study's findings.

Contrary to these results, some studies present divergent views. For instance, Ahmad and Xu (2023) reported that age negatively influenced access to formal sources of agricultural information while positively affecting informal sources, a relationship not observed in the current study. Phiri (2018) noted that higher education levels positively influenced access to formal information sources but negatively affected access to informal sources. This discrepancy could stem from differences in study contexts, such as the availability of information systems and the role of informal networks in different regions. In Uganda, informal channels may be equally accessible to farmers regardless of education or age, potentially explaining the non-significance of age and the overarching positive role of education.

Additionally, the findings on gender contradict studies such as Godwin (2018), which highlighted gender disparities in access to information, with women relying more on informal sources compared to men. In this study, no significant gender differences were observed, possibly reflecting efforts in Uganda to promote gender equality in accessing in agricultural extension services

Therefore, the findings reinforce the critical role of education, farming experience, membership, and economic incentives in facilitating access to PHM information. The contradictions in literature highlight the importance of

context-specific strategies to enhance information dissemination among smallholder coffee farmers.

5.2.3 Factors influencing farmers' adoption of coffee post-harvest management practices

The third objective of this study was to determine the factors that influence use of PHM practices among smallholder coffee farmers. The results indicated that smallholder coffee farmers' access to PHM information significantly influences the adoption of improved PHM practices. The multiple regression analysis revealed that 37.1% of the variability in the adoption of these practices could be explained by the combined influence of socio-economic characteristics of smallholder coffee farmers and access to information on PHM of coffee. Significant predictors of PHM practice adoption included age ($B = -0.074$, $p = 0.018$), access to PHM information ($B = 0.350$, $p = 0.000$), gender ($B = 0.084$, $p = 0.037$), and membership in a coffee farming group ($B = 0.169$, $p = 0.000$). The negative relationship between age and the adoption of Post-Harvest Management (PHM) practices suggests that older coffee farmers are less likely to adopt improved PHM practices compared to their younger counterparts. This could be attributed to several factors. Older farmers may be more resistant to change, preferring traditional farming methods over new techniques that require adjustments to their established routines or younger farmers may be more adept at utilizing modern technology and accessing new information, making them more receptive to improved practices. Thus, age negatively influences adoption behavior, with younger farmers displaying a greater willingness to embrace innovation and improved farming techniques.

Several studies support these findings. Luzinda et al. (2018) found that access to agricultural information significantly influences the adoption of appropriate drying practices among smallholder farmers, which is essential for preserving coffee bean quality. Kapgen and Roudart (2023) and Narine et al. (2019) noted that the adequacy, relevance, and timeliness of information significantly impact farmers' intention and behavior towards adopting new practices. Ansah et al. (2018) in Ghana and Klink (2020) in Gulu district also highlighted the critical role of relevant and timely information in adopting improved post-harvest management practices.

In contrast, some studies highlighted limitations of the influence of access to agricultural information on adoption of agricultural practices. Tibagonzeka et al. (2018) in Uganda revealed that while many farmers received adequate information, a small percentage relied on this information in practice, indicating a gap between information access and actual adoption. Mwanga (2023) in Kapchorwa district emphasized that ease of use, accessibility, and the cost of technology are key factors influencing farmers' choices, suggesting that merely having access to information may not be sufficient for adoption without considering these additional factors.

5.3 Conclusion

The study concluded that the conventional sources of information of radio, community interactions, print media, and extension agents influenced smallholder coffee farmers' access to information on coffee PHM practices. In addition, Education, farming experience, group membership, and garden size influenced smallholder coffee farmers' access to coffee post-harvest

management (PHM) information. Further, smallholder coffee farmers' adoption of improved PHM practices is influenced by access to information on post-harvest management practices of coffee, age, gender, and group membership.

5.4 Recommendations

The study revealed that access to information, extension support, farmer group membership, peer interactions, and youth dynamics significantly influence the adoption of post-harvest management (PHM) practices among smallholder coffee farmers. Based on these findings, several actionable recommendations are proposed.

Firstly, rural radio programs include for coffee PHM information dissemination. Government and agricultural authorities should support radio stations to improve signal quality, broadcast at farmer-friendly hours, and use local languages. Such measures will ensure that timely and relevant post-harvest management knowledge reaches a wider audience, bridging information gaps in remote farming communities.

Secondly, it is important to increase farmers' access to extension services since extension agents had the strongest influence on information access and adoption of PHM practices. This could be through the local leaders lobbying the private sector such as coffee processors and NGOs to provide extension services to supplement those provided by government.

Thirdly, coffee farmers should be encouraged to belong to farmer groups. Since membership to coffee farming groups significantly increased access to information and adoption of PHM practices. Government should encourage the

formation, strengthening, and formalization of coffee farmer groups through incentives, support, and capacity-building initiatives since coffee is the leading export crop in Uganda.

Fourthly, structured peer-to-peer learning programs should be promoted since interactions among farmers were found to improve access to information on PHM practices. National and district agricultural offices should implement initiatives such as farmer field days, mentoring schemes, and demonstration plots that utilize experienced farmers as local knowledge hubs.

Finally, promotion of improved PHM practices. Focus more on younger farmers since, they were more likely to adopt improved PHM practices than older farmers.

5.5 Areas for future research

While traditional information sources like radio and community meetings are effective, digital sources such as mobile phones, television, and the internet have not significantly impacted PHM information access. Future research should explore the specific barriers to digital information access, such as digital literacy, infrastructure issues, and affordability, to better understand how to improve the use of these modern sources of information among smallholder coffee farmers.

Although gender was not a significant factor in accessing PHM information, it influenced the adoption of improved practices. Future studies should delve into the gender dynamics and socio-economic factors that affect both access and adoption. Understanding the social, cultural, and economic elements that

differentially impact male and female farmers can help develop more targeted and effective interventions.

The significant impact of extension agents and farmer groups on information access suggests that training and capacity-building programs are crucial. Future research should evaluate the long-term effectiveness of these programs and conduct longitudinal studies to track how continuous access to information and evolving socio-economic conditions influence the sustainability of PHM practices.

REFERENCES

Ahmad, S., & Xu, H. (2023). Socioeconomic Determinants and Perceptions of Smallholder Farmers towards Agroforestry Adoption in Northern Irrigated Plain, Pakistan. 12(4), 813.

Ainembabazi, J. H., & Mugisha, J. (2014). The Role of Farming Experience on the Adoption of Agricultural Technologies: Evidence from Smallholder Farmers in Uganda. Journal of Development Studies, 50(5), 666–679. https://doi.org/10.1080/00220388.2013.874556

Amin, M. E. (Martin E. (2005). Social science research: Conception, methodology and analysis. 462.

Annual Agricultural Survey (AAS) 2019. (2019). Annual Agricultural Survey. Uganda Bureau of Statistics. https://microdata.ubos.org: 7070/index.php/catalog/62

Ansah, I. G. K., Justice, E., & Donkah, S. A. (2018). Effect of postharvest management practices on welfare of farmers and traders in Tamale metropolis and Zabzugu District, Ghana. Cogent Food & Agriculture, 4(1).

Birch, I. (2018). Agricultural productivity in Kenya. Knowledge,Evidence and Learning for Development.

Bonephace, E. M., Gui, X., & Makawia, P. J. (2022). Assessment of awareness of Farmers on agricultural information services in Mara Region, Tanzaniaservices in Mara Region, Tanzania. University of Nebraska - Lincoln.

Bravo-Monroy, L., Potts, S. G., & Tzanopoulos, J. (2016). Drivers influencing farmer decisions for adopting organic or conventional coffee management

practices. Food Policy, 58, 49–61. https://doi.org/10.1016/J.FOODPOL.2015.11.003

Butt, T. M., Gao, Q., Luqman, Luqman, M., & Hussan, M. Z. Y. (2017). Mode of ICTS Applications in Plant Production and Protection Technology in Rural Punjab-Pakistan. ResearcherGate, 25.

Dagne, T. W., & Oguamanam, C. (2018). ICTs in Agricultural Production and Potential Deployment in Operationalising Geographical Indications in Uganda. SSRN Electronic Journal.

Dalawi, I., Isa, M. R., Chen, X. W., Azhar, Z. I., & Aimran, N. (2023). Development of the Malay Language of understanding, attitude, practice and health literacy questionnaire on COVID-19 (MUAPHQ C-19): Content validity & face validity analysis. BMC Public Health, 23(1). https://doi.org/10.1186/S12889-023-16044-5

Dillman, D. A. (2014). The Tailored Design Method | Social & Economic Sciences Research Center | Washington State University. https://sesrc.wsu.edu/about/total-design-method/

Farooq, S., Muhammad, S., & Chauhdary, K. M. (2018). Role of print media in the dissemination of agricultural information among farmers. Pakistan Journal of Agricultural Research.

Fidelugwuowo, U. B. (2022). Socio-economic Characteristics and Access to Agricultural Information in Public Libraries among Smallholder Farmers in South-East Nigeria. African Journal of Library, Archives and Information Science, 32(1).

Godwin, J. L. (2018). Gender differences in use and preferences of agricultural information sources in Pakistan. The Journal of Agricultural Education and Extension, 24(5).

International Coffee Organization [ICO]. (2022). Coffee Development Rport 2022-23. https://www.icocoffee.org/documents/cy2024-25/coffee-development-report-2022-23.pdf

Jimoh, K. A., Hashim, N., Shamsudin, R., Man, H. C., Jahari, M., & Onwude, D. I. (2023). Recent Advances in the Drying Process of Grains. Food Engineering Reviews, 15, 548–576.

Kapgen, D., & Roudart, L. (2023). A Multidisciplinary Approach to Assess Smallholder Farmers' Adoption of New Technologies in Development Interventions. The European Journal of Development Research, 35.

Kirimi, F. K., Onyari, C. N., Njeru, L. K., & Mogaka, H. R. (2021). Effect of on-farm testing on adoption of banana production technologies among smallholder farmers in Meru region, Kenya. Journal of Agribusiness in Developing and Emerging Economies, 13(1), 90–105. https://doi.org/10.1108/JADEE-04-2021-0100

Klink, R. (2020). Adaptation of post-harvest loss interventions: A case study in the Gulu and Oyam district, Northern uganda. Wageningen University. https://edepot.wur.nl/336958

Kumar, R. (2023). Farmers' Use of the Mobile Phone for Accessing Agricultural Information in Haryana. Open Information Science, 1.

Langat, G. K., Phylis, B., & Josphine, K. (2018). Role of Television in Communicating Agricultural Information: International Journal of Language and Linguistics, 5(2).

Lecoutere, Spielman, E.-, Campenhout, D. J.- Van, & Bjorn. (2020). Women's empowerment, agricultural extension, and digitalization, Disentangling information and role-model effects in rural Uganda. International Food Policy Research Institute (IFPRI).

Lemma, M., Mulema, A., Demeke, Y., & Kinati, W. (2019). Community conversations increase women's access to farming information in the Ethiopian highlands. CGIAR Research Program on Livestock Capacity Development Strategy.

Luzinda, H., Nelima, M., Wabomba, A., Musoli, P. C., & Kakur, A. (2018). Factors Influencing Adoption of Improved Robusta Coffee Technologies in Uganda. Uganda Journal of Agricultural Sciences, 18(1), 33–41.

Luzinda, H., Nelima, M., Wabomba, A., Musoli, P. C., & Kakuru, A. (2018). Factors Influencing Adoption of Improved Robusta Coffee Technologies in Uganda. Uganda Journal of Agricultural Sciences, 18(1(2018)), 33–41. http://dx.doi.org/10.4314/ujas.v18i1.3

Maake, M. M. S., & Atwi, M. A. (2022). Farmer's perceptions of effectiveness of public agricultural extension services in South Africa: An exploratory analysis of associated factors. Agriculture & Food Security, 11.

Martínez-García, C. G., Dorward, P., & Rehman, T. (2016). FACTORS INFLUENCING ADOPTION OF CROP AND FORAGE RELATED AND ANIMAL HUSBANDRY TECHNOLOGIES BY SMALL-SCALE DAIRY

FARMERS IN CENTRAL MEXICO. Experimental Agriculture, 52(1), 87–109. https://doi.org/10.1017/S001447971400057X

Matheson, G. J. (2019). We need to talk about reliability: Making better use of test-retest studies for study design and interpretation. PeerJ, 2019(5). https://doi.org/10.7717/PEERJ.6918/SUPP-1

Mensah, E., Osei, C. K., Asantewaa, J. K., & Aboagye, R. (2023). Access to and Use of Agricultural Information among Maize Farmers in Ejura Sekyedumase Municipality. International Journal of Agricultural Studies, 2(1).

Midamba, D. C., & Kizito, O. (2022). Determinants of access to trainings on post – harvest loss management among maize farmers in Uganda: A binary logistic regression approach. Cogent Economics & Finance, 10(1). https://doi.org/10.1080/23322039.2022.2148359

Million, M., Like, M., & Chalchisa, T. (2020). Adoption Status and Factors Determining Coffee Technology Adoption in Jimma Zone, South West Ethiopia. Pelita Perkebunan, 36(1), 68–83.

Mukasa, D., Rusinamhodzi, L., Van Asten, P. J. A., Amwonya, D., Sseguya, H., Okiror, F. A., Kirungi, D., Wodada, W., Komakech, V., Margiotta, S., & Jassogne, L. (2025). International Journal of Agricultural Sustainability A stepwise approach to facilitate adoption of climate smart practices for smallholder coffee production in Uganda A stepwise approach to facilitate adoption of climate smart practices for smallholder coffee production in Uganda. International Journal of Agricultural Sustainability, 23(1). https://doi.org/10.1080/14735903.2025.2513790

Narine, L. K., Harder, A., & Roberts, G. (2019). Journal of International Agricultural and Extension Education of trinad. Journal of International Agricultural and Extension Education.

Nestle. (2022). Creating Shared Value and Sustainability Report 2022. Nestle. https://www.nestle.com/sites/default/files/2023-03/creating-shared-value-sustainability-report-2022-en.pdf

Nnamulondo, P. (2019). I THE PERCEIVED CONTRIBUTION OF EXTENSION WORKERS IN MEETING FARMERS' INFORMATION NEEDS IN , MITYANA DISTRICT. makerere university.

NPHC. (2014). District Males Females Total Households.

Osei, R. D., Dzanku, F. M., Osei-Akoto, I., Asante, F., Hodey, L. S., Adu, P. N., Adu-Ababio, K., & Coulibaly, M. (2018). Impact of voice reminders to reinforce harvest aggregation services training for farmers in Mali. International Initiative for Impact Evaluation. https://www.3ieimpact.org/sites/default/files/2018-12/IE90_TW4_1016_Mali_aggregation_centres.pdf

Philipos, M., Mesfin, Y., Bukero, G., Mitiku, G., Girma, T., & Nurhussen, H. (2017). Source, Availability and Use of Agricultural Information by Extension Agents in Southern Ethiopia. International Journal of Recent Research in Interdisciplinary Sciences (IJRRIS), 1(3), 14–24.

Phiri, A. (2018). Information seeking behaviour of rural smallholder farmers in Malawi. Information Research.

Ragin, C. C. (2011). Constructing Social Research: The Unity and Diversity of Method—Charles C. Ragin, Lisa M. Amoroso—Google Books. Gooogle Play

Books. https://books.google.de/books?hl=en&lr=&id=8CprlwcXBjwC&oi=fnd&pg=PP1&dq=Ragin+(2011),+secondary+data&ots=BR_PXBIVuu&sig=gerXYkAUaTxzK8qEF4Xv-1P-kVI#v=onepage&q=Ragin (2011)%2C secondary data&f=false

Rogers, E. M. (1962). Diffusion of Innovations (3rd edition) . https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://teddykw2.files.wordpress.com/2012/07/everett-m-rogers-diffusion-of-innovations.pdf

Royan, M. (2024). Factors Affecting Adoption of Good Agricultural Practices on The Java Arabica Sindoro-Sumbing in Temanggung Regency. https://dumas.ccsd.cnrs.fr/dumas-04501573v1

Sigigaba, M., S.F.G., Y., C, B., & O.O., P. (2022). The nexus between extension services and community libraries as agricultural information sources for smallholder farmers in Amathole District Municipality. South African Journal of Agricultural Extension, 50(1).

Tekinerdogan, B., Ayim, C., Kassahun, A., & Addison, C. (2020). Adoption of ICT innovations in the agriculture sector in Africa: A Systematic Literature Review. https://arxiv.org/ftp/arxiv/papers/2006/2006.13831.pdf

Tibagonzeka, J. E., Akumu, G., Kiyimba, F., Atukwase, A., & Wambete, J. (2018). Post-Harvest Handling Practices and Losses for Legumes and Starchy Staples in Uganda. Agricultural Sciences, 9(1).

Tufa, A., Alene, A. D., Cole, S. M., Manda, J., Feleke, S., Abdoulaye, T., Chikoye, D., & Manyong, V. (2022). Gender differences in technology

adoption and agricultural productivity: Evidence from Malawi. World Development, 159, 106027. https://doi.org/10.1016/J.WORLDDEV.2022.106027

UBOS. (2014). National Population and Housing Census 2014 Area Specific Profiles Bulambuli District.

Uganda Coffee Development Authority. (2022). UGANDACOUNTRY COFFEE PROFILE. Uganda Coffee Development Authority. https://new.ugandacoffee.go.ug/sites/default/files/2022-03/Uganda Country Coffee Profile_1.pdf

Uganda Coffee Development Authority [UCDA]. (2019). Arabica Coffee Handbook.

Uganda Coffee Development Authority(UCDA). (2023). Strategic goals of Uganda Coffee Development Authority. Uganda Coffee Development Authority. https://ugandacoffee.go.ug/resource-center/fact-sheet

van Velthoven, M. H., Wang, W., Wu, Q., Li, Y., Scherpbier, R. W., Du, X., Chen, L., Zhang, Y., Car, J., & Rudan, I. (2018). Comparison of text messaging data collection vs face-to-face interviews for public health surveys: A cluster randomized crossover study of care-seeking for childhood pneumonia and diarrhoea in rural China. Journal of Global Health, 8(1), 010802. https://doi.org/10.7189/jogh.08.010802

Vargas, D., Cruz, D. G. Dela, & Beltran, Y. L. P. (2022). Social Media as an Information Dissemination Arm to Promote Agricultural Knowledge Among Farmers' in Time of Pandemic. Www.Journal.Innovation.Com.

Wale, E., & Mkuna, E. (2023). Smallholder satisfaction with the quality of agricultural information, and their preferences among the sources, Empirical evidence from KwaZulu-Natal, South Africa. Journal of Agriculture and Food Research, 14.

Wambua, D. M., Gichimu, B. M., & Ndirangu, S. N. (2021). Adoption of ICT innovations in the agriculture sector in Africa. International Journal of Agronomy.

Wikipedia. (2014). Bulambuli, Uganda—Facts and information on Bulambuli—Uganda.Places-in-the-world.com. Uganda.Places-in-the-World.Com.

APPENDICES

Appendix I: Questionnaire for farmers

Dear respondent,

I am Wasike Jeremiah, a student of Kyambogo University pursuing a Master's degree in Agricultural Education and Extension. I am conducting this study titled "determinants of access to information and adoption of post- harvest management practices among smallholder coffee farmers in Bulambuli district, Eastern Uganda" as a partial requirement for this course. I am here to kindly request you to be part of this study on promise that the information you provide shall be very confidential and only used for this purpose.

Date:

Location

Sub-county

Parish

Village

SECTION A: SOCIO-ECONOMIC CHARACTERISTICS

For the sections below, please tick the most appropriate option that applies to you.

S/N			Response
A1	Gender	Male	
		Female	
A2	Education level	No formal education	
		Primary level	
		Secondary	
		Tertiary	
A3	Age	18 - 35	
		36 -50	
		51 ++	
A4	Experience in coffee farming	Below 5 years	
		6 to 10 years	
		Over 10 years	
A5	Are you a member of any coffee farming group	Yes	
		No	
A6	What is the size of your coffee garden in acres?		

SECTION B: SOURCES OF INFORMATION

Which of the following sources of information do you use to obtain information on post harvesting practices of coffee? Answer as appropriate.

B1	Source of information	Yes	No
B1.1	Radio		
B1.2	Mobile phones		
B1.3	Community meetings		
B1.4	Television		
B1.5	Fellow farmers		
B1.6	Internet		
B1.7	Print media (Fliers, newspapers, manuals)		
B1.8	Extension agents		
B1.9	Agro-input dealer		

If you have other sources of information on post-harvest handling management practices of coffee, please mention

……

Rate the extent to which you access information post-harvest handling management practices of coffee from the different sources.

Source of information	Very accessible	Accessible	Scarcely accessible	Not accessible
	4	3	2	1
Radio				
Mobile phones				
Community meetings				
Television				
Fellow farmers				
Internet				
Print media				
Extension agents				
Agro-input dealer				

SECTION C: ACCESS TO AGRICULTURAL INFORMATION

1. I have access to information on post-harvest management practices of coffee.

   Yes [___] No [___]

2. The following statements describe the attributes (quality) of information accessed by farmers. For each of the statements below, rate your agreement on a scale of 1 to 5 whereby 1- strongly disagree (SD), 2-Disagree (D), 3-Not sure (NS), 4- Agree (A), and 5- Strongly Agree (SA).

No.	**Statements**	**SD 1**	**D 2**	**NS 3**	**A 4**	**SA 5**
2.1	The information I obtain is relevant to my information needs regarding post-harvest handling management of coffee					
2.2	The information regarding improved post-harvest handling management of coffee practices that I access/obtain is easy to use					
2.3	The information on coffee post-harvest handling management practices is consistently delivered in a timely manner.					
2.4	The information regarding improved post-harvest handling management of coffee practices that I access/obtain is adequate					

SECTION D: ADOPTION OF IMPROVED PHM PRACTICES

The statements below relate to the adoption of improved post-harvest handling management practices by farmers. For each of them, rate your agreement on a scale of 1 to 5 whereby 1- strongly disagree (SD), 2-Disagree (D), 3- Not sure (NS), 4- Agree (A), and 5- Strongly Agree (SA).

No.	Statements	SD 1	D 2	NS 3	A 4	SA 5
5.1	I use the information obtained on proper storage of coffee.					
5.2	I use information obtained on appropriate drying practices for coffee.					
5.3	I use improved coffee fermentation control practices.					
5.4	I have not used the information on coffee post-harvest handling management practices that I received					

Which of the following constraints limit your access to information on post harvesting practices of coffee? Answer as appropriate

Constraints	Yes	No
I find it difficult to contact an extension agent		
I am not able to read and write (illiteracy) relevant print materials		
Poor radio and television signals		
Timing of agricultural programs on radio and television is not suitable for me		
The telecommunication signals are not good making it difficult to use phones		
Lack of money to purchase newspapers or manuals with relevant information,		

Appendix II: Garden size

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
What is the size of your coffee garden in acres?	290	0.3	10.0	1.422	1.3822
Valid N (list wise)	290				

Appendix III: Introductory Letter

KYAMBOGO UNIVERSITY

P. O. BOX 1 KYAMBOGO
Tel: 041 - 4286792 Fax: 256-41-220464
Website:www.kyu.ac.ug Email: drgt@kyu.ac.ug

Directorate of Research and Graduate Training

Office of the Director

APPENDIX 8: INTRODUCTORY LETTER

Date: February 12th 2025

The Chief Administrative Officer,
Bulambuli District
P.O. Box 2998, Mbale

The students came and conducted his research in the area of study successfully

BULAMBULI DISTRICT LOCAL GOVERNMENT
0 3 MAY 2025
Email:caosofficebulambuli@gmail.com
CHIEF ADMINISTRATIVE OFFICER
05/05/2025

RE: WASIKE JEREMIAH

Dear Sir/Madam,

This is to introduce to you the above named student Reg: No **22/U/GAEE/777/PE** pursuing Master of Science in Agricultural Education and Extension, Department of Agriculture Education and Agriculture Economics, Kyambogo University.

He intends to carry out research on ***"Determinants of Access to Information and Adoption of Coffee Post – Harvest Management Practices among Small – Holder Farmers in Bulambuli District, Eastern Uganda"*** in partial fulfillment of the requirements for the award of Master of Science in Agricultural Education and Extension, Department of Agriculture Education and Agriculture Economics of Kyambogo University.

The purpose of this letter therefore is to request you to grant him permission to carry out his study.

Any assistance rendered to him will be highly appreciated.

Yours sincerely

Prof. Bosco Bua
AG. DIRECTOR

KYAMBOGO UNIVERSITY
12 FEB 2025
DIRECTOR
DIRECTORATE OF RESEARCH AND GRADUATE TRAINING