UNIVERSITY FOR DEVELOPMENT STUDIES, TAMALE

FACTORS ACCOUNTING FOR WOMEN'S PARTICIPATION IN AGROFORESTRY IN JAMAN SOUTH DISTRICT, GHANA

FRANCIS DIAWUO

2017

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BY

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(UDS/MEM/0048/14)

THESIS SUBMITTED TO THE DEPARTMENT OF ENVIRONMENT AND RESOURCE STUDIES, FACULTY OF INTERGRATED DEVELOPMENT STUDIES, UNIVERSITY FOR DEVELOPMENT STUDIES, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF PHILOSOPHY DEGREE IN ENVIRONMENT AND RESOURCE MANAGEMENT

SEPTEMBER, 2017

DECLARATION

STUDENT

I hereby declare that this thesis is the result of my original work and that no part of it has been presented for another degree in this University or elsewhere:

Candidate's Signature: ..... Date: .....

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SUPERVISORS'

I hereby declare that the preparation and presentation of this dissertation/thesis was supervised in accordance with the guidelines on supervision of dissertation/thesis laid down by the University for Development Studies.

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ABSTRACT

Women's contributions to agroforestry are mostly overlooked in male dominated societies. This study assessed women's participation in agroforestry practice, the socio-economic factors influencing their participation and stakeholder involvement for improving their participation in the Jaman South District. A concurrent mixed method approach, combing both qualitative and quantitative methods was used for data collection using household questionnaires survey, key informant interviews, and focused group discussions. A total of 204 women farmers were randomly selected from four communities for the study. Data was analysed using index of participation, correlation analysis and multinomial logistic regression and presented descriptively using tables and charts. The study revealed that majority (85.3%) of respondents were active in the practice of agroforestry. While agri-silviculture was identified as the main system of agroforestry, scattered trees on farmlands, alley cropping, Taungya and home-gardening were the agroforestry technologies practiced. Women's participation was high in seed preparation (78%), sowing (92%), weeding (85%), harvesting (87%), drying (85%) and storage (82%) and low in spraying (33%). Only access to capital and credit (P=0.017) and extension services and information (P=0.019) were significant in influencing women's practice of agroforestry. The study revealed further that women have easy access to land as majority (88.5%) owned the land on which they were farming through inheritance or ties with family. Whiles Drobo Community Bank Limited gives loans to farmers to enable them maintain and expand their farms to be able to get more produce, the Ministry of Food Agriculture had no arrangement in place to ensure

women's access to capital and credit. The study recommends that efforts should be made by the government to encourage the development of rural microcredit institutions with regulations friendly to women. MoFA should train volunteer extension officers, majority of whom should be women.

ACKNOWLEDGEMENTS

"I can do all things through Christ which strengthens me" (Philippians 4:13). To God be the Glory and Honour for His love, guidance and protection throughout the course of my studies. My sincerest gratitude and appreciation goes to my supervisors; Dr Dzigbodi A. Doke and Mr Enoch A. Kosoe whose suggestions and constructive guidance have made this thesis a success. I am grateful to Dr Ebenezer Owusu-Sekyere and Mr Reginald Addy-Morton for their indelible suggestions. I am grateful to Dr Kenneth Peprah (HOD), Department of Environment and Resource Studies, the Dean, Vice-Dean and Graduate Coordinator of the Faculty of Integrated Development Studies and the entire management of the University for Development Studies, for their continual support during my difficult times. I appreciate your support, may God bless you.

I am equally grateful to Mr Ransford Boachie-Boadu (MoFA, Jaman South District) and Mr Johnson Adu Yeboah (Drobo Community Bank Limited) for being the source of invaluable information for the study. To my research respondents and people of the various communities involved in the study, I say thanks to them for allowing me carry out my research in their communities and availing themselves for interviews.

I am thankful to Mr Osei David and Clement Yeboah for assisting me in collecting data from the field. I owe gratitude to all my lecturers, not forgetting my friends, especially Latif Nasare and Abdul Karim Issifu who proofread my thesis into this nice piece and also to Sylvester Deku and Belinda Kunsu who supported me in diverse ways. Me da mo ase!

DEDICATION

I dedicate this thesis to my Dad, Ernest Diawuo and to the memories of my mother, Lucy Benewaa and my friend, Emmanuella M. Dong (May your souls Rest in Peace).

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LIST OF ABBREVIATIONS

BACCSOD	-	Brong Ahafo Catholic Co-operative Society Development
DCBL	-	Drobo Community Bank Limited
EPA	-	Environmental Protection Agency
FSD	-	Forest Services Division
FAO	-	Food and Agricultural Organisation
FC	-	Forestry Commission
FGD	-	Focus Group Discussion
FTA	-	Forest, Tree and Agroforestry
GSS	-	Ghana Statistical Service
ICARD	-	Information Centre for Agricultural and Rural Development
ICRAF	-	International Centre for Research in Agroforestry
IDRC	-	International Development Research Centre
IPCC	-	Intergovernmental Panel for Climate Change
IP	-	Index of Participation
JSDA	-	Jaman South District Assembly
JHS	-	Junior High School
KII	-	Key Informant Interviews
MoFA	-	Ministry of Food and Agriculture
MTS	-	Modified Taungya System
NGO	-	Non-Governmental Organisation
NRM	-	Natural Resources Management

NWFP	-	Non-Woody Forest Products
REDD	-	Reducing Emissions of Deforestation and Degradation
SPSS	-	Statistical Package for Social Sciences
UN	-	United Nations
WAC	-	World Agroforestry Centre

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Land, a source of identity for most societies in the world (UN-HABITAT, 2012), plays an important role in the livelihoods of many people in tropical Africa, especially Ghana where majority of the people are small-scale farmers. The most relevant livelihood on earth since time immemorial, agriculture (Ministry of Food and Agriculture (MoFA, 2010) also strives on the availability of environmental resources such as land and forests. In time past, when population was low and agricultural land was in abundance, farming practices such as shifting cultivation and bush fallow were able to sustain soil fertility and crop yields by stimulating soil regeneration before usage (Food and Agricultural Organisation (FAO) (1982) cited in Opoku-Mensah (2015). However, world population increase has made this aim difficult to attain.

Today, the world's population is projected to reach over 9 billion by the year 2050 (FAO, 2010a). The population of Ghana unsurprisingly has been following the increasing trend over the years. With a population of about 8 million in the 1970s, Ghana's population has increased massively to more than 24 million in 2010 with a population growth rate of 3% per annum (Ghana Satirical Service (GSS), 2011). The implications of this increase are the strains on the nation's forestry resources, since more than 60% of the population are engaged in agricultural activities (MoFA, 2010). The effects of increasing population does not only deplete natural resources but also exacerbate other

stressors such as climate change, resulting in hunger, deforestation, soil infertility and poverty (GSS, 2011).

Agriculture contributes about three quarters of tropical deforestation (Wollenberg et al., 2011); meanwhile it is the mainstay of Ghana's economy and livelihood to most rural people. The situation is reflective of what exists in the Jaman South District. The district's extensive forest cover is discombobulated with large-scale timber extraction activities; use of traditional farming methods which include slash and burn, shifting cultivation and extraction of wood fuel (JSDA, 2010). In congruence, MoFA (2010) reports that most farmers (95%) use traditional farming methods with the remaining (5%) blending both the traditional methods and modern technologies. These unfriendly traditional farming methods have added many woes to the natural environment in the district by degrading the forest from primary to secondary (JSDA, 2010).

In most parts of Ghana, long term practice of shifting cultivation, short fallows, slash and burn and the increasing use of artificial fertilizers have robbed most lands and ecosystems of their fertility and their ability to provide services (MoFA, 2010). The Forestry Commission (FC) of Ghana reports that Ghana's forest loss cover is a whopping 2% per annum (FC, 2015). The challenges of population increase and the accompanying impacts on land availability, deforestation, and the use of unfriendly traditional farming practices and methods tend to result in low food supply due to the depletion of forest resources and loss of soil fertility.

Meeting the challenges of deforestation and loss of soil fertility, among others, the historical practice of agroforestry has been advanced as an agricultural

technology to help address issues of forest cover loss, land degradation, soil infertility, crop loss, and to enhance food security and improve conditions of living of farmers (Atangana et al., 2014). Agroforestry is a collective name for land-use systems and technologies where woody perennials (such as trees, shrubs, palms, bamboos, etc.) are deliberately used on the same land-management units as agricultural crops and/or animals, in some form of spatial arrangement or temporal sequence (FAO, 2016). Agroforestry may also refer to agricultural technology where trees form significant part of the system providing food, fuel, fodder, medicinal products, building materials and saleable commodities, as well as contributing to the maintenance of soil fertility, water conservation and environmental protection.

Agroforestry systems considered in the traditional land use in West Africa and beyond, are widely seen as a promising solution to land degradation problems (Poudyal, 2009). Adoption of agroforestry can lead to improved crop and livestock production and also serve as a major source of cash income to households, because agroforestry practices are less costly and more affordable and also inputs for fodder and soil amendments are readily available to small-holder farmers (Parwada et al., 2010). Agroforestry systems are multifunctional systems that can provide a wide range of economic, sociocultural, and environmental benefits. While agroforestry is a climate change adaptation strategy (FAO, 2010a), it can also help in climate change mitigation since it has the potential of creating carbon sink that removes carbon dioxide (CO_2) from the atmosphere, or the maintenance of existing carbon in the vegetation (Smith, 2010; IPCC, 2012).

Across Africa, women's participation in agroforestry is integral to the success of the practice (Kiptot & Franzel, 2011), as they play crucial role in most production systems in the household. However, their involvement is impaired by certain socio-political factors, cultural norms and practices. Evidence abounds in FAO (2013a) that compared with men; women are frequently disadvantaged in their access to forest resources and economic opportunities in the forest sector. Women face various constraints and challenges that limit their capacities to achieve optimal production and agricultural development (Degrande & Arinloye, 2014).

Although women often make significant labour contributions to agroforestry (Kiptot & Franzel, 2011), their opportunities in the sector are limited to low-return activities that are of little or no interest to men. Kiptot and Franzel (2011) assert again that agroforestry activities are often gender-differentiated. That is, while men are interested in trees for commercial purposes and tend to control the production as well as marketing of higher valued products and the use of the income generated, women are more inclined to favour multipurpose tree species for subsistence use, such as those that provide food, fuel-wood and fodder and help improve soil fertility.

In the agroforestry value chain, gender categories have differentiated tasks and responsibilities in tree and crop management, harvesting, processing and marketing. While women tend to play specific roles in agroforestry value chains, they face particularly constraints in marketing (Yisehak, 2008). Degrande et al., (2014) add to the constraints by stating that women lack appropriate technology and have limited access to processing technologies, marketing strategies and market information.

Notwithstanding the fact that the Protocol to the African Charter on Human and Peoples Rights on Women's Rights prohibits any form of discrimination against women and promotes equal rights for women and men to land and property, there is still gender differentiation in land and tree tenure. Kiptot and Franzel (2011) observed that women in Africa have limited rights to land except in isolated cases. For instance, in Ghana where patrilineal societies operate in the Northern parts, women's rights are often through ties to their husbands and these rights terminate once the husband dies. Similarly, Quisumbing et al., (2001) observed that even in matrilineal societies such as the Akan communities of Ghana, women traditionally do not possess inheritance rights like land. Land is transferred from a deceased man to his brother or nephew (sister's son) in accordance with the decision of the matrilineal clan. These situations among other notable ones constraint women's access to productive resource like land, hence impeding their participation in agricultural related projects.

1.2 Problem Statement

Women play key roles in agroforestry production systems. Globally, women are responsible for about 70 percent of farm work and are made up of about 60 percent of the farming population (Mulugeta & Amsalu, 2014). However, through their roles as farmers and labourers, women face more severe constraints than men in access to productive agroforestry resources (FAO, 2011) which affects their contributions to food security and household sustenance. Kiptot and Franzel (2011; 2012) argue that across sub-Saharan Africa factors such as limited access to land, capital, labour, information,

extension services, taboos and household decision making tend to hinder women's effective participation in agroforestry.

The situation in the Jaman South District in terms of women's participation in agroforestry is ruminative of the findings of Kiptot and Franzel (2011; 2012). Men involved in agriculture have more access to and control over resources such as land, labour and household decision making powers than women (JSDA, 2010). The end result is that men are active in the cultivation of cash/commercial crops (such as cocoa and cashew) while women tend to prefer multipurpose tree species for household subsistence (JSDA, 2010).

Although the factors affecting women's participation in agroforestry are known (Kiptot & Franzel, 2011; 2012), the degree of impact of these factors differ with time and place (in terms of cultural setting). It is imperative therefore to identify the key factors and their extent of influence on women's practice of agroforestry in the Jaman South District. The district was selected for the study because agroforestry is widely practiced with cocoa and cashew being the dominate tree crops farmed. However, the sector is dominated by men who control most of the farm labour and resources like land. Although culture plays a defining role, there are or may be other unknown reasons for this situation. Also, the nature of women's participation in agroforestry, the degree of participation in farm management activities and decision making in Jaman South District are not explored. For these reasons, deep search for literature on women's participation in agroforestry in Jaman South District does not yield any empirical results, a situation which creates knowledge gaps.

1.3 Research Questions

The main research question of the study is: what are the factors influencing women's participation in agroforestry in the Jaman South District of Brong Ahafo Region?

The specific research questions include:

i. How do women participate in agroforestry in the Jaman South District?

ii. How do social, cultural and economic factors influence women's participation in agroforestry in Jaman South District?

iii. How do stakeholders in the district influence women's participation in agroforestry practice?

1.4 Research Objectives

The main research objective of the study is to: assess the factors that influence women's participation in agroforestry in Jaman South District of Brong Ahafo Region. The study specifically sought:

i. To examine how women participate in agroforestry.

ii. To ascertain the influence of social, cultural and economic factors on women's participation in agroforestry.

iii. To assess the level of involvement of relevant stakeholders in influencing women's participation in agroforestry.

1.5 Significance of the Study

The Medium Term Development Plan of the Jaman South District (2010-2013) reported inadequate data and gender sensitive indicators on natural resource access, management and use as a major challenge to the district in measuring disparities, establishing baselines, monitoring progress and

designing gender responsive policy and programmatic responses. By appraising women's participation in agroforestry, the research may add to this existing but limited data on gender involvement in agriculture and natural resources access and management. In this same regard, the study might provide appreciable inputs to the assembly for designing programmes and projects to help improve women situations in the district.

There exits knowledge gaps in literature on the degree of women's participation in farm management activities and decision making, constraints to participation in agroforestry and stakeholder involvement in agroforestry activities in the study area. By investigating the forms of agroforestry systems, participation in farm activities and decision making, social, economic and cultural factors influencing agroforestry practice, stakeholder involvement in agroforestry, this study provides further insights and knowledge to augment previous work and literature on the concept (agroforestry practice) in the study area.

Finally, it is hoped that the findings of this study will provide insights, increase commitment and serve as a point of initiative to players in the agroforestry sector, such as Ministry of Food Agriculture (MoFA), Forestry Commission (FC) and the Jaman South District Assembly through the development of plans, policies and projects that serves as drivers to boost women's participation in agroforestry and general agricultural projects and programs.

1.6 Operational Terms

Agroforestry: Agroforestry refers to a dynamic, ecologically based, natural resource management systems that through the integration of trees on farms and in the agricultural landscape, diversifies and sustains production for increased social, economic and environmental benefits for all land users at all levels.

Participation: Participation refers to a process through which stakeholders influence and share control over development initiatives and the decisions and resources which affect them. Participation is the involvement of people and communities (stakeholders) in problem identification, formulation of plans as well as the implementation of decisions over their own lives.

1.7 Ethical Consideration

The study duly observed community entry protocol. During this time, the rationale of the study was made known to the respondents and they were assured of anonymity and confidentiality of any information they gave out. Adequate arrangements were therefore made with the participants where convenient place and time were agreed on for the researcher's meeting with them. Also informed consents of the respondents were sought before their views were recorded. Moreover, the researcher obtained a permission note (an introductory letter) from Department of Environment and Resource Studies, University for Development Studies to enable him get the needed assistance in the fieldwork. Anonymity and confidentiality of respondents' information was held in the greatest esteem whiles information from literature and secondary sources has been properly acknowledged.

1.8 Organisation of the Study

The study is structured into five chapters. Chapter One presents relevant background of the study and includes the introduction, problem statement that leads the study objectives, research questions and scope of study. Chapter Two presents a review of relevant literature regarding agroforestry practice, women's involvement in agroforestry in Africa, benefits of agroforestry, agroforestry development in Ghana, institutional arrangements and factors that hinder gender participation in natural resource management, as well as the conceptual framework guiding the study, among others. Chapter Three discusses the study area and offers an outline of the methodologies employed in the research. Details of results and discussion are presented in Chapter. Chapter Five contains summary of major findings, conclusion and recommendations.

CHAPTER TWO

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

2.1 Introduction

The chapter reviews pertinent literature on the concept of participation and its relevance to the study. Other issues reviewed include the concept of agroforestry, agroforestry systems in Ghana, benefits of agroforestry, women participation in agroforestry practice, women's participation in agroforestry value chain and women's tree preference.

2.2 The Concept of Agroforestry

Agroforestry is the practice whereby traditional farming of food crops is mixed with tree planting. The International Centre for Research in Agroforestry (ICRAF) defines agroforestry as dynamic, ecologically based, natural resource management systems in which the integration of trees on farms and in the agricultural landscape, diversifies and sustains production for increased social, economic and environmental benefits for all land users at all levels. Kitalyi et al. (2013) define agroforestry to include a diversified system of farming that helps in sustaining agricultural production; improve household food security and incomes as well as contribute towards environmental and social benefits. Agroforestry therefore accentuates on the ecological and economical interfaces with different components. By implications, agroforestry involves two or more species of plants and/or animals of which at least one is a timbered perennial; an agroforestry system always has two or more outputs; the cycle of an agroforestry system is always more than one

year and; even the simplest agroforestry system is more complex, ecologically (structurally and functionally) and economically than a monocropping system. This description covers two key issues in agroforestry, which is: improving the quality of environment and enhancing household sustenance. Agroforestry is a sustainable land management system that helps increase soil fertility and crop yields, combines the production of crops (including tree crops) and forest plants and/or animals instantaneously or sequentially on the same unit of land, and using simple cultural practices of the local population. Whiles this practice is good for improving the quality of the environment, is noted to greatly contribute to household income and food security.

Key characteristics that distinguish agroforestry systems from agriculture and forestry include greater structural and functional complexity (Nair & Dagar, 1991). Structurally, agroforestry dynamic phases in the development of a productive ecology (Mead, 2009), while it functionally emphasises on multipurpose trees, and the production of multiple outputs balanced with protection of the resource base. Deductively, agroforestry systems are a way of diversifying ecosystems by creating new ecological niches for plants and animals. This definition, however, leaves out the core of agroforestry which is to enhance food security, livelihood and soil infertility.

2.2.1 History and Focus of Agroforestry

Agroforestry is deeply rooted in traditional farming where agricultural practices are blended with forestry practices. Fernandes and Nair (1986) cited in Atangana et al. (2014) use an example from the Christian Bible of a homegarden (i.e. association of multipurpose tree and shrubs, annual or perennial plants and/ or livestock within the household compound) given to

Adam and Eve, to illustrate this dependence. Home-gardens (an agroforestry technology) for instance, have long been widespread in Africa, South and Southeast Asia, and Latin America (Atangana et al., 2014).

In the 1960s and 1970s, when population was rapidly increasing, rainfalls were erratic, and the need for more food and fuel-wood increased, research in agriculture focused on multiple cropping. Also, the awareness of some difficulties associated with modern intensive and high input agricultural developments, especially in the tropics led to the search for alternatives by the Food and Agricultural Organisation (FAO). According to Nair (1993), the most important initiative that contributed to the development of agroforestry came from the International Development Research Centre (IDRC) in Canada. At a time when the FAO had indicated that slash-and-burn agriculture was accounting for about 70% of deforestation of tropical forests (Nair, 1993), the IDRC was also being challenged by the growing rate of deforestation in the tropics and the associated negative consequences, such as reduced soil fertility and increased soil degradation (Atangana et al., 2014). For these reasons, a team headed by an IDRC official, John Bene, was tasked to identify gaps in research and forestry, to formulate forestry research programmes that would obtain results with considerable economic and social impact on developing countries, and to prepare an action plan for securing the support of donors.

In their report, the team concluded that priority should be given to production systems that integrate forestry, agriculture and animals to optimize land use management in the tropics (Atangana et al., 2014). The IDRC report strongly recommended the establishment of an international organization that would support, plan, and coordinate research involving land management systems in

agriculture and forestry on a global scale. The International Council for Research in Agroforestry (ICRAF) was subsequently created in 1977. In 1991, the Council was upgraded into a Centre and was called the International Centre for Research in Agroforestry (ICRAF). As the ICRAF was established and the term "agroforestry" was coined, the ancient practice of agroforestry was institutionalized for the first time.

In 2002, a further expansion led to the establishment of the World Agroforestry Centre (WAC) (Atangana et al., 2014). The ICRAF/WAC, has since moved from an initial emphasise on coming to terms with the plethora of traditional agroforestry practices to providing many fundamental science and social science concepts. Agroforestry is now accepted in both industrialised and industrialising world as an important land-use system driven by the need to create sustainable and robust forestry ecosystem (Mead, 2009). At the initial stages of establishment of ICRAF, the focus was on creating an inventory of agroforestry systems, collecting information, and disseminating information on erosion control and soil fertility conservation. Other research activities focused on alley cropping, fallow systems with nitrogen-fixing intercropping, promotion of multi-purpose species and the development of agro-pastoral systems that are adapted to the tropics (Atangana et al., 2014). Today, the focus of agroforestry is on the needs of people through poverty eradication and sustainability of environmental resources. This is due to the recognition that local people have many needs such as food, materials for shelter and fuel as well as income, and agroforestry presents an amicable means of meeting these needs through the services provided by trees and forest resources.

Agroforestry focuses also on sustainable land use and this is achievable by improving the biophysical components of the environment.

2.2.2 Classification of Agroforestry

Understanding and evaluating agroforestry systems requires classifying them according to some common criteria (Table 2.1). The reason for this classification is to provide a practical basis for the blend and analysis of information about existing systems and the development of new ones. According to Nair (1993) and Vira et al. (2015), agroforestry systems are classified according to these sets of criteria:

i. *Structural basis:* refers to the composition of the components, including spatial arrangement of the woody component, vertical stratification of all the components, and temporal arrangement of the different components.
ii. *Functional basis:* refers to the major function or role of the system, usually furnished by the woody components (these can be of a service or protective nature, e.g., windbreak, shelterbelt, soil conservation).
iii. *Socioeconomic basis:* refers to the level of inputs of management (low input, high input) or intensity or scale of management and commercial goals (subsistence, commercial, intermediate).
iv. *Ecological basis:* refers to the environmental condition and ecological suitability of systems, based on the assumption that certain types of systems can be more appropriate for certain ecological conditions; i.e., there can be separate sets of agroforestry systems for arid and semiarid lands, tropical highlands, lowland humid tropics, etc.

Table 2.1: Classification of Agroforestry Systems

Categorisation of the system based on their structure and functions			**Grouping of systems according to their spread and management**	
(nature and arrangements of components voody ones)		Function (role and/or output of component especially woody ones)	Agro-ecological environmental adaptability	Socio-economic and management level
Component	Arrangements of Components			
lture (crops and shrubs/tree and	*In space* (spatial) Mixed dense (e.g. homegards)	*Productive Functions* Food, fodder	*Systems in/for* Lowland Humid tropics	*Based on local technology input* Low input (marginal)
al nimals and	Mixed space (e.g. most systems of trees in pastures)	Fuelwood Other products	High humid tropics (above 1200 m .a.s.l., Malaysia)	Medium input High input
astoral (crops, imals and trees)	Strip (width of strip to be more than one tree)	*Protection Function* Windbreaks	Lowland subhumid tropics (e.g. savanna zones of Africa, Cerrado of South America)	*Based on cost/benefit relations* Commercial
ultipurpose tree ture with trees, with trees, etc)	Boundary trees on edge of plots of fields. *In time* (temporal) coincidental, concomitant, overlapping, sequential (spatial), interpolated	Shelterbelt Soil conservation Shade (for crops, animals and man)	Highland and Subhumid (tropical highlands) (e.g. Kenya, Ethiopia)	Intermediate Subsistence

air (1993)

2.3 Institutional Framework of Agroforestry in Ghana

Modern agroforestry has been instituted in agricultural practices and policies in Ghana. Ghana's first and only agroforestry policy was developed in 1986 with an overall objective of promoting agroforestry practices for sustainable land-use (Asare, 2004). However, not much has been achieved since there is often a considerable distance between what national policy suggests and the situation on the ground. The National Agroforestry Policy recognised the need for an organised and co-ordinated approach if agroforestry was to play any major role in the promotion of sustainable agricultural development. Hence, the government of Ghana, the United Nations Development Programme (UNDP) and FAO initiated a national programme to support agroforestry. The aim was to help establish and put in operation an Agroforestry Unit (AFU) within the Crops Services Department of the Ministry of Food and Agriculture (MOFA), and to establish a National Co-ordination Network between the Agroforestry Unit, the Government, and NGOs with agroforestry agenda (Asare, 2004). Today, agroforestry development is spearheaded by the Forestry Services Division of Forestry Commission and MoFA.

2.4 Review of some Agroforestry Systems/Technologies in Ghana

The technologies in agroforestry are multidimensional in nature and give a myriad of opportunities for sustaining ecosystem functions. This includes the use of live fences to protect farms, woodlots to produce fuelwood, and nitrogen fixing trees to improve soil fertility, soil organic matter and physical conditions (Ajayi, 2007). Agroforestry technologies reviewed in this study

are: taungya system, home-gardens, alley cropping, and silvo-pastoral systems. One distinctive feature of these technologies from the traditional shifting cultivation is that they are associated with a more intensive use of land and can be used by smallholder farmers with few resources.

2.4.1 Taungya System

Taungya is an old-aged forest plantation practice in many parts of the world. The FAO (2012) defines Tuangya as an agroforestry system where crops are grown only during the first years of the forest rotation. Oluwadare (2014) describes Taungya farming as a system of raising forest plantation together with crops where the clearing of site, planting and tendering of the trees are done wholly or in part by the farmers in exchange for the privilege of growing their annual crops on government reserved forests. The responsibility of farmers therein is to tend the trees to maturity, whiles they are also expected after some years (usually three years) to move to other lands. Interactions between crops and trees under Taungya systems are designed to achieve complementary rather than competitive effects (Vieira et al., 2009).

In Ghana, Taungya has been in practiced for some time. In the 1930s, the government launched a plantation development programme. The intention was to produce a mature crop of commercial timber in a relatively short time, while also addressing the shortage of farmland in communities bordering forest reserves (Agyeman et al., 2003). Farmers were given parcels of degraded forest reserves to produce crops and to establish and maintain timber trees (Abugre et al., 2010). Under this initial arrangement, farmers had no

rights to benefits accumulating from the planted trees and had no decision making role in any aspect of forest management (Birikorang, 2001; Agyeman et al., 2003). This resulted in the neglect of tree after food crops were matured and harvested, hence abuse of the system which subsequently collapsed. After the collapse in 1984, the system was reviewed and re-launched in 2002 as the Modified Taungya System (MTS) (Kalame, 2009).

Under the MTS, farmers are now fully involved in the establishment and maintenance of the plantations. Essentially, farmers are now owners of the products with the FC, landowners and forest fringe communities as shareholders. The rights of Taungya farmers are now guaranteed under the Timber Resources Management Amendment Act, 2002 (ACT 617), which states that "no timber rights shall be granted in respect of land with private plantation; or land with any timber grown or owned by any individual or group of individuals". This means Taungya farmers are free from unnecessary encroachment by timber operators. Since MTS is an approach to the allocation of economic benefits and resources, farmers are therefore eligible for a share of the benefits accruing from the plantation according to a benefit-sharing framework, which ensures greater benefit flows to participating farmers (Agyeman et al., 2003).

2.4.2 Home-gardens

Since the early studies of home-gardens in the 1930s by the Dutch scholars Osche and Terra on mixed gardens in Java, Indonesia, there have been extensive contributions to the subject blending definitions, species inventories,

functions, structural characteristics, composition, socio-economic, and cultural relevance (Galhena et al., 2013). Home-garden is commonly defined as a piece of land with a definite boundary around a homestead, with the cultivation of diverse mixture of perennial and annual plant species, often in combination with raising livestock, and managed mainly by household members for subsistence production (Mekonen et al., 2015). Home-gardens are agro-ecosystems located close to the area that serves as a permanent or temporary residence. This explanation of a home-garden is similar to Agbogidi and Adolor (2013) that home-gardens are complex ecosystems close to the house where plants can be closely observed and managed, and are convenient place for traditional plant experimentation. It is in line with this that Galhena et al. (2013) contend that, in home-garden, cultivation is fully or partially committed for vegetables, fruits, and herbs primarily for domestic consumption.

Home-gardens are rich in plant diversity and are considered among all "man-made" agro-ecosystems for their high biological diversity. The forest-like structure and composition of home-gardens and the specific management practices tend to enhance nutrient cycling and increase soil organic matter (Mohan et al., 2007). They are common in the humid tropics and are characterised by the intensive use of multi-purpose trees, shrubs, food crops and animals. Mainly established with the intent to grow and produce food items for family consumption, Galhena et al. (2013) again convey that home-gardens can be diversified to produce outputs that have multiple uses

including indigenous medicine and home remedies for certain illnesses and an alternative fuel source, manure, building material, and animal feed. In Ghana, home-gardens are practiced by a number of farmers in both urban and rural settings and have been beneficial to household sustenance. A study by Akrofi et al. (2009) on the impacts of commercial-orientation on home-garden cultivation indicated that home-gardens in Ghana are either extensively managed for subsistence or intensively managed for commercial production. This is because for subsistence and household consumption little labour is required while for commercial need more capital and labour are required.

2.4.3 Alley Cropping

Alley cropping is practice of agroforestry where agricultural or horticultural crops are grown in the alley ways between widely spaced rows of woody plants. It is a practice that combines annual and perennial crops to produce yield, multiple products and profits at different times, while enabling a landowner to use available space, time and resources more effectively. Alley cropping is mostly used in humid or sub-humid tropical areas on fragile soils and seems to work best where farmers need to intensify crop production but have soil fertility problems. It involves periodic pruning and the return of the residues from hedgerow trees or shrubs contribute to recycling of plant nutrients, improvements in soil temperature, enhancement of soil structure, erosion control, maintenance of microbial activity and high soil nutrient status (Wang et al., 2010). Pruned materials are also used by women to produce firewood for domestic consumption.

2.4.4 Silvo-pastoral

Silvo-pastoral is an agroforestry practice that combines trees, forage, and livestock to optimize production. The term "silvo-pasture" means "forest-pasture," while "silvo" is derived from a Latin word that means "forest" (Goodchild, 2014). Silvopastoral involves the practice of combining animal production with trees and pastures (Alao & Shauibu, 2013). This combination can be arranged as a pure stand with fodder trees or shrubs planted as a protein bank or mixed in different shapes such as living fences of fodder trees and hedges (ibid). The main objective of this practice is therefore to supply feed for livestock during the dry season with high quality tree leaves. Silvopastoral systems provide more ecosystem services than open pasture lands (Buttler et al., 2009). They favour biodiversity by creating complex habitats that support diverse plants and animals and harbour a richer soil biota, and increase connectivity between forest fragments (Haile et al., 2010).

2.5 The Concept of Participation

The concept of participation in not a new phenomenon as far as rural development and agriculture is concerned. The world today is in a 'new era of participation' (Muraleedharan, 2005; Masanyiwa & Kinyashi, 2008), in that participation has become an integral part of many development interventions of Non-Governmental Organisations (NGOs) and governmental institutions. As a rich concept, participation means different things to different people in different settings. Participation presents a number of difficulties in terms of its definition. Kinyashi (2006) used the World Bank's Learning Group on

Participatory Development definition which sees participation as a process through which stakeholders influence and share control over development initiatives and the decisions and resources which affect them. By this definition, participation in rural development broadly aims to actively involve people and communities (stakeholders) in the problem identification, formulation of plans as well as the implementation of decisions over their own lives.

Per the assessment of Bretty (2003:5), participation is an empowering process where "people, in partnership with each other and those able to assist them, identify problems and needs, mobilise resources, and assume responsibility to plan, manage, control and assess the individual and collective actions that they themselves decide upon". Adding to Bretty's view of participation is Dale (2004), who also sees participation as an empowerment of the poor, minority groups and the marginalised. As an empowerment process therefore, participation in development initiatives such as agricultural projects and policies is a process of developing the skills and abilities of rural people (such as farmers) to enable them manage better, have a say in or negotiate with existing development systems. This is anticipated to give the poor, minority groups, marginalised, children and women the power and capacity to take charge of their lives socially, economically and politically in their quest to alleviating poverty. Participation as empowerment can therefore help to amplify unacknowledged voices and enable rural people to decide upon and take the actions needed for their development (Masanyiwa & Kinyashi, 2008).

Participation in agroforestry is therefore the active involvement of smallholder farmers and the marginalised groups (e.g. women) from start to end all farming activities. This is expected to lift and empower them in society. In agroforestry, efficient participation can also be seen as empowerment where all bottlenecks and impediments (such as land tenure and financial issues) that obstructs marginalised groups from active involvement in agriculture could be removed.

2.5.1 Forms of Participation

In literature, authors distinguish different degrees, shapes, levels, types and dimensions of participation. Participation from the perspective of development initiatives broadly ranges from a mere involvement of people to an autonomous decision making at the local level. This study adopts Agarwal (2001:624) typology of participation to show the levels (movement from lower to a higher level) of participation of women in agroforestry management activities and decision making. The ability of an individual to move below or up a level is an indication of how active the person is within the group or society. From nominal participation where members of a group may not have influence on the group, participation moves from passive to interactive where members become active and with voice and influence in the group's decisions (Table 2.2).

Table 2.2: Typology of Participation

Level/ Form of Participation	Characteristic Features

Nominal Participation	Member in the group
Passive Participation	Being informed of decisions ex post facto: or attending meetings and listening in on decision making without speaking up
Consultative Participation	Being asked an opinion on specific matters without guarantee or influencing their decisions
Activity/ Specific participation	Being asked to (or volunteering) to undertake specific task
Active Participation	Expressing opinions, whether or not solicited
Interactive(Empowerment) Participation	Having voice and influence in group's decision

Source: Adopted from Agarwal (2001)

Former typologies of participation place self-mobilisation or self-initiated activities as the topmost, however they fail to solve all problems (Adom, 2012). It can therefore be deduced from Agarwal's (2001) that even interactive participation (which is seen as the topmost) has limits of socio-economic, inequality and power relations within the group or community. Relatedly, even if women's participation in agroforestry is found to be 'interactive', issues of power relations (between husband and wife in the household), inequality (such as access to land) may still limit their participation, seemingly due to cultural relations. This typology of participation will therefore enable the identification of women's participation in agroforestry as either interactive, active, activity or passive, keeping in mind the social, economic, and cultural constraints.

The concept of participation is used to provide an analytical basis to assess the level of women's participation in agroforestry activities. This is done by identifying the activities women farmers partake on the farm as well as in decision making concerning farm management. Women participation in forest resources plays important roles in management of natural resources. Findings by Coleman and Mwangi (2013) demonstrate that women's participation in decision making in forest and agricultural institutions can reduce conflicts within forest user groups. Agarwal (2001) reports also that women's inclusion in decision-making of forest user groups in South Asia, reduced tendencies for rule breaking by those not previously engaged in formulating the rules, hence women's participation in either on-farm activities or decision making is crucial.

2.6 Environmental Benefits of Agroforestry

Agroforestry has been used as a major strategy to charge forest occupants to become partners in rehabilitating degraded forestlands. As an alternative to the 'destructive' slash-and-burn farming of most upland farmers, agroforestry was expected to reduce soil erosion, improve soil quality, vegetative cover, land productivity and uplift the farmers' level of living through sustained farm productivity. Agroforestry may help in soil conservation and microclimate amelioration, soil nitrogen fixation and provision of shade. Environmental components reviewed include soil, water, biodiversity and climate change.

2.6.1 Soil Fertility

Soil management is a key feature of agroforestry systems. In both tropical and temperate climates, agroforestry systems are designed and implemented to counter soil erosion and degradation, and improve soil quality and health (Smith, 2010). In fact, one important ground of agroforestry is the addition of organic mulch and its favourable effect on the physical and chemical properties of soil, and hence on crop productivity. As well as increasing structural stability of the soil, tree roots can enhance water infiltration and improve water storage by increasing the number of soil pores. Tree roots and trunks also act as physical barriers to reduce surface flow of water and sediment (Smith, 2010).

An analysis of more than 90 peer-reviewed studies on soil fertility improvement found consistent evidence of benefits in maize yields in Africa from planting nitrogen-fixing green fertilizers, including trees and shrubs (FAO, 2013b) although the level of response varied by soil type and technology. There have been studies assessing the value of green mulch from leguminous trees to enhance soil fertility for adjacent crops in tropical agroforestry systems. The *Arbuscular mycorrhizal* (AM) fungi, for instance has been noted to enhance plant nutrient uptake and growth, soil stability and soil aggregation, litter decomposition rates, and could potentially enhance crop yields while reducing the need for chemical fertiliser input.

2.6.2 Water

The effects of agriculture on water systems are numerous and include changes to water chemistry with eutrophication and food web modifications, pesticide pollution, increased sediment load from soil erosion, changes to hydrological cycles via changes in evapotranspiration rates and run-off, modification of river flow and irrigation impacts, effects of exotic species, and physical modification of the habitat through canalisation, drainage and embankment (Moss, 2008). Research (Udawatta et al., 2010) has established that tree strips located adjacent to water courses reduce non-point source water pollution from agricultural land by; reducing surface runoff from fields; filtering surface runoff; filtering groundwater runoff; reducing bank erosion; and filtering stream water. A principal cause of non-point source pollution and soil erosion is excessive surface water runoff. Riparian (river bank) buffers and other agroforestry systems can help reduce runoff and increase infiltration (Smith, 2010). Agroforestry can reduce soil water content during critical times such as flooding periods and increase water infiltration and water storage.

2.6.3 Biodiversity

The influence of agroforestry systems on biodiversity cannot be underestimated as it has been acknowledged that as an integrated land use system, agroforestry can directly enhance agro-biodiversity and contribute to the conservation of landscape biodiversity. The role of agroforestry systems in biodiversity conservation was investigated in most developing countries (Moreno-Calles et al., 2010). Notwithstanding the fact that the introduction

and colonization of invasive alien tree species has the potential to replace less aggressive indigenous plant species and hence threaten biodiversity (WAC, 2006), studies conducted in Eastern and Western Africa show that agroforestry systems usually contain more than half of the tree species that are found in nearby primary forests. In fact, traditional agroforestry practices benefit biodiversity through in-situ conservation of tree species on farms, reduction of pressure on remaining forests, and the provision of suitable habitat for plant and animal species on farmland (Khanal, 2011). Agroforestry can help reduce pressure to deforest additional land for agriculture if adopted as an alternative to more extensive and less sustainable land use practices, or it can help the local population cope with limited availability of forest land and resources. Agroforestry systems can also provide habitat and resources for partially forest-dependent native plant and animal species that would not be able to survive in a purely agricultural landscape. For instance, agroforestry systems such as tropical home-gardens, which may contain several species and varieties of trees and crops, can provide important reservoirs of tropical tree and crop germplasm.

2.7 Socio-Economic Benefits of Agroforestry

Agroforestry delivers organised systems of social and economic benefits in a range of agro-ecosystems. Although a key objective for implementing agroforestry systems in the tropics is to improve the livelihoods of the poor smallholder farmers (Smith, 2010), societal benefits of the practice has received little attention, especially with the economic feasibility of the

agroforestry agriculture to smallholder farmers (FAO, 2013b). Combining trees and crops on agricultural lands has the potential of influencing positively the local economic stability through improved food security, economic stability, and increase in employment and diversified local skills, among others.

2.7.1 Economic Benefits

Economic and financial benefits of agroforestry are the effects of increasing productivity of the system and which are induced by market forces and price fluctuations. Diversification in agroforestry product yields increase potential for economic benefits by providing periodic revenues (Smith, 2010). Widely traded agroforestry tree foods that support farmer incomes and the food security of rural and urban populations in Africa include the indigenous incipient domesticated shea tree (*Vitellaria paradoxa*) (Masters & Addaquay, 2011) and exotic mango (FAO, 2013b).

Although market data recorded for agroforestry tree products on smallholder farmers are sparse and limited (FAO, 2013b), information on export value is quantified for tree commodity crops such as palm oil (*Elaeis guineensis*), coffee (*Coffea arabica*), rubber (*Hevea brasiliensis*), cocoa (*Theobroma cacao*) and tea (*Camellia sinensis*) (FAO, 2013b). Together, the annual export value of the above five commodities is tens of billions of United States dollars (FAO, 2013b). While the proportion of value that accrues to smallholder producers may be small, often the production constitutes a considerable proportion of farm takings and is used to support household food purchases.

Agroforestry may also represent a cost effective and sustainable complement, or in some cases a substitute, to the use of inorganic fertilizer, especially if fertilizer costs rise in the future (Ajayi et al., 2008). The need to place monetary value on the ecosystem services delivered by agroforestry practice (such as the Clean Development Mechanism and REDD+) represents a real economic incentive for the practice of agroforestry systems such as Tuangya.

2.7.2 Food Production

Solving the problem of food security involves among other interventions a range of unified agricultural approaches, such as enhancements in staple crop productivity and the cultivation of a wider range of edible plants that provide fruits, nuts, vegetables, etc., for more diverse diets (Frison et al., 2011). Malézieux (2013) reports that the potential for varying crop production resides in the great range of lesser-used indigenous foods in forests and wooded lands that are often richer in micronutrients, fibre and protein than staple crops. Although such foods have traditionally been harvested from forests and woodlands, access to these resources is declining (FAO, 2010b); agroforestry cultivation provides an alternative resource. A mixture of indigenous and exotic tree foods in agroforestry systems supports nutrition, the stability of production, and farmer income.

Agroforestry trees enhance food production by a wide range of other means, including provision of shade and support for crops that need it, supporting animal production and improving soil fertility (FAO, 2013a). Agroforestry has an important role in increasing the yields of vegetables, and provide varied of

nutritionally balanced diets rather than calories alone (Susila et al., 2012). While increasing average crop yields, the planting of trees as green fertilizers in is able to stabilize crop production in drought years and during other extreme weather events, and improve crop rain use efficiency (Sileshi et al., 2011, 2012), especially in the context of climate change where drought incidence is abruptly increasing.

2.7.3 Reduced Reliance on Fossil Fuels

In a time of mounting concerns about long-term availability of oil, agroforestry systems have the potential to reduce reliance on fossil fuel consumption in a number of ways. The production of renewable energy, through coppice systems or as a by-product of timber production can reduce the use of fossil fuels for heating and cooking. Furthermore, internal cycling of nutrients, and enhanced pest and disease control, can reduce the need for oil-based agrochemicals and localised production of multiple outputs can avoid the need for long-distance transportation of goods and therefore reduce fuel use (Smith, 2010).

2.8 Why Women matter in Agroforestry

The Beijing platform twenty years ago set out a comprehensive agenda to remove all the obstacles to women's active participation in all spheres of public and private life through a full and equal share in economic, social, cultural and political decision-making (Ndiaye, 2014). Twenty years down the line, women are still subordinated with regards to participation in natural resource management (NRM) of which they are key stakeholders. The African

Ministerial Conference on Beijing Plus in 2014 restated the need for high level of political commitment to tackle gender issues in natural resources management. Development thinkers have pointed a lot to the critical role gender can play in the development initiatives such as in agriculture and food production. Given this, a lot has been documented on gender issues in agricultural production; meanwhile not enough have been done on women's involvement in agroforestry (Kiptot & Franzel, 2011).

It is internationally recognized that addressing gender imbalances is a major step towards the alleviation of poverty and food insecurity in Africa, while delivering environmental services and mitigating climate change (Degrande & Arinloye, 2014). The importance of upholding women's involvement in NRM and poverty reduction for that matter is that, it is a human right and also a matter of improving agricultural business (KIT et al., 2012). Women in agroforestry in sub-Saharan Africa are noted to play crucial roles in agricultural production. Since Boserup's book on women's role in economic development, many scholars and writers (Quisumbing & Pandolfelli, 2010; Peterman et al. 2010) have demonstrated much about the impact of the woman in production systems.

The focus on women in agroforestry is important because although women contribute a lot to the agricultural system, they face various constraints that limit their quest to achieving optimal production and development they so deserve (Debrande & Arinloye, 2014). Research (Mehra & Rojas, 2008; Kiptot et al., 2014; Degrande & Arinloye, 2014) has shown that women have

less access to productive resources and opportunities such as labour, land, education, information and technology. However, agroforestry is a low-cost system that requires lesser inputs and services and as well offers a diversity of products such as food, timber and soil fertility (Kiptot & Franzel, 2011; 2012), and offers great opportunities to women who in many instances cannot be able to adopt high tech due to their severe credit and cash constraints.

Forestry activities including agroforestry systems are not gender-neutral (FAO, 2013ab; Degrande & Arinloye, 2014). While men are usually interested in trees for commercial purposes; women are more inclined to favour tree products for subsistence such as for food, fuelwood, fodder and soil fertility improvement. Compared to men, women are frequently disadvantaged, for a range of interrelated cultural, socio-economic and institutional reasons, in their access to and control over forest resources and in the availability of economic opportunities. As a result, there are differences in participation between men and women in access to and use of forest products and services, resulting in gender disparities observable in many dimensions of the forestry–food security nexus (FAO, 2013a). For these reasons, focusing research on women's participation is a means of helping in understanding the nature of the situation, and contributing to their wellbeing.

2.9 Women's Participating in Agroforestry Management Activities

"Women are the backbone of farming in Africa, just as they are in most of the world. They plant the seeds, they till the fields, they harvest the crops, they bring them to market, they prepare the meals for their families. And so we

need a good collaboration to make sure that women are equal partners with men farmers all the way through the process, to enable farmers who are women to make a contribution that will transform agriculture, add to the gross domestic product of their country, and give them more income to educate their children to have a better life". (Hillary Clinton, August 5, 2009).

The statement above juxtaposes the strong relationship between effective women's participation in agriculture and development. Recognised as an engine of growth and poverty reduction in countries, agriculture is the main occupation of the poor. But the sector in many developing countries is underperforming, in part because women, who represent a crucial resource in agriculture and the rural economy through their roles as farmers, labourers and entrepreneurs, face more severe constraints than men in access to productive resources (FAO, 2011).

Women make essential contributions to the agricultural and rural economies in all developing countries. Women often participate and manage complex households and pursue multiple livelihood strategies. Their activities typically include weeding, seed preparation, selling agricultural commodities, and harvesting (Mulugeta & Amsalu, 2014); tending animals, processing and preparing food, working for wages in agricultural or other rural enterprises, collecting fuel and water, engaging in trade and marketing, caring for family members and maintaining their homes (FAO, 2011). Most women perform some of these same agricultural activities as men, but they describe this work

as 'helping' (their husbands) (Ochoa, 2012), but not as agricultural work. Many of these activities, although are not defined as 'economically active employment' in national accounts (FAO, 2011), are crucial for the well-being of rural households.

Notwithstanding the fact that exact contribution of women's participation in agriculture in terms of magnitude and nature are often hard to assess (FAO, 2011), it can be emphatically stated that women continue to play important roles in all agriculture and forestry activities. These agricultural and forestry roles include management and utilisation of natural resources as well as the practice of traditional knowledge on management and protection of forest and forest resources (ICARD, 2012). Research (UN-REDD 2013; Ndiaye, 2014) indicates that women have participated in almost all production activities and in the decision-making processes related to agroforestry production, although sometimes their views might not be considered by the men. They (women) however continue to contribute more hours of labour to cultivation, livestock raising, agricultural processing, and marketing of agricultural goods in sub-Saharan Africa and in Asia (FAO, 2011; UN-REDD, 2013). In forestry, women also contribute to the work force (UN-REDD, 2013). They tend to be highly involved in activities like nursery tending, seedling preparation and non-woody forest product (NWFP) collection. Meanwhile, activities such as thinning and pruning, forest rehabilitation and enrichment planting are undertaken by both men and women (FAO, 2015).

In typical agroforestry systems, more women than men tend to participate in processing and product sale (Catacutan & Naz, 2015). Despite the encouraging women's involvement in the forestry sector such as cocoa/cacao (Hoang, 2006; Catacutan & Naz, 2015), gender disparities exist due to cultural norms that strengthen forestry as a male profession, where, women's work is of secondary importance (FAO, 2015). Aris (2013) posits that women who want to persist in agroforestry (e.g. cocoa or cashew agroforestry) must contend with the general perception in many agricultural communities that, they are roles for men.

Assessing the various factors affecting rural women involvement in decision-making process in agroforestry activities, Mulugeta and Amsalu (2014) indicate that lack of experience, illiteracy, false assumption about the role of rural women in agriculture, shortage of technical knowledge/skills, and shortage of extension service are some of the factors that further worsen women's participation in agroforestry. Others are women's lack of appropriate technology and limited access to processing technologies, marketing strategies and market information (Degrande et al., 2014). All of these factors also tend to have greater influence on how women participate in agroforestry practice, management and value chain activities.

2.9.1 Women's Participation in Agroforestry Value Chain

Value chain according to Kaplinsky and Morris (2000) cited in Oduol et al., (2014) describes a full range of activities undertaken by firms and people to bring a product or service from conception to its end use as well as final

disposal after use. In agroforestry, value chain concerns the activities involved in bringing a timber or non-timber product from the tree or forest, through processing and production, to delivery to final consumers and ultimately disposal. Value chain also includes activities such as harvesting, cleaning, transport, design, processing, production, transformation, packaging, marketing, distribution and support services (Haverhals et al., 2014). The link between gender differentials and forest and tree-based livelihoods is gaining recognition.

According to Mai et al. (2011), there is a growing recognition of the role of gender in shaping access to, control of and use of forest, agroforestry and tree resources and markets and their associated benefits. Agroforestry and forestry value chains are crucial for the incomes and livelihoods of many small producers. Women's contributions to agroforestry are important for their incomes, well-being and food security of their households (FAO, 2013a). However, their roles in value chains tend to be poorly supported by policy-makers and extension services.

In sub-Saharan Africa, markets for agricultural inputs and outputs are often disaggregated. While market failure is a major constraint to smallholder farmers, the effects are often heavy for the marginalised groups such as the poor, women and households in low potential areas (FAO, 2011). Challenges to smallholder women farmers are particularly high, because they potentially face higher entry barriers than men in modern market chains (Oduol et al., 2014).

In their study on *avocado* value chain in Kenya, Oduol et al. (2014) further contended that where the value chain is well developed and the returns are high, women dominate the production stage while men tend to own the fields, make decisions on sales of fruits of premium quality and control revenues. This is mainly because men are the household heads. Although women are seen to be dominating, their domination is in activities that are of little interest to men, such as leaves. In fact, women are often subordinate to men or carry out activities with limited visibility (Shackleton et al., 2011).

A general trend, however, is that men participate more in chains when the value of the products increases, whereas women participate both to gather goods for their own and family use, and to generate income (Haverhals et al., 2014). Nevertheless, women in female headed households appear to be fully integrated in most of the stages of the agroforestry value chain (Oduol et al., 2014) than women in male headed households (Kiptot & Franzel, 2011), although they face greater challenges than men in performing tasks that are physically demanding.

In an assessment of literature on gender participation in forest, tree and agroforestry (FTA), Haverhals et al. (2014) revealed that social and cultural, economic, political, institutional and environmental factors account for the gender difference in agroforestry and forestry value chain. Therefore, a universal approach that involves identifying and understanding the bottlenecks and opportunities for women to participate in the production and marketing of high value agricultural commodities is required. Comprehensive analysis of a

value chain, facilitating women to form and strengthen associations, assisting women to improve productivity and marketing of products considered to be in women's' domain and improving women's access to information (Kiptot & Franzel, 2012; Coles & Mitchell, 2011; Oduol et al., 2014) is a prerequisite for the development of an equitable value chains.

2.9.2 Women's Tree Preference

Although both women and men engage in one enterprise, agroforestry, tree preference is gender specific in most cases. Thus, women and men have different interest and objectives regarding the choice of tree to plant (Kiptot & Franzel, 2011). While men favour trees of more commercial value, women tend to prefer multipurpose tree species for subsistence, such as fodder, fruit, fuel-wood and soil fertility improvement.

From their study in Tanzania, Fasse and Winter (2014) found that women participate in and prefer fruit trees that provide high quality and less smoky fuelwood. Fasse and Winter specifically cited *Faidherbia albida*, a leguminous, nitrogen-fixing tree that sheds leaves during the dry season to help improve access to nitrogen of associated crops. From field demonstrations (FAO, 2013b; FAO, 2014), it is evidenced also that crops under the *Faidherbia albida* tree produce more yields than crops without the tree. The implication of this is the depth of women's local knowledge on tree management and their important role in securing food for the household.

2.10 Factors Affecting Women's Participation in Agroforestry

In as much as governments and multinational institutions in developing countries have developed numerous polices to boost the involvement of women in rural development interventions, there are still some socio-economic and cultural norms and procedures that have created an unequal pattern of decision making, and training processes which often are male biased. The inability of women to meaningfully participate in development initiatives in the rural area is due to some constrains they face as a result of their socio-economic roles in society. The following are some of the factors affecting women's effective participation in agroforestry.

2.10.1 Cultural Norms and Taboos

Socio-cultural norms and beliefs influence the adoption and practice of agroforestry. Customs and taboos for instance, determine the respective roles of women and men within society, community or the household, and which hinders women's effective participation. In Africa, it is often difficult to generalise the influence of cultural norms and taboos on women participation because they differ across people and place (Kiptot & Franzel, 2011). It is important, however, to acknowledge that cultural norms determine people's actions (Kiptot & Franzel, 2012). In some cultures in Africa, women may be prevented by cultural norms from participating in rural organisations (Kaaria & Osorio, 2014) or may be prohibited from planting or using certain trees (Kiptot & Franzel, 2011; 2012). In western Kenya for instance, Kiptot and Franzel (2012) mentioned that it is tabooed for a woman to plant a certain tree

else she would become barren or her husband would die. This study explores the cultural practices and how they influence agricultural practices in the Jaman South District.

2.10.2 Land Tenure Systems

Women in Africa lack the rights to land except in few cases. This is because land tenure systems in many parts of Africa give rights to own and dispose of land to male adults (Place, 1994). The FAO (2010a) indicates a huge gender disparity in land rights (access and control), with women having less access and ownership over land, water and other natural resources that can enhance food production and sustain their livelihoods (Grey et al., 2014). This situation arises from the fact that in most African countries where patrilineal societies operate, such as Northern Ghana (Kpieta & Bonye, 2012a), women's rights to land and other valuable resources are tied to their husbands and they may cease to exist upon the death or divorce of the husband. Overall, women are less likely to own land, less likely to have rented land and when they have access, the land is too small or of low quality (FAO, 2011). However, based on their study on the gender dimensions of land and its wealth creation among the Dagaabas in North - Western Ghana, Kpieta and Bonye (2012a:113) found that "land tenure ownership is gradually evolving into a fully-fledged Western style property right system", where land renting is integral. This implies that with time women may be more likely to rent or access and own land. Whiles it is evident in literature that women face difficulties in assessing land for agroforestry, the extent of the difficulties are not the same everywhere. This

study will help in fixing this gap by exploring how land assess and ownership shape women's involvement in agriculture and agroforestry in particular.

2.10.3 Gender Roles and Household Decision-making

Gender roles define to a large extent how household resources are used. Women are mostly engulfed by productive and reproductive roles in the house and according to Kaarie and Osorio (2014), these multiple roles and household burdens of women limit their time for agricultural activities. Thus, the time burden may prevent them from fully participating in agricultural and development activities (FAO, 2011). In terms of household decision making, women tend to succumb to the powers of the men. Kiptot and Franzel (2011; 2012) revealed that women's decision making powers are limited to by-products of 'men's trees' and subsistence crops with low returns on labour.

2.10.4 Labour

Women are responsible for approximately 43% of agricultural labour in developing countries (FAO, 2011). In fact, labour is the only major resource that women in developing countries have at their disposal. However, female-headed households are disadvantaged since they face challenges in obtaining male labour (Swinkels et al., 2002). While in most instances men have control over women's labour, women have slight or no control over men's labour. Not only are they not able obtain the needed labour, poor women are often unable to hire labour due to lack of cash.

2.10.5 Financial Resources

Access to financial resources such as credit, is linked to women's access to property, land, literacy rates. The implication of this is lack of financial resources (Quisumbing & Pandofelli, 2010) that limit women's meaningful participation in agroforestry. Notwithstanding these, women in most parts of developing countries have devised means of overcoming the challenge. In Kenya for instance, women have devised innovative means of getting credit such as joining informal saving clubs popularly known as "merry go round" or "chama" (Kiptot, 2007). Meanwhile, Quisumbing & Pandofelli (2010) argue that financial credit alone may not be enough if women invest in microenterprises that have low returns.

2.10.6 Education, Training and Access to Information

Coleman and Mwangi (2013) in their study on forest user groups found that because women tend to be less literate and have less education than men, they were less likely to participate meaningfully in forest groups. Also, Agarwal (2001) observed that lack of access to information on rural activities, which is common among women with little or no education, was another great constraint to women participation in agricultural and development related activities.

2.11 Conceptual Framework on Women's Participation in Agroforestry

Women's role in agroforestry cannot be underrated and in turn agroforestry has the potential to offer them great benefits. Meanwhile, their participation in agroforestry is impeded by several factors. The framework (Figure 2.1)

conceptualises that lack of women's participation in agroforestry are caused by three main factors; cultural, economic and social factors (Kiptot and Franzel, 2011; 2012).

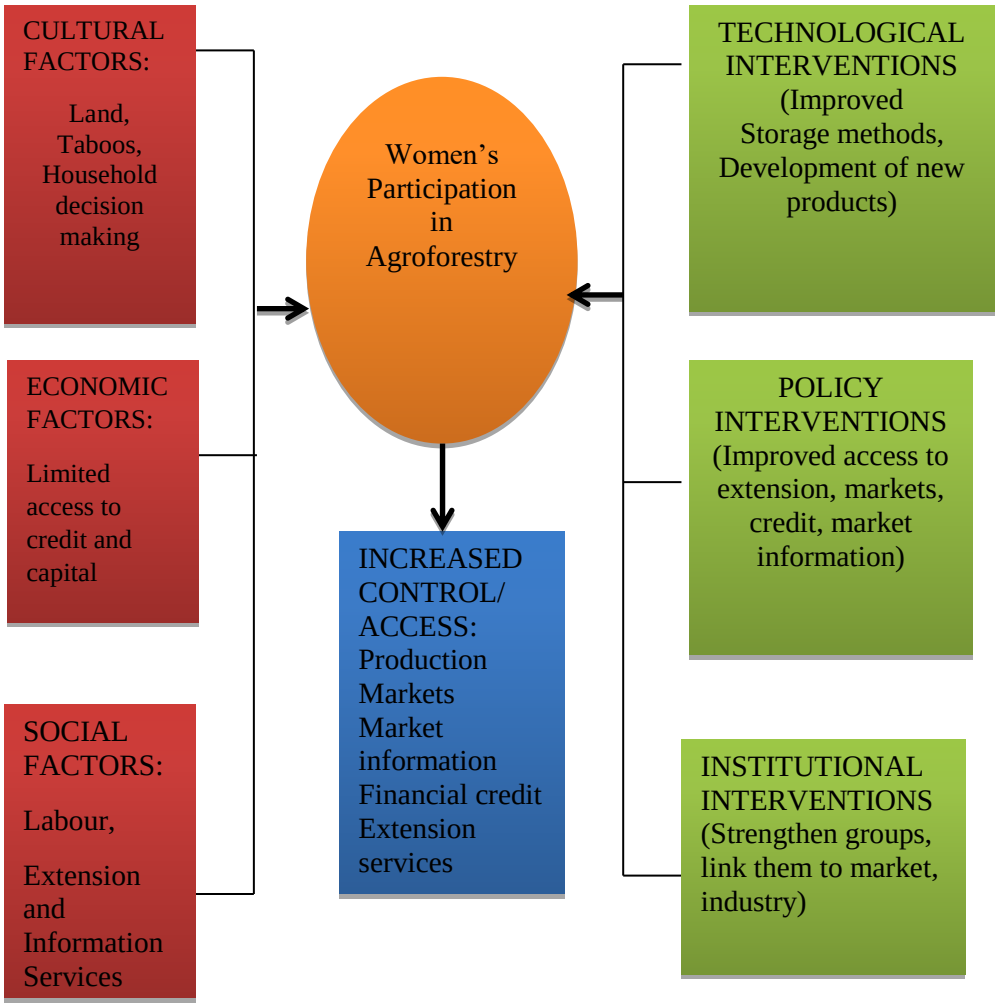

Figure 1.1: Conceptual Framework on Women's Participation in Agroforestry

Source: Adapted from Kiptot and Franzel (2011).

The cultural factors include access to land and land tenure issues, taboos and household decision making. Women's access to agricultural land is a major problem in most parts of Ghana. This is because land tenure systems do not

concede land ownership to women. This tends to affect their involvement since agroforestry is dependent on accessibility to agricultural land.

The economic factors also include limited access to capital and credit facilities for women in agroforestry to expand their farms for improved yields, whiles the social factors consists of lack of labour, extension services and information. These factors do not only diminish women's participation in agroforestry practice, they also reduce their access and control in terms of agricultural production, market and market information, extension services and agricultural information as well as the benefits accrue to them (Figure 2.1). Despite these challenges, women are using the little resource at their disposal in agroforestry related activities. Participation in this framework looks at the form of participation (establishment of nurseries, planting of seedlings, weeding, etc.); and the effects of participation (benefits that accrue from agroforestry).

Figure 2.1 also introduces various interventions through which women's participation in agroforestry could be enhanced. There is the need for technological interventions (e.g. development of improved post-harvest storage methods, appropriate agricultural and processing equipment, and development of new products) (Kiptot & Franzel, 2011). Moreover, policy interventions such as access to financial credit, extension, market, market information and institutional interventions such as facilitation by NGOs and state institutions, strengthening of farmer groups and associations and linking them to market and industry can potentially influence women for effective and

active participation in agroforestry. These interventions have the potential of lifting women from the lower end of participation in all activities of agroforestry including the value chain to a position where they would have more access to extension services, credit and market information, hence improving the benefits that accrue to them (Figure 2.1). The study therefore focuses on assessing how the cultural, economic and social factors are influencing women's participation in agroforestry in the Jaman South District.

2.12 Conclusion

The review concentrated on agroforestry practice in and around Ghana. It centred on the concept of agroforestry, history and development of agroforestry, agroforestry systems in Ghana and environmental and socio-economic benefits of agroforestry. It also covered women's participation in farm management activities in agroforestry systems, women's tree preference in agroforestry and the factors that affect to their participation as well as the nexus between agroforestry and climate change. It has been reviewed that agroforestry systems such as Taungya, homegardens and alley cropping, etc. provides benefits in the form of food, shade, fuelwood, etc. to farmers, especially women. The review also underscored that women, although are very crucial to the success of agroforestry practice and contribute much to the practice, their participation is constrained by cultural norms and beliefs, land tenure systems, gender roles in the household decision making processes, labour and technology. The conceptual framework stipulates that governmental and non-governmental organisations should implement policy

intervention to offset the challenges that impair women's effective participation in agroforestry.

CHAPTER THREE

STUDY AREA AND METHODOLOGY

3.1 Introduction

This chapter covers the area of the study and methodology. The chapter discusses the geographic certain of the study area in terms of location, population, and environmental conditions that enhance agricultural practices. The chapter also delves into the research methodology employed to achieve the objectives of the study.

3.2 Study Area

This section covers the location and size of the District; climatic conditions and vegetation of the area; geology. The soil formation which to some extent determines the crops grown; environmental conditions; and the economic activities of the people are also discussed.

3.2.1 Location and Size

The Jaman District was carved out of the then Berekum District in 1988, as part of the government efforts in deepening decentralization. It was established by the LI 1376 of 1988. By the LI 1777 of 2004, the Jaman District was further sub-divided into Jaman South and Jaman North Districts (GSS, 2014).

The district has a total land area of about 755.37290 square kilometres (km2). It is located between latitudes 7o 35’ N and 7o58’N and longitudes 2o 47’ W

and 2o 78'W (GSS, 2014) (Figure 3.1). It shares borders with the Jaman North District in the north, Berekum Municipal in the south-east, Dormaa Municipal in the south-west and La Cote d'Ivoire in the west (JSDA, 2010). The results of 2010 population and housing census show that the total population in the district is 92,649. This constitutes 47 percent male population and 53 percent female population. This implies that gender parity and development interventions directed towards females would lead to greater alleviation of poverty in the larger society. The census further indicates that the Jaman South is youthful (GSS, 2014).

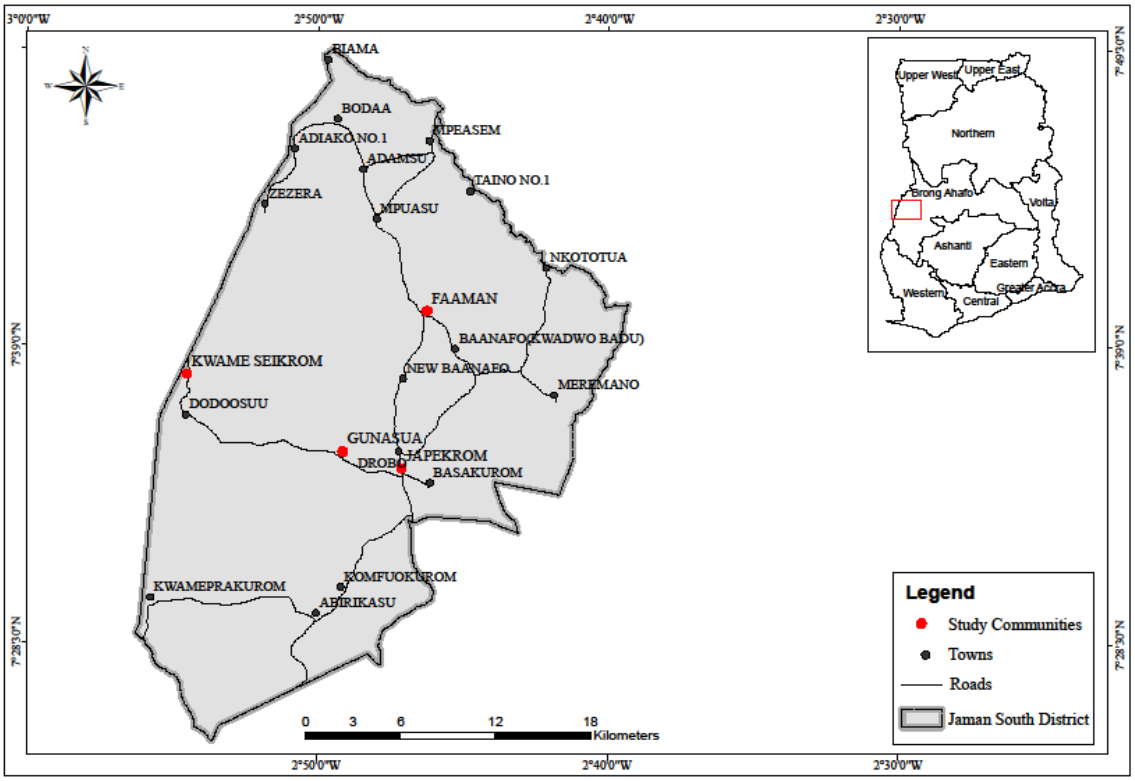

Figure 2.1: Map of the Study Area

Source: Author's Construct (2017)

3.2.2 Climate and Vegetation

The district lies within the wet semi-equatorial region, with a mean annual rainfall ranging between 1,200 -1,780mm and a double maxima rainfall pattern. The district has its major rainy season from April to June while the minor rains are from September to October. The month of August experiences a short dry season, with the prolonged one in the months of December to March. The average annual temperature is about 25°C. Relative humidity is also generally high between 70 percent and 80 percent during the rainy season (GSS, 2014).

The district has two major types of vegetation. These are the semi-deciduous forest and savanna woodland (GSS, 2014). Parts of the original semi-deciduous forest have become secondary type of vegetation as a result of extensive lumbering and agricultural activities (JDSA, 2010). This secondary type of forest is made up of shrubs and grasses with few indigenous tree species such as Odum, Wawa and Mahogany. The savanna woodland is located at the northern part of the district where it shares boundaries with the Jaman North district and parts of La Cote d'Ivoire. It is characterized by elephant grass, shrubs and a few scattered trees ranging between 14 to 27m high (GSS, 2014).

3.2.3 Geology and Soil

There are three main categories of rocks and two soil types which underlie the district namely; Birimian, Buem and Dahomeyan rocks. Considering these rock types, the Birimian rocks are the mineral bearing rocks (GSS, 2014). The

district is largely characterized by soils developed over the Birimian and Buem series. These geological features together with the vegetation influence give rise to two distinct soils: the forest Ochrosols and the savanna ochrosols. Substantial clay deposits which could be developed into ceramics can also be found in parts of the District (GSS, 2014).

The combination of these underlying rocks has resulted in the formation of different soil types which support different agricultural production. Moderately well drained clayey loam type of soils, for example is very good for the production of cashew, cocoa, citrus, oil palm and food crops; loamy sand soil type support the production of maize, vegetables and legumes; silky clay soil type is good for the production of maize, vegetables, legumes, and sugar cane, and clay soil, good for the production of vegetables sugar cane and rice.

3.2.4 Economic Activities

Agriculture is the major economic activity undertaken in the District employing about 72% of the active workforce (GSS, 2014). The major staple food crops produced include cassava, plantain, maize, yam, rice and vegetables such carrots, cabbage, tomatoes and pepper. Traditional methods of farming by slash and burn with little mechanization is predominant in the district. For this reason, food crop production is generally on subsistence level with output per yield substantially low. The average farm size is usually about one to two acres per farmer (GSS, 2014).

The predominant cash crop is cashew which is cultivated on a large-scale by the local farmers, followed by cocoa and oil palm. One notable challenge, however, is that the increasing use of land for cashew plantations can deprive food crop farmers access to land for cultivation. There is also an increasing demand for land for other non-agricultural activities in the district especially in the wake of the small and illegal mining in the area (GSS, 2014).

Livestock production is also carried out in large scale within the district; through this, individual households across the district earn some income to supplement their socio-economic needs. Fish farming is also a very important economic activity for some communities in the district. Dwenem and Drobo are the known communities which produce tilapia on commercial quantities for domestic consumption (GSS, 2014).

A number of small scale industries in the form of agro processing can be found in most parts of the district. Specific locations include a wood processing facility in Drobo and other strategic communities within the district. Cassava which is the largest tuber crop produced and consumed in the district is processed on a small scale into gari. Akpeteshie (a local gin) distillation is also an important agro-based activity in the district (GSS, 2014).

National and cross boarder marketing of goods and services go on between Ghana and Cote d'Ivoire. This serves as an economic contact point which empowers the natives and other investors to create and expand business. Some banking institutions such as the Ghana Commercial Bank and other

rural/community banks such as Drobo Community Bank, Kaaseman Rural Bank, Nkoraman Rural Bank, Brong Ahafo Catholic Cooperative for Social Development (BACCSOD), Suma Rural Bank and Dormaa Teacher Cooperative Credit Union offer wide financial assistance to prospective businesses. Other economic activities include trading such as hairdressing, dressmaking, carpentry, block-making, auto-electricians, fitting, car-body spraying, refrigeration mechanics or repairers.

3.2.5 Environmental Conditions

The District has extensive forest, which have given rise to timber extraction on a large scale. In spite of this large- scale timber extraction activity, there is no big saw-milling plant in the district. The use of traditional farming methods which include slash and burn, shifting cultivation and extraction of wood fuel have added their effect on the natural environment by reducing the forest from primary to secondary. These activities have encouraged leaching, erosion and general degradation of the environment, hence the need for the practice of agroforestry. High incidences of bush fires in the district have contributed to the poor state of the natural environment. However, education campaigns on environmental degradation have been intensified in the district by both governmental and non-governmental agencies (GSS, 2014).

3.3 Methodology

This sections details the steps, processes and procedures employed in the study to ensure the attainment of the stated objectives. Issues discussed under this section include but not limited to the research design, sampling

procedures, sources of data, data gathering methods and techniques for data analysis and presentation.

3.3.1 Research Design

The study employed the concurrent mixed method design. This involves the use of both qualitative and quantitative approaches in gathering, analysing and presenting data. Specifically, the methodological triangulation (Denzin, 2006) or the current triangulation type of mixed method design was used in order to overcome the weakness in using one method with the strengths of another. The use of quantitative methods enabled the researcher to measure certain independent variables such as access to land, household decision making, capital, extension services and information, among others on women's participation in agroforestry (dependent variable). The qualitative methods on the other hand, enabled the researcher to assess in-depth how women are participating in agroforestry (i.e. the form of their participation), why the identified variables (access to land, household decision making, capital, extension services and information) are influence their participation and how relevant stakeholders are influencing the participation of women in agroforestry practice. Since there is no single, absolutely correct method to studies in social science (Neuman, 2003), the choice of this design offered the researcher the opportunity to measure and test some variables whiles understanding the issues in-depth.

The strengths of the research design lies in its ability to easily describe and report data, help in designing and validating of research instruments and help

generalise to a degree that qualitative data alone could not do. Its weakness however are that it is time consuming and the fact that some designs (instruments) generate unequal results. The weakness were however overcome by consistency and proper time management.

3.3.2 Sources of Data

Data for the research was obtained from both primary and secondary sources. Participatory Rural Appraisal tools were used to collect the primary data. The primary data was collected directly from respondents on the level of women's participation in agroforestry to determine the form of their participation, factors affecting their participation and on the institutional arrangements that influence their participation.

Secondary data was also garnered through reviewing of relevant already existing information in the form of documents, journal articles, as well as MPhil and PhD theses. Data from journal articles and theses were obtained through internet search using the Google and Google scholar search engines. The secondary data was sought based on the objectives of the study. Key words such as agroforestry, Ghana, participation, women participation, women and agroforestry, women participation in agroforestry, gender and agroforestry, factors affecting women's involvement in agriculture, etc. were searched for. Relevant information from articles and theses were extracted for use in the study with due acknowledgment of the respective authors. Also, official documents from FAO, ICRAF, MoFA, FC and the Jaman South District Assembly were gleaned and reviewed for use in the study.

3.3.3 Sampling Procedure

This section outlines the sampling processes through which data was gathered. Issues considered here include the sample size, sample techniques and data collection methods.

3.3.3.1 Targeted Population and Sample Frame

The study targeted women and men involved in both crop and tree farming. Also, officials from selected institutions (MoFA, and Drobo Community Bank Limited (DCBL) and Forest Services Division (FSD) of the Forestry Commission) constituted part of the target population of the study. From the perspective of Miller (1991), a research study based on representative sample is thought to be efficient in achieving results than those with a larger sample or those that use the whole population. Hence, the sample must satisfy efficiency, representativeness, reliability and flexibility. For this reason, the sample frame constituted households within selected communities.

3.3.3.2 Sample Size

The study obtained a total of 3,230 households from the four selected communities to constitute the sample frame. To determine the sample size, Yamane's (1967) sampling method was adopted. The formula was adopted in determining the sample size to ensure that the sample mean was closer to the household population mean and also to minimize errors.

Mathematically, the formula is stated as: $n = \frac{N}{1+N*(\alpha)^2}$

Where; n = sample size; N = sample frame; α = error margin and 1 = constant.

But; **N**=Sample frame (3230) and **α** represents the margin of error (**0.07).** By substituting 3,230 and 0.07 into the formula: $\frac{3230}{1+3230*(0.07)^2}$

Therefore; n= 204.018, which is approximated to 204.

Hence, a total of 204 households were selected for the household survey. In order to the get a sample size for each of the selected communities, the total sample size of 204 was proportionately divided among the four communities (Table 3.1).

Table 3.1: Household Sample Size for the Selected Communities

Community	Sample Size
Japekrom	104
Gonasua	51
Faaman	27
Kwameseikrom	22
Total	**204**

3.3.3.3 Simple Random and Stratified Sampling

The District Analytical Report by the Ghana Statistical Service (2014) outlined 20 largest communities in the District based on population. Out of these communities, simple random sampling was used to select four for this study using the random number generation in Microsoft's Excel. The selected communities were Japekrom, Gonasua, Faaman and Kwameseikrom (Figure 3.1).

Stratified sampling was also used in the selection of households. The study communities are grouped into sections or strata by their respective Town Councils. Japekrom is grouped into 10 sections, Gonasua 8 sections, Faaman 4 sections and Kwameseikrom 4 sections. Using these sections or strata, households were randomly selected from each section for the study.

Again, simple random sampling was used to select the household respondents out of the four communities selected. In a house of two or more households only one was selected for interview. The technique offered every household in the selected communities an equal chance of inclusion. It also ensures the law of statistical regularity which states that if on the average the sample chosen is a random one, the sample will have the same composition and characteristics as the universe (Yin, 2009).

3.3.3.4 Purposive Sampling

According to Patton (2002), the use of purposive sampling is based on the judgment of the researcher, as to who could provide information relevant for achieving the objectives of the study. Hence, purposive sampling technique was used to select people with adequate knowledge about agroforestry practice. Key informants were purposively selected for interviews on the subject of study. This group of respondents included officials from MoFA, the DCBL and FSD. They were selected based on the assumption that, they have in-depth knowledge on the subject and could contribute to the needed information. Since “the power and logic of purposeful sampling lie in selecting information-rich cases for study in depth” (Patton, 2002:230), using

this technique afforded the researcher an upper-hand in obtaining accurate and tangible information which illuminated the questions under study.

3.3.4 Data Collection Methods

Familiarization visit to the communities and the selected institutions was carried out. The visits afforded the researcher an opportunity to make contacts with key informants. It was at this stage that community entry protocol was duly observed. The visits were used to introduce the study with the aim of establishing trust with stakeholders. Primary data collection was done by the researcher and two assistants. These research assistants were given orientation and training on interview and questionnaire administration skills. The research assistants were also be taken through the rationale and objectives of the study and the target population. The primary data collection started on 9th December, 2016 and ended on 23rd December, 2016.

3.3.4.1 Questionnaire Administration

Primary data was gathered using household and institutional questionnaires. The household questionnaires were administered by the researcher to the household respondents (i.e. women), while institutional questionnaires were also administered to three officials from the institutions that were purposively selected (MoFA, Forest Services Division and Drobo Community Bank). The questionnaires contained both close-ended and open-ended questions. The close-ended questions afforded respondents the opportunity to select responses from available options. That means respondents were limited in their response.

The questions for the interviews were open-ended to allow participants express their views more freely than in a structured questionnaire. Two Hundred and Four household questionnaires were administered. The questionnaires were divided into sections based on the objectives of the study. The first section involved questions on demographic information of respondents. The second section investigated the form of women's participation in farm management activities and household decision making on issues regarding agroforestry practices.

To get information on the extent of women's participation in farm management activities, respondents were asked using a five-point likert scale namely: 'Always', 'Often', 'Occasionally', 'Rarely', and 'Never' to indicate their frequency of participation. Also, questions were asked whether women's opinion were considered, only consulted or had the final say in decisions concerning farm management in the household.

The third section also focused on asking participants questions on the social, economic and cultural factors that affect their participation in the practice of agroforestry. Respondents were asked to indicate whether they strongly agree, agree, neither agree nor disagree, disagree or strongly disagree, that factors such as capital, land, taboos, household decision, and extension services and information affect their participation. Also, the fourth section of the questionnaire involved interview questions administered to key informants. Questions were asked on the institutional arrangements that govern and

regulate agroforestry in the district and hence the influence (of those structures) on women's participation.

3.3.4.2 Focus Group Discussions (FGDs)

Focus group discussions and interviews provide the means for collecting qualitative data in some settings and situations where a one-shot collection was necessary (Berg, 2007). Focused Group Discussions (FGDs) were conducted with selected respondents across the four communities. Although there are many views on the number that constitute FGD (see Twumasi, 2001; Kumekpor, 2002), Sarantakos (1993) is of the view that a focus group should be large enough to provide a basis for a reasonable discussion but not too large to become uncontrollable. The rationale for FGD was to get more in-depth information from the respondents. Participants were selected based on their knowledge and experience in the practice of agroforestry. In all, 8 sessions of FGDs (4 for women and 4 for men) were held across the four communities. Ten men from each community that were willing to participate were purposively selected for the FGDs to get their views on the matter under study.

3.3.5 Techniques for Data Analysis and Presentation

Qualitative and quantitative data analysis techniques were used to analyse the data into meaningful information. Quantitative data gathered through questionnaires were analysed descriptively through frequencies and percentages with the aid of Microsoft excel and Statistical Package for Social Sciences (SPSS) version 20. To measure the form/extent of women's

participation in agroforestry management activities, index of participation was calculated based on respondents' participation agroforestry activities. Index of participation was computed based on a formula used by Kosoe (2012).

Table 3.2: Computation of Index of Participation

Always	Often	Occasionally	Rarely	Never
1	0.8	0.6	0.4	0.2

Source; Kosoe (2012)

Participation indices were computed as follows:

1. Computation of frequency of participants (n) in a particular activity.

Division of frequency by the total number of respondents (N). The formula adopted is: $IP = n / N;$

Where;

IP -Index of participation in an activity;

n - Frequency of respondents participating in an activity;

N -Total number of respondents.

The Index of Participation values is interpreted on a scale of 0 – 1; where zero means stakeholders have no chance of participating and 1 means always participating. Hence, increase in values from 0-1 implies an increasing participation level of women with respect to a specific agroforestry management activity (Table 3.2).

The Pearson's correlation test was also used to analyse the relationship between demographic factors and practice of agroforestry. The demographic factors were significant at 0.01 and 0.05. To determine the factors that influence the women's participation in agroforestry, multinomial logistic regression model was used. This model was adopted due to: the nature of dependent variables being discrete in nature. The model is useful for situations in which you want to be able to classify subjects based on values of asset of predictor variables (Wafuke, 2012). This model is similar to logistic regression but it is more general because a dependent variable is not restricted to two categories. The probability of a given household being in one of the three levels of adoption given asset of explanatory variable is given by the expression below: $Y = 0 + {}_1X_1 + {}_2X_2 + \ldots\ldots + nXn + \varepsilon i$ ..... (1) Where; 0 =constant; 1… 13= estimated coefficients; Y=Practice of Agroforestry; X1 - Xn are the explanatory variables and is the error term. The variables with significant influence to the model at $P< 0.05$.

Content analysis was employed to analyse the qualitative data gathered through focus group discussions and key informant interviews, while presentation was in the form of narrations and descriptions. Data in the form of audio recording were transcribed into English from the local dialect and the content of discussions was then analysed. The views and contributions from these recording were discussed in the work alongside with finding from the questionnaire. Field notes gathered during filed work on daily basis, which took the form of conversations and stories were also reviewed. The rationale

was to keep track of important events or issues that cropped up during the day and prepare adequately for the next day.

In summary, the study employed the mixed method design, consisting of both quantitative and qualitative approaches. The study targeted women and men involved in both crop and tree farming. Research communities and respondents were selected using simple random, stratified and purposive sampling. While questionnaires, key informant interviews and focused group discussions were used to collect primary data, participation index and regression models in SPSS were used to analyse and present the data.

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION

4.1 Introduction

This chapter presents analysis and discussions of data collected from respondents. The chapter covers the socio-demographic characteristics of respondents, forms of agroforestry systems and technologies. Factors influencing women's participation in agroforestry and the role of institutions in promoting women's participation in the practice of agroforestry are also discussed.

4.2 Socio-Demographic Information of Respondents

This section presents a detailed description of respondents in the study communities. Issues discussed here include age distribution, educational background, and household status of the respondents, among others.

4.2.1 Age Distribution of Respondents

According to the Ghana Statistical Service (GSS, 2014), the economically active population of the district is between 15 years and beyond for both men and women. The study however showed that, age for active workforce for farming in the District is 20 years and beyond. This is because the population below the age of 20 years are usually in school. The average age group of the respondents was (40-49) (with a Standard Deviation (SD) of ±1), meaning that all the communities have majority of the respondents in the age group 40-49, represented by 31.4 percent of the total respondents. Respondents between the

age group (50-59) constituted 24.5 percent. Also, respondents within the age (20-29) constituted the smallest with 6.8 percent, whereas slightly over 3.5 percent were in the 60+ years age group with 10.3 percent (Table 4.1).

Table 4.1: Age Distribution of Respondents

	Age Groups				
Community	**20-29**	**30-39**	**40-49**	**50-59**	**60+**
Japekrom	7(3.4)	26(12.7)	36(17.6)	22(10.8)	13(6.4)
Gonasua	3(1.4)	15(7.4)	10(5.0)	13(6.4)	6(2.9)
Faaman	2(1.0)	8(3.9)	9(4.4)	7(3.4)	1(0.5)
Kwameseikrom	2(1.0)	6(2.9)	9(4.4)	4(2.1)	1(0.5)
Total	14(6.8)	55(27.0)	64(31.4)	50(24.5)	21(10.3)

Figures in parenthesis are percentages.

Source: Field Survey, December 2016.

Analysis of the age distribution between the different age groups from all the communities indicates that 66.2 percent of all the respondents are within the ages of 40 and 60. The findings support earlier studies by Enete and Amusa (2010a) on women's contribution to cocoa agroforestry decision making in Nigeria, that agroforestry farmers have an average age of between 40 to 50 years and above. Also the increasing number of young women farmers between the ages 20 and 49 (Table 4.1) indicates that there is a pool of youthful labour to draw on for agricultural activities. This emphasises the view of Pattanyak et al., (2003) that the presence of youthful labour should

make it possible for the integration of labour-intensive tree integration and agroforestry activities into farming systems.

4.2.2 Educational Status of Respondents

The study revealed that 45.1 percent of the respondents had Junior High School (JHS) (formally, Middle School and JSS) educational status, while 9.8 percent had no formal education. Majority of the respondents (58.8%) (13.7% for primary school and 45.1% of JHS) have either completed or dropped out of basic school. Meanwhile, 13.7 percent and 17.7 percent attained secondary and tertiary education respectively (Table 4.2).

Table 4.2: Educational Status of Respondents

Community	Educational Status				
	Non-Formal	Primary	JHS	SHS	Tertiary
Japekrom	8(3.92)	17(8.33)	49(24.02)	13(6.37)	17(8.32)
Gonasua	9(4.41)	4(1.96)	22(10.78)	7(3.42)	9(4.40)
Faaman	2(0.98)	1(0.49)	11(5.39)	7(3.42)	6(2.93)
Kwameseikrom	1(0.49)	6(2.94)	10(4.90)	1(0.49)	4(1.95)
Total	20(9.8)	28(13.7)	92(45.1)	28(13.7)	36(17.7)

Figures in parenthesis are percentages.

Source: Field Survey, December 2016.

The level of education of farmers is noted to have influence on their practice of agroforestry. For instance, Mekoya et al. (2008) mentioned that agroforestry requires high levels of education since technologies used in the

system are knowledge intensive. By implication, the higher the level of education of farmers, the more likelihood they are to adopt new technologies such as agroforestry. However, the low level of education among women farmers in the study area had not obstructed their participation and practice of 'new' agricultural technologies of agroforestry and hence defiling the notion of conservatism (Anon, 1987) among farmers with low level of education.

4.2.3 Household Status of Respondents

The study categorised household status of the respondents into 'Wife' (69.1%), 'Household Head' (28.4%) and 'Daughter' (2.5%) (Table 4.3).

Table 4.3: Status of Household Respondents

Community	Household Status		
	Wife	Head	Daughter
Japekrom	62(30.4)	39(19.1)	3(1.5)
Gonasua	42(20.6)	8(3.9)	1(0.5)
Famman	20(9.8)	6(2.9)	1(0.5)
Kwameseikrom	17(8.3)	5(2.5)	0(0.0)
Total	141(69.1)	58(28.4)	5(2.5)

Figures in parenthesis are percentages.

Source: Field Survey, December 2016.

The study refers to a 'wife' as a woman who lives with the husband whereby the husband (may or may not) support them in farming and therefore act as the heads of the household. A 'household head', on the other hand, is a woman or respondent who lives with the family and exercises control over members of

the family as the head. This agrees with the description of household headship by Rosenhouse (1989) and Meijer et al. (2015), as a hierarchical relationship that exists between household members and that the head is the most important member; that the head is a regular presence in the home; has overriding authority in important household decision matters; and, provides a consistent and central economic support. Meanwhile, a daughter is considered by the study as a female member of the household who is a farmer. Table 4.3 indicate more 'wife' in all the communities than 'household head' or 'daughter'. This suggests that majority of agroforestry farmers in the study area are married, hence they are more likely to have men support them on the farm.

4.3 Forms of Agroforestry Systems Practiced and Women's Participation in Farm Management Activities and Decision Making

This section examines the forms of agroforestry systems practiced in the study area, level of women's participation in farm activities and decision making. Other issues detailed in the section include women's tree species preference and the relationship between socio-demographic characteristics and the practice of agroforestry.

4.3.1 Agroforestry Adoption and Practice

The study revealed that more than two-thirds (174) representing 85.3 percent of the respondents are active in the adoption and practice of agroforestry while 14.7 percent are not practicing agroforestry (Table 4.4).

Table 4.4: Women's Participation in Agroforestry

Community	Status on Agroforestry Practice		Total
	Yes	No	
Japekrom	86(82.7)	18(17.3)	104(100.0)
Gonasua	43(84.3)	8(15.7)	51(100.0)
Faaman	24(88.8)	3(11.2)	27(100.0)
Kwameseikrom	21(95.5)	1(4.5)	22(100.0)
Total	174	30	204

Figures in parenthesis are percentages.

Source: Field Survey, December 2016.

In Kwameseikrom, 95.5 percent of respondents were practicing agroforestry, followed by Faaman (88.8%), Gonasua (84.3%) and Japekrom (82.7%) (Table 4.4). In Kwameseikrom, for instance, at least one household in every house is practicing agroforestry, mainly cashew agroforestry. The nearness of the community to the Ivorian border boosts the production and marketing of cashew. For this reason the community has been described as the "hub of cashew production" in the district.

On the other hand, Japekrom had the highest number of respondents (17.3%) not practicing agroforestry, relatively because of its urban status, coupled with other alternative means of livelihood such as trading, hair dressing, and dressmaking, among others; whiles Kwameseikrom had the least (4.5%) number of respondents' not practicing agroforestry (Table 4.4). The high level of participation in agroforestry across the communities is due to the fact that sale of crops (especially the tree crops) contributes to their household income.

This reflects Ajayi et al., (2008) findings that proceeds from agroforestry complements household livelihood and income.

However, respondents that were not practicing agroforestry indicated that they are involved activities other than farming so they barley have more time for intensive farming. These respondents were teachers, nurses, civil servants, hair dressers, toilers and traders. Aside the lack of time, the respondents mentioned limited of availability of land as other reason influencing their non-involvement in agroforestry. The respondents revealed that they are not natives in the communities they are residing and hence getting access to land to farm perennial cash crops like cashew, cocoa or woody perennial is difficult. A 47-year-old respondent in Japekrom revealed that;

> *I am a civil servant and can go on transfer at any time. To me, there is no need to plant trees knowing I wouldn't be here for long. I would rather plant only food crops and invest my money in other activities* (Female Household Respondent, Japekrom, December 2016)

Another respondent, a landowner also hinted in a FGD at Japekrom that;

> ……. *I will not give my land to a settler to plant trees. If you do that they would later think that the land is theirs. I will give land to a settler to produce food crops but not to plant trees unless the trees* (Cocoa or Cashew) *are for me* (Male Discussant, Japekrom, December 2016).

This implies that some land owners were unwilling to give their lands to non-natives or settlers for agroforestry since they may find it difficult to take their lands back if the need be. In addition, some settlers were also reluctant to plant trees because they might relocate and leave the (permanent) trees on the lands. These revelations reflects that of Nair (1993) that land availability increases farmers adoption of agroforestry and vice versa.

4.3.2 Agroforestry Systems and Technologies Practiced

There are three main types of agroforestry systems; agri-silviculture, silvopastoral and agri-silvo-pastoral. The study revealed that agri-silviculture is the main system of agroforestry practiced in the study area. In agri-silviculture, farmers plant tree crops together with food crops and vegetables on the same agricultural landscape. This system of farming is commonly referred to as mixed cropping which contains both food crops and tree crops or woody perennials. This finding was supported by the District Development Officer in-charge of Women and Agricultural Development at Ministry of Food and Agriculture (MoFA) in a key informant interview (KII).

> *The only system practiced here in the district by both men and women is agri-silviculture. We do not practice the silvo-pastoral and agri-silvi-pastoral* (referring to other agroforestry systems) *here because there are not many animals here that would require one to go into that* (Key Informant at MoFA, Drobo, December 2016).

According to Alao and Shuaibu (2013:157), agro-silviculture could also be likened to shifting cultivation, except that "the fallow vegetation is planted

with economic trees whose gestation period is equivalent to the fallow period". Moreover, agri-silviculture falls within the socio-economic and ecological basis (Nair, 1993; Vira et al., 2015) for the classification of agroforestry, where the aim of farming is mainly to enhance the scale of management and achieve commercial values whiles promoting ecological conditions.

There are various technologies of agroforestry. Key technologies identified and practiced by farmers are; scattered trees on farms (51.1%); Home-garden (26.4%); Alley Cropping (13.8%); Taungya (8.6%) (Figure 4.1).

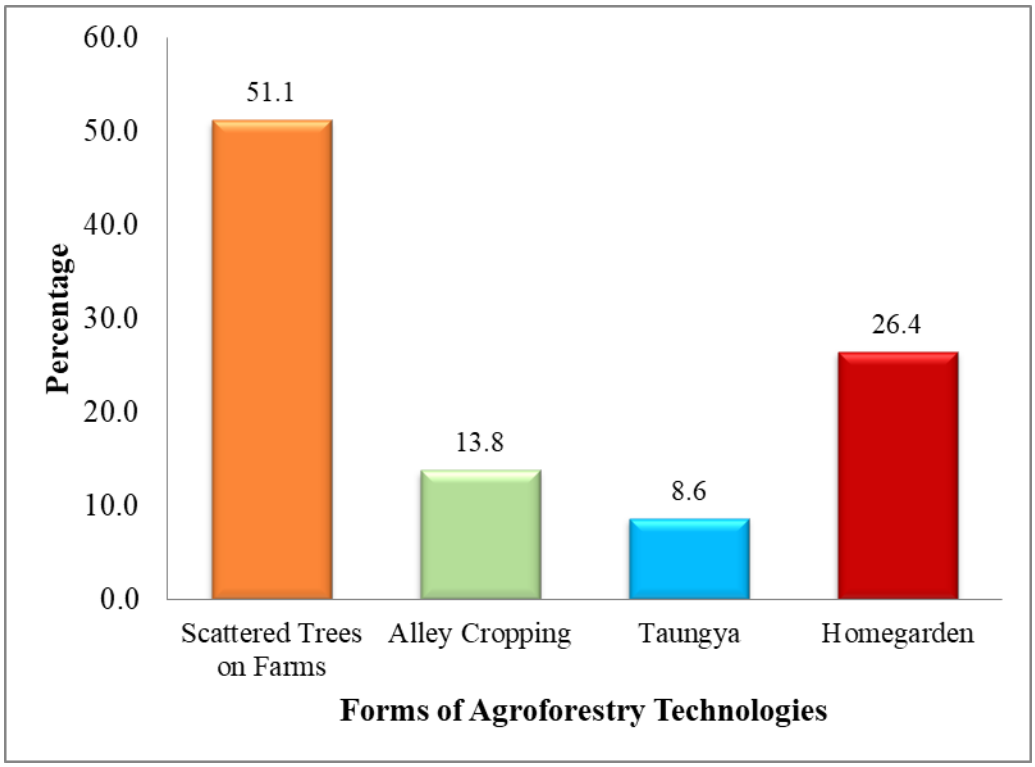

Figure 3.1: Forms of Agroforestry Technologies Practiced

Source: Field Survey, December 2016.

Under Scattered Trees on farms, farmers (in most cases) retain or plant trees on their farmlands for income, food, soil and environmental improvement, and for shade during the harsh weather period (Alao & Shuaibu, 2013). The study revealed under this technology that, tree crops retained on the farmlands are usually naturally occurring trees or indigenous trees such as avocado pear, orange, and kola. The study gathered also that this type of agroforestry technology is practiced hand-in-hand with shifting cultivation. Shifting cultivation is a traditional cropping sequence where farmers farm on the same piece of land for some period of time before moving to another land. Shifting cultivation has been practiced in the district for centuries.

Respondents mentioned that when their fore-fathers were practicing shifting cultivation, they planted and retained the trees on the farms and the result is what they are reaping today. Some of the benefits of dispersed trees on farmlands as enumerated by respondents include; shade, enrichment of soil nutrients and organic matter, ability to withstand harsh conditions and the provision of commercial and subsistence values. A participant in FGD in Japekrom who farms in Zezera (a community within the district) talked about the values of such indigenous trees;

> *……my family enjoy economic benefits from tree crops like avocado and orange. These trees were on the land when we began farming and every season we harvest and get money from it. Aside this, they provide cover for the food crops from harsh weather conditions during the dry season* (Female Discussant, Japekrom, December 2016).

For reasons such as above, the study found that even today, some farmers intentionally or unintentionally plant and leave tree crops such as mango, orange and avocado pear on farm lands.

Another technology practiced by respondents is alley cropping. The main purpose of this method is to maintain or increase crop yields by improving the soil and micro-climate through the cycling of nutrients, mulching and weed control. In the study area, economic crops such as cashew, cocoa, orange and mango are grown in alleys with food crops such as plantain, cassava and maize planted in the areas. The type of food crops and vegetables planted is the farmer's discretion. When asked why they practice alley cropping, it was mentioned that extension officers advised that alley cropping helps overcome the overcrowding of trees and was influential in improving soil nutrients. A 51-year-old cocoa and cashew farmer in Gonasua had this to say;

> *…….an extension officer once visited our community and entreated us to plant the trees in lines since it helps to avoid overcrowding and unnecessary pruning. We* (her household) *have benefited from it because it helps to maintain and improve soil nutrients. The weeded plants also serve as mulch for the trees, especially when they are young* (Female Discussant, Gonasua, December 2016).

While some respondents hailed alley cropping, others expressed their dislike for the technology. These respondents stated that practicing alley cropping

was a waste of fertile land and farm resources. One of such participants intimated;

> *Alley cropping is a waste of land, seeds and resources. They* (extension officers) *tell us, for instance that, there should not be more than 80 or so* (not really sure of the exact number) *trees on an acre of land. Meanwhile I can sow more than that and if the need be, I can prune some out, besides it is very technical* (Female Discussant, Kwameseikrom, December 2016).

The same opinion was expressed my most discussants in FGDs across the four communities, hence their abstinence from alley cropping practice. Besides this, respondents revealed that they do not get access to the extension officers to do the measurements for them, and this poses a great challenge to the practice of alley cropping. This finding is in line with the observations of Nair (1993) and Vira et al. (2015) that alley cropping technique requires careful planning and considerable labour and management.

Moreover, another agroforestry technology, Taungya, was identified to be practiced by 8.6 percent of respondents in three communities; Japekrom, Gonasua and Kwameseikrom. Typical tree planted in this system is *Tectona grandis* (teak) and it is spearheaded by the men. The main aim of these farmers for using teak has been to regenerate their lost forest while deriving sustenance values through intercropping. Farmers unanimously concluded in the FGDs that Taungya system has been beneficial to their households and the

environment. A male farmer in Gonasua in an interview attested to this claim by revealing that;

> ……*the Taungya system provides cover for degraded forests. My father's cocoa farm burnt down in the 1983 fire outbreak and the land become a 'desert'. With advice from a relative who was an agriculturalist, we planted the land with teak in order to reclaim the lost forest. Today the place has become green again and we even sell some of the trees from time to time* (Personal Interview, Gonasua, December 2016).

Although the practice of Taungya is spearheaded by the men, women (their wives) play major part in the practice. They (women) are usually in charge of the planting of intercrops and vegetables and as well assist in weeding. The only thing they do not do is taking that initial step in growing the trees; hence they do not consider themselves owners or co-owners of the trees. This situation is unlike the growing of other tree species like cashew and cocoa where women even own the trees. This observation was supported by an officer at the Forest Service Division (FSD) in a KII that Taungya is practiced by the men. According to him,

> *One thing I know for sure is that Taungya is practiced mostly be the men. The women consider that as men's work".* Giving possible reasons for this, he revealed that; *the women are interested in trees that bring some income to them in the nearest future. So they would go in for trees with short term maturity than those with long term*

> *maturity. That is why they often go into the farming of cashew and cocoa since they know at least within three years of farming they can reap some benefits* (Key Informant at FSD, Drobo, December 2016).

Household interviews with the women revealed that indeed they preferred to plant tree species like cashew and cocoa to the planting of *Tectona grandis* (teak) because "they give money fast". According to a 37-year-old respondent at Faaman, there is no need farming a crop that wouldn't bring immediate results, a perception that was shared by some of the men in the FGDs. Besides the monetary values, it also became known that cashew as a crop is more tolerant to harsh weather conditions.

> *Unlike cocoa for instance which cannot withstand bush fires, cashew can come back to life even after severe bush fires or harmattan. If I had more land, I would farm cashew than cocoa* (Female Discussant, Faaman, December 2016).

One important discovery, however, was that unlike the Modified Taungya System (MTS) (Abugre et al., 2010; Kalame, 2009; Agyeman et al., 2003) where farmers are given parcels of degraded forest reserves by the government to produce food crops and to help establish and maintain trees, Taungya farmers in the study area are using their own (degraded) land for the practice. This is because farmers have little knowledge on regulations concerning the acquisition of reserved forests. This however, implies that farmers have total control over the proceeds from the system; they enjoy full access to and control over the intercrops and vegetables as well as the trees.

The last but not the least agroforestry technology identified by the study was home-garden. The practice of home-garden was mainly observed among respondents in Kwameseikrom, Gonasua and Faaman. Home-gardens in the district are characterised by the use of multipurpose tree (mainly; *Citrus sinensis, Carica papaya* and *Mangifera indica*) as well as food crops and all sorts of vegetables (*Abelmoschus esculentus, Manihot esculenta, Zea mays, Musa sapientum, Capsicum annuum* and *Lycopersian esculentum*). This description corresponds with the definition of home-garden by Bajpai et al., (2013) as a multi-species, multi-use small scale land use system in an ecosystem that are for the immediate needs of households with regards to their food, health and fuel. Respondents indicated that home-gardens are essential for the sustenance of their households in terms of food supplies and income, hence it supplements and ensures household food security. These findings also collaborate the submission of Galhena et al., (2013) that home-garden is supplemental rather than the main source of family consumption and income; occupy a small area and are a production system that the poor can easily enter at some level. Owing to the essential use of home-gardens as source of sustenance and nutritional supplement, home-gardens have been seen as a treasure trove of biodiversity (Galhena et al., 2013).

4.3.3 Extent of Women's Participation in Farm Management Activities

At the centre of agroforestry farming systems are women farmers who are generally responsible for managing trees and participating in various activities. Major farm management activities the study identified are land

clearing, seed preparation, planting, weeding, spraying/fertilizer application and harvesting. The index of participation, as used in Kosoe (2012), was used to assess the extent of women's participation in various farm activities.

Across the four communities women's participation in land clearing and preparation can be considered average. Specifically, the Index of Participation (IP) in Japekrom, Gonasua, Faaman and Kwameseikrom was 0.64, 0.67, 0.62 and 0.62 respectively (Table 4.5).

Table 4.5: Index of Participation for Major Farm Management Activities

	Index of Participation			
	Communities			
Activity	Japekrom	Gonasua	Faaman	Kwameseikrom
Land Clearing	0.64	0.67	0.62	0.62
Seed Preparation	0.72	0.75	0.82	0.84
Sowing/Planting	0.87	0.94	0.94	0.93
Weeding	0.83	0.88	0.81	0.91
Spraying/Fertilizer Application	0.33	0.25	0.40	0.33
Crop Protection (e.g. pruning)	0.54	0.78	0.67	0.73
Harvesting	0.84	0.89	0.84	0.94
Drying	0.78	0.88	0.80	0.93
Collection of by-products	0.62	0.78	0.74	0.74
Storage of Produce	0.77	0.87	0.78	0.86

Source: Field Survey, December 2016.

Less than half (39%) of the respondents in all the four communities indicated they 'often' participate in land clearing and preparation (see Appendix 1). These respondents are usually involved in the removal of stumps and general preparation of the land for the raising of mounds. Clearing of *Kwae*[1] was identified as the difficult and a primary responsibility of men (husbands, sons or hired labour). On the other hand, some women, all of whom were household heads revealed they usually take part in the clearing of forests that are without thick canopy trees, locally referred to as *Nfofoa*[2]. According to a 42-year-old woman in Faaman;

> *I am all alone in this. I have just started cashew farming; I don't have money to hire enough labour. I therefore tend to depend on my own strength and that of my daughter who stays with me. Hired labour clears the portion that my money can cater for, and then we* (she and her daughter) *also clear small in addition. Beyond that all other activities regarding land preparation is undertaken by us* (Female Household Respondent, Faaman, December 2016).

Another farm activity women participate usually was seed preparation. Seed preparation involves the collection of seeds for sowing. It involves purchasing

[1] *Kwae* is a local name for thick forest, usually crowded with canopy trees that require much strength to clear and which most women find it difficult to do.

[2] *Nfofoa*, also a local term, is used to refer to a sparse forest. It refers to a land which has been left to grow after farming activities as in the case of shifting cultivation.

of seeds for planting or seeking some from friends and relatives, if there are no financial resources to buy. There happened to be high participation in seed preparation since a high number of the respondents (48%) 'Often' participate in this activity, while only 3 percent 'Never' participate (see Appendix 1). The study indicates a high participation among respondents in Kwameseikrom (IP=0.84). Following Kwameseikrom are Faaman, Gonasua and Japekrom with IP of 0.82, 0.75 and 0.72 respectively (Table 4.5). This reflects the observations of Enete and Amusa (2010b) and the FAO (2015) that women tend to be highly involved in activities like nursery tending, seedling preparation.

The study showed again that women in Kwameseikrom and Faaman often participate in seed preparation more than the other communities. Respondents revealed that they are always the ones go to the shops to buy the seeds or at worse follow fellow farmers for the seeds to plant. In a FGD in Kwameseikrom, the women revealed that although they may co-own farms with their husbands, they prepare the vegetable seeds whiles the men go in for the economic crops and food crops. One of the participants shared this;

> *I don't remember the last time my husband came home with even tomato seeds. "During planting seasons",* she continued, *"he's always concentrated on the getting cocoa seedlings from the agric people* (officials of the Forest Services Division), *so I also proceed to look for the other seeds, after all the farm and its rewards are for both of us,* she concluded (Female Discussant, Kwameseikrom, December 2016).

The implication of the above revelations is that both men and women actively participate in seed preparation activities but with different purposes. That is, whiles men ranked trees that grow straight and fast and have much economic values, women usually prefer vegetables and multipurpose trees.

Following seed preparation was sowing and/or planting, where women's participation was very high across all communities. Gonasua and Faaman had the highest IP of 0.94 and 0.94 respectively. This was followed by Kwameseikrom and Japekrom with IP of 0.93 and 0.87 respectively (see Table 4.5). Compared with other communities, participation was less in Japekrom because majority of the women indicated they are involved in other income generation activities such as trading, dressmaking and hairdressing aside farming. This makes it difficult for them to always be at the farm; hence they hire labour to work for them. It was interesting to know however, that no respondent had rarely or never participated in sowing and planting of seeds. Interviews with the women revealed that their husbands are equally active in the planting activity. Crops such as *Anarcadium occidentale* (Cashew), *Theobroma cacao* (cocoa), *Dioscorea spp.* (Yam) *Manihot esculenta* (Cassava) *Xanthosoma sagittifolium* (Cocoyam), *Musa sapientum* (plantain) *Zea mays* (Maize), *Lycopersian esculentum* (Tomato) *Capsicum annuum* (Pepper) *Abelmoschus esculentus* (Okro), *Mangifera indica* (Mango) and *Arachis hypogaea* (Groundnut) are sowed or planted by both men and women, although women usually concentrate on the vegetables in case of male headed households.

Weeding was another important agroforestry management activity that most women do. Weeding is more necessary at the beginning of agroforestry systems. It was revealed that weeding in agroforestry practice is not very often, except during the initial stages. This is in consonance with Kiptot and Franzel (2012) that if trees are mixed with annual crops, then no extra weeding is required. Notwithstanding this, there is always weeding at the initial stages of planting before the intercrops begin to cover and women are at the core of activities. Across all the four communities, 51 percent of women indicated that they 'Always' participate in weeding. Meanwhile, women participating 'Often' and 'Never' reduced to 2.7 percent and 2 percent respectively (see Appendix 1).

The proportion of women that were participating in weeding in Kwameseikrom was high with IP of 0.91, while in Japekrom (0.83), Gonasua (0.88) and Faaman (0.81). Weeding at the initial stages of planting is considered a woman's work since it demands time and patience to weed around growing plants. The men attested to this at a FGD in Japekrom. When asked why women are those weeding especially during the early stages of germination, one male participant stated that;

> *Women have the patience to take care of young plants. A man is likely to clear the very crop, he is weeding around* (Male Discussant, Japekrom, December 2016).

However, this is not true for all men. In the FGDs organized in the other three communities, some of the men disagreed with the assertion that women are

better managers of crops. These discussants posited that there is nothing their wives do on the farm that they cannot do. One of such men is a 56-year-old cocoa and cashew farmer in Kwameseikrom who also has farms in Western Region (Sefwi). This respondent opined that men do weeding as much as women. He furthered that;

> *We are all partakers in farm management activities. I clear the land; she helps in preparing it for planting. We all sow or plant the crops. She weeds, I weed. I apply chemicals* (pesticides and weedicides) *on the matured cocoa tress, she doesn't. When it comes to harvest she is involved as much as I am. Also in drying and storage she is with me. The only thing I wouldn't allow her to do is to carry heavy loads home* (Personal Interview, Kwameseikrom, December 2016).

This opinion is a justification that women in male headed households are supported in farm activities, maybe more than women in female headed households.

However, the study revealed that women's participation was very low in spraying, with Japekrom, Gonasua, Faaman and Kwameseikrom all having low IPs of 0.33, 0.25, 0.40 and 0.33 respectively (Table 4.5). Across the four communities, more of the women (63.2%) had 'never' participated in the spraying of crops (see Appendix 1), hence their low participation. Apparently, spraying is undertaken by the men. This agrees with the finding of Catacutan and Naz (2015) that men are more into laying out the farm, ploughing and spraying. At Faaman, the women revealed they usually apply fertilizers on

their pepper crops to ensure good yields but not spraying. Meanwhile because the cash crops (e.g. cashew) are resistant to the harsh conditions of the weather, respondents indicated they hardly apply chemical fertilizers. Use of inorganic fertilizer was mentioned in some communities. One respondent in Japekrom for instance, revealed her household apply poultry waste on their farm after plough to make the soil more fertile.

However, women's participation was above average in crop protection activities such as pruning. More women indicated they often participate in this activity, hence an average participation with IP of 0.54, 0.78, 0.67 and 0.73 for Japekrom, Gonasua, Faaman and Kwameseikrom respectively (see Table 4.5). The finding concords FAO's (2015) observation that activities, such as thinning and pruning, forest rehabilitation and enrichment planting, are undertaken by both men and women. Women for instance participate in pruning because pruned materials are usually used for firewood.

Furthermore, the findings of the study showed that if there is one activity that women participate always and often after sowing/planning, then it is harvesting and drying. Participation in harvesting was highest in Kwameseikrom (0.94). Although the IPs of the other communities reduced [Faaman (0.84), Gonasua (0.89) and Japekrom (0.84)], generally there was high participation (see Table 4.5). Harvesting, ranges from picking of cashew nuts, cocoa pods, orange and mango to harvesting of maize, pepper, yam and tomato, among other crops.

For drying of crops, some respondents are 'always' (34.8%) and 'often' (49.5%) participating. Hence, high participation in all communities; Japekrom (0.78), Gonsaua (0.88), Faaman (0.80) and Kwameseikrom (0.93) (see Table 4.5). Drying is required of cocoa, pepper, okro, and rarely of cashew. In congruence to these findings, Catacutan and Naz (2015) on gender roles and decision making to agroforestry adoption in Vietnam, reveals that women's participation is higher than men's in terms harvesting and sorting crops. Also, Enete and Amusa (2010b) stated that women's contribution is high in cocoa based agroforestry in harvesting and post-harvesting activities ranging from breaking and scooping out of cocoa seeds through to fermentation, transportation, sun-drying and marketing.

4.3.4 Women's Participation in Farm Management Decision Making

According to UN-REDD (2013) since the 1990s, women have taken part in almost all production activities and in the decision-making processes related to agricultural production. The extent of women's participation in decision making was measured at five levels; always, often, occasionally, rarely and never. The study revealed that the role men play in decision-making is paramount, however that is not to say there is avocation of women in household decision-making. Across the four communities, there was an indication that decision making in the household regarding land preparation, type of tree or crop to farm, time of sowing, determining the farm size, purchase of fertilizers and weedicides, marketing of produce, farm credit and loans and crop rotation plans are jointly made by men and women (i.e. in the

case of male headed households). Participation in decision making in these activities can therefore be described as interaction participation (see Agarwal, 2001) where women have the voice in and influence decision on the farm, leading to empowerment.

The finding is in line with Catacutan and Naz (2015) that joint decisions are made regarding crop varieties and tree species to plant. The study also reveals that more often than not, households headed by females have the final decision making roles whiles in male headed households there are either no consultation, only consultation or consideration of opinions[3]. Interviews with respondents from female headed households revealed that, they (women) take care of the household, therefore decisions (either tough or easy) were theirs to make. A 49-year-old respondent at Faaman had this to say;

> *Who do I have to consult from outside this house? …….yes I seek opinions from friends and others but the final decision is made by me, there is no husband or man to challenge me on the decisions I make,* she retorted when asked whether she seeks council from other people. She continued, *I make decisions on the size of land to farm, the type of labourers to hire, crop management activities, whether to use fertiliser or not and the type of crop or tree to plant. My husband and I were farming cocoa in Western Region but since his demise I took the decision to farm cashew on the land we have here* (referring to Faaman). *Last year for instance, I didn't farm pepper but it had good*

[3] Women in male headed households don't make final decisions except in few instances. For instance if the husband has travelled, not a farmer or indisposed.

market, so I decided to farm it more this year, which was a sole decision I made. Maybe if there was a man I wouldn't have farmed cashew in the first place, she guessed (Female Household Respondent, Faaman, December 2016).

The women revealed that decisions regarding land preparation and determination of land size was usually made by the men, although their husbands do them the honest by seeking their opinions. The study reveals that 44.6 percent and 44.6 percent of respondents respectively had their opinions considered on decision concerning land preparation and determination of farm size (Table 4.6).

Table 4.6: Women's Participation in Decision Making on Land Preparation and Land Size

Extent of Participation	Land Preparation				
	Japekrom	**Gonasua**	**Faaman**	**Kwame seikrom**	**Total**
No Consideration	3 (1.5)	1 (0.5)	0 (0.0)	0 (0.0)	**4(2.0)**
Only Consulted	23 (11.2)	6 (2.9)	4 (2.0)	2 (1.0)	**35(17.1)**
Opinion Considered	41 (20.1)	24 (11.7)	13 (6.4)	13(6.4)	**91(44.6)**
Make Final Decision	37 (18.1)	20 (9.8)	10 (4.9)	7 (3.4)	**74(36.2)**
	Determining Land Size				**Total**
No Consideration	14 (6.8)	1 (0.5)	0 (0.0)	0 (0.0)	**15 (7.3)**
Only Consulted	9 (4.4)	6 (3.0)	5 (2.4)	3(1.5)	**23(11.3)**
Opinion Considered	44 (21.5)	23 (11.3)	12 (5.9)	12(5.9)	**91(44.6)**
Make Final Decision	37 (18.1)	21 (10.3)	10 (4.9)	7(3.4)	**75(36.7)**

Figures in Parenthesis are Percentages.

Source: Field Survey, December 2016.

This is an affirmation of Ojo's (2001) finding that men initiate the cultivation and take responsibility for major initial farm activities while women play supporting roles.

On decision making regarding determination of land size, some respondents in Japekrom (13.4%) indicated that their husbands do not consult them when determining the land size. One of such respondent is a 35-year-old farmer at Japekrom. She posited that although her husband tells her about land preparation, she has no say on the size of the farm because farm labour for that activity is provided by the husband;

> *I have no say on that* (size of the farm) *because he uses his own strength, as and when he thinks he had cleared enough land for a year's farm he stops* (Female Household Respondent, Japekrom, December, 2016).

Moreover, large proportion of women (60.3%) and (57.8%) revealed that their opinions on decision making concerning the crop or tree to plant and the time of sowing or planting respectively are valued and considered (Table 4.7). This finding suggests an equal participation of women and men. The finding therefore contradicts that of Catacutan and Naz (2015) in Vietnam that smaller proportion of women get involved in deciding the type of crop or tree to plant.

Table 4.7: Women's Participation Decision Making on Crops to Farm and Time of Sowing

Extent of Participation	Type of Crop/Tree to Farm				Total
	Japekro	Gonasua	Faaman	Kwamesei Krom	
No Consideration	-	-	-	-	-
Only Consulted	2 (1.0)	1 (0.5)	0(0.0)	1 (4.5)	**4 (2.0)**
Opinion Considered	63 (30.9)	29 (14.2)	17 (8.3)	14 (6.9)	**123 (60.3)**
Make Final Decision	39 (19.1)	21 (10.3)	10 (4.9)	7 (3.4)	**77 (37.7)**
	Time of Sowing				**Total**
No Consideration	0 (0)	1 (0.5)	0 (0)	0 (0)	**1 (0.5)**
Only Consulted	3 (1.5)	3 (1.5)	1 (0.5)	1 (0.5)	**8 (4.0)**
Opinion Considered	63 (30.9)	26 (12.7)	16 (7.8)	13 (6.4)	**118 (57.8)**
Make Final Decision	38 (18.6)	21 (10.3)	10 (4.9)	8 (3.9)	**77 (37.7)**

Figures in Parenthesis are Percentages

Source: Field Survey, December 2016.

The high participation of women in decision making on these activities stems from the fact that they are more knowledgeable especially on deciding the kind of intercrops to use. This claim is supported by the studies of Ndiaye (2014) that women participate in all activities and in the decision-making processes related to agroforestry. In a FGD at Kwameseikrom, one woman revealed that;

> *There is nothing a man knows that we don't know, most women even do farming more than the men* (Female Discussant, Kwameseikrom, December, 2016).

The findings further revealed that women from male headed households were quick to add that they are not the "final sayers" but whatever they suggest their husbands agree with them.

> *Yes he is the head of the house, but he will not sow tomato or pepper or okro whiles I'm around. It becomes my responsibility to tell him, okay, I will sow this or that of the intercrops.* When asked whether the husband has ever prevented her from sowing any crop, she said, *my husband has never prevented me. What I say he listens but of course not at all times. I can't say for all women around here, but one thing I know is that women usually decide on most the intercrops to plant* (Female Discussant, Gonasua, December, 2016).

The above findings imply that women's opinions on such activities are valued but they need the approval of their husbands before planting the crops. This is supported by the studies of Chavangi (1994) in Luhya in the Western Provinces of Kenya, that a wife is expected to seek the consent of her husband before going ahead with any plans that may bring about any changes in the allocation of the household's resources.

Furthermore, regarding the marketing of farm produce great proportion (90.1%) of the women make final decision on the types of crops or produce to take to the market (Table 4.8).

Table 4.8: Women's Participation in Decision Making on Marketing of Farm Produce

Extent of Participation	Marketing of Farm Produce				Total
	Japekrom	Gonasua	Faama	Kwameseikrom	
No Consideration	-	-	-	-	-
Only Consulted	1(0.5)	1(0.5)	0(0.0)	0(0.0)	**2(1.0)**
Opinion Considered	9(4.4)	5(2.4)	4(2.0)	2(1.0)	**20(9.8)**
Make Final Decision	95 (46.5)	46 (22.5)	23 (11.8)	20(9.8)	**184 (90.1)**

Source: Field Survey Results, December 2016.

Figures in Parenthesis are Percentages.

It was revealed in FGD at Faaman with both males and females that decisions on the crops (such as plantain, cocoyam, cassava and other vegetables) to sell are made by the woman, provided there is something left for household consumption. A female participant in Faaman said this;

> *Men don't take crops to market. When the food gets home it's the sole responsibility of the woman to do the marketing* (Female Discussant, Faaman, December, 2016).

The study reveals that on the marketing of cash crops like cocoa and cashew it is the men that take produce to the market. This confirms the findings of Oduol et al., (2014) that men make decisions on the sales of fruits of high quality and control revenues. A woman will only make that decision if the husband is indisposed. In a FGD with the men in Kwameseikrom, it was revealed that their wife's influence greatly in decisions on marketing of produce[4]. One discussant had this to say;

> *Sometimes we all decide whether to sell all produce* (Cashew) *at a time or to store some and wait for a better price. Sometimes too we do that independently. You should know that most of the women have got their own farms, and they sell their produce sometimes without our notice* (Male Discussant, Kwameseikrom, December 2016).

The above discussions indicate that women participate in all levels of the participation ladder as described by Agarwal (2001). That is, from having an opinion on specific farm activities (consultative participation) through to being asked to undertake a task (active specific participation), expressing opinions (active participation), and interaction participation, where women's

[4] This happens if the couple co-owns the farm. But under circumstances where each of them have their own farms, product marketing decisions are done independently.

voice influence decision making in the household, the case of women in female headed households.

4.3.5 Women's Tree Preference

Contrary to the observations of Fasse and Winter (2014) that preference of agroforestry tree species is gender specific, and that women and men have different interest and objectives regarding the choice of trees to plant (Kiptot & Franzel, 2011), women and men have no varied interests in tree species in the study area. Both women and men prefer to plant trees that have commercial and subsistence values. Common tree species they plant include: *Theobroma cacao* (Cocoa), *Anarcadium occidentale* (Cashew), *Mangifera indica* (Mango), *Persea americana* (Avocado Pear), *Citrus sinensis* (Orange). Multiple responses gathered on women's tree preference revealed that cashew was most the preferred tree women plant in agroforestry with 147 responses, followed by Cocoa (85), Orange (39) and 'Others' (such as kola and teak) (Table 4.9).

Table 4.9: Multiple Response of Tree Species Preference

Common Name of Tree	Frequency
Cocoa	85
Cashew	147
Orange	39
Mango	20
Others	29

Source: Field Survey, December 2016.

Supporting the finding is the report by the Ghana Statistical Service (GSS) (2014) that the predominant cash crop in the district is cashew which is cultivated on a large-scale by the local farmers, followed by cocoa. Cashew farming has particularly gained much attention in the district since almost all the agroforestry farmers were seen planting and farming cashew. The reason for this development is partly because of the 'big' market for cashew in Ghana and La Cote d'ivoire. The study learned that some households have even exhausted all their farm lands to cashew farming. A 46-year-old woman in Kwameseikrom hinted that she has no more land for food crop farming;

> *It was a family land that belonged to my father. I was the only child and since his death I have used everything for cashew. As at now, I don't have land to farm food crops for household consumption. I depend on other people for that access, that is, those who have the land and are now beginning planting. We go into agreement where I plant food crops for myself and the cashew for the owner of the land. In such instance I have no right over the cashew. That is how we have been surviving for the past two years* (Female Household Respondent, Kwameseikrom, December, 2016).

The GSS (2014) report asserted that increasing use of land for cashew plantations may deprive food crop farmers' access to land for cultivation. Based on the findings of the study, it can be confirmed that excessive use of fertile lands solely for cashew farming can affect the availability of arable

lands for other agricultural activities in the near future. This is because food crop cannot do well when the trees have formed closed canopy. This will consequently affect food security of households and eventually lead to hunger and deepened poverty of the rural households.

Crops and vegetables such as plantain, cocoyam, cassava, beans and garden eggs, maize, tomatoes, pepper, onions, etc. (see Table 4.10) are planted together with the both indigenous and exotic trees.

Table 4.10: Tree and Crop Species Identified by their Botanical, Common and Local Names

Botanical Name	Common Name	Local Name
	Vegetables	
Lycopersian esculentum	Tomato	Ntoso
Capsicum annuum	Chilli Pepper	Meko
Abelmoschus esculentus	Okra	Nkruma
Elaeis guineensis	African oil palm	Abè
Arachis hypogaea	Groundnut	Nkate
Musa sapientum	Plantain	Brodie
Zea mays	Maize	Abro
	Root tubers	
Dioscorea spp.	Yam	Bayerè
Manihot esculenta	Cassava	Bankye
Xanthosoma sagittifolium	Cocoyam	Mankani
Colocasia esculenta	Taro	Kookoo
	Fruit Trees	
Citrus aurantifolia	Lime	Ankaatwaree

Citrus sinensis	Sweet orange	Ankaa/Akutu
Musa x paradisiaca	Banana	Kwadu
Carica papaya	Pawpaw	Brōfrè
Terminalia catappa	Tropical almond	Abrofo nkate
Anarcadium occidentale	Cashew	Atea
Mangifera indica	Mango	Mango
Theobroma cacao	Cocoa	Cocoa/Chocolate tree
Persea americana	Avocado pear	Peya
Azadirachta indica	Neem	Kintwo
Cola nitida	Kola nut	Bese

Source: Field Survey, December 2016.

Reasons for the choice of these trees and crops among others include income, fruits, shade, fuel-wood and soil management. These findings support other studies that women tend to prefer multipurpose tree species for subsistence, such as fodder, fruit, fuel-wood and soil fertility improvement (Fasse & Winter, 2013; Kiptot et al., 2014).

4.3.6 Relationship between Socio-Demographic Characteristics and the Practice of Agroforestry

The study analysed the relationship between socio-demographic characteristics of respondents and the practice of agroforestry in the study area. Socio-Demographic variables such as the age, education, household status and farm size were crosstabultated to show the relationship with the practice of agroforestry (Table 4.11).

Table 4.11: Pearson Correlation Analysis of difference in Socio-Demographic Characteristics of Respondents and Practice of Agroforestry

Socio-Demographic Variable	Practice of Agroforestry		Pearson Correlation Coefficient	
	Yes % (n=174)	No% (n=30)	Coefficient, r	Significance
Age			-0.168	**NS**
20-29	6.3	10		
30-39	23	50		
40-49	33.9	16.7		
50-59	25.9	16.7		
60+	10.9	6.6		
Educational Status			0.147	**S**
No Formal	10.9	3.3		
Primary	14.4	10		
JHS/Middle School	45.4	43.4		
SHS	13.8	13.3		
Tertiary	15.5	30		
Household Status			0.213	**S**
Wife	71.8	53.3		
Household Head	27.6	33.3		
Daughter	0.6	13.3		

NS: Not Significant; **S:** Significant at 0.05

Source: Field Survey, December 2016.

A close analysis of the relationship between the different age groups and the practice of agroforestry shows that 63.2 percent of all respondents fall within

the active age group (20-49). Studies on alley farming adoption and practice in Cameroon, by Adesina et al. (2000) and cocoa practice in Ghana by Boahene et al. (1999), support that young farmers are more likely to adopt agroforestry technologies. Despite this, the study showed that as much 36.8 percent of all respondents are within the age group (50-60+). The finding, therefore, iterate that age is not a determinant to the practice of agroforestry.

Supporting the finding is the Pearson correlation coefficient test which indicates that age of respondents is negatively and poorly correlated (r = -0.168) with their practice of agroforestry (Table 4.11). This finding, however, contradicts the views of Njoku (1991) and Dhakal et al. (2015) that the adoption of new agricultural technology by small-scale farmers is influenced by several factors including age. Although one cannot refute the fact that older farmers are more experienced than younger farmers and are weak to do labour intensive activities, age disparities does not affect women farmers' practice of agroforestry systems in the study area.

The study shows from the analysis of relationship between educational status of respondents and practice of agroforestry that 89.1 percent of respondents with one level of education or the other (Primary, JHS, SHS and Tertiary) were practicing agroforestry. According to Adesina et al. (2000) farmers that are educated are more likely to adopt new technologies of agroforestry than uneducated farmers. The correlation coefficient test also showed a strong association between the level of education of respondents and the practice of agroforestry (r = 0.147) (Table 4.11). While the finding agrees with Lapar and

Ehui (2004) that education significantly influences the adoption of improved soil management technologies in the Philippines, it contradicts Stoll-Kleemann and Oriordan (2002) that low level of education was not significant to the adoption and practice of agroforestry. Obviously, as people acquire more education or climb higher the educational ladder, they are more likely to adopt new agricultural technologies and interventions. This is explained to mean again that, if more women in the study area had increased level of education (i.e. beyond JHS), they would understand the need for the adoption of new agricultural technologies.

In addition, respondents with household status of 'wife' (71.8%) were seen to be practicing agroforestry more than the household-heads (27.6%) and daughters (0.6%). That is, more married women were practicing agroforestry (seemingly because they have the support of their husbands) than the single, divorced or widowed. The Pearson correlation coefficient test also maintained a strong and significant association (r = 0.213) between the household status of respondents and the practice of agroforestry in the Jaman South District (see Table 4.11). This finding is supported by Asfaw and Maggio (2015) that agroforestry technology adoption, practice and outcome may depend on whether the decision-maker is the husband or the wife, as well as if the decision-maker is also the household head.

Furthermore, the study found that majority (81.6%) of the respondents practicing agroforestry have farm size more than 2 acres with 15.5 percent and 2.9 percent having 1-2 acres and less than 1acre respectively (Table 4.12).

Meanwhile, the correlation coefficient test shows that land size was not significant at influencing respondents practice of agroforestry (r = -0.584) (Table 4.12). This is because according to the respondents the success of agroforestry depends on the type of technology employed but not necessarily the size of farm. This claim is supported by the finding of Edinam et al. (2013) which states that in the presence of low land and labour availability, farmers may be more ready to adopt agroforestry practices such as enriched fallows and intercrops to boost agroforestry productivity.

Table 4.12: Relationship between Land Size and Practice of Agroforestry

Variable	Practice of Agroforestry		Pearson Correlation Coefficient	
	Yes % (n=174)	No % (n=30)	Coefficient, r	Significance
Farm Size			-.584	NS
< 1 acre	2.9	43.3		
1-2 acres	15.5	40		
>2 acres	81.6	16.7		

NS: Not Significant; **S:** Significant at 0.05

Source: Field Survey, December 2016.

In summary, the main agroforestry system in the study area, agri-silviculture, is practiced along with technologies such as scattered trees on farm lands, alley cropping, taungya and home-gardens. Women participation was high in major farm management activities such as weeding, seed preparation, sowing

and harvesting and marketing of farm produce. In farm decision-making, women's participation was equally adequate in major activities. Whereas women in female headed households had final decision making roles, women in male headed households rather get their opinions expressed on major decisions (which may be valued or not). Major tree crops cultivated are cashew and mango are intercropped with food crops like plantain, cassava, cocoyam and maize.

4.4 Social, Cultural and Economic Factors Influencing Women's Participation in Agroforestry

The conceptual framework in Figure 2.1 stipulates that women's participation in agroforestry adoption and practice may be influenced by limited access to land and capital, cultural norms/customs, labour, extension services and information as well as household decision making. In order to determine the influence of these factors on women's participation in agroforestry in the study area, the multinomial logistic regression model was used the likelihood influence of these factors on agroforestry practice. The likelihood ratio test of the model was used to show the distribution of each variable. The study showed that variables with significant likelihood influence to the model ($P< 0.05$) were lack capital and access to credit and extension services and information (Table 4.13).

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that

effect are 0. It therefore follows that; access to land and land tenure (with P>0.05 at = 0.117), taboos (at P = 0.886 more than P< 0.05), labour (at P =0.155 more than P<0.05) and household decision-making and activities (at P = 0.216 more than P<0.05) are not likely to influence women's participation in the practice of agroforestry (Table 4.13). In essence, only two factors (lack of capital and access to credit and extension service and information) from the conceptual framework influence women's participation in agroforestry in the study area. This implies that though across Africa there may be similar factors influencing women's participation in agroforestry (as alluded in the conceptual framework), the degree of influence of the factors vary across time and space.

Table 4.13: Likelihood Ratio Test for Factors Influencing Agroforestry Practice

Effect	-2 Log Likelihood of Reduced Model	Chi-Square	Df	Sig
Intercept	121.090[a]	.000	0	
Access to Land and Land Tenure	128.474	7.384	4	.117
Taboos	122.242	1.152	4	.886
Lack of Capital and Access to Credit	133.177	12.087	4	.017*
Extension Services and Information	131.069	9.979	3	.019*
Labour	127.746	6.656	4	.155
Household Decision	126.872	5.782	4	.216

Making and Activities

*Significant at 0.05

Source: Field Survey, December 2016.

4.4.1 Cultural Factors

Cultural factors identified and discussed by the study are access to land and land tenure, taboos and household decision making. The study results indicated that majority (88.7%) of respondents practicing agroforestry owned the land on which they were farming, with only 11.3 percent indicating they were farming on the land on concessional basis (Figure 4.2). This explains why access to land was not significant at affecting women's practice of agroforestry ($P<0.05$; $P = 0.117$) in this study.

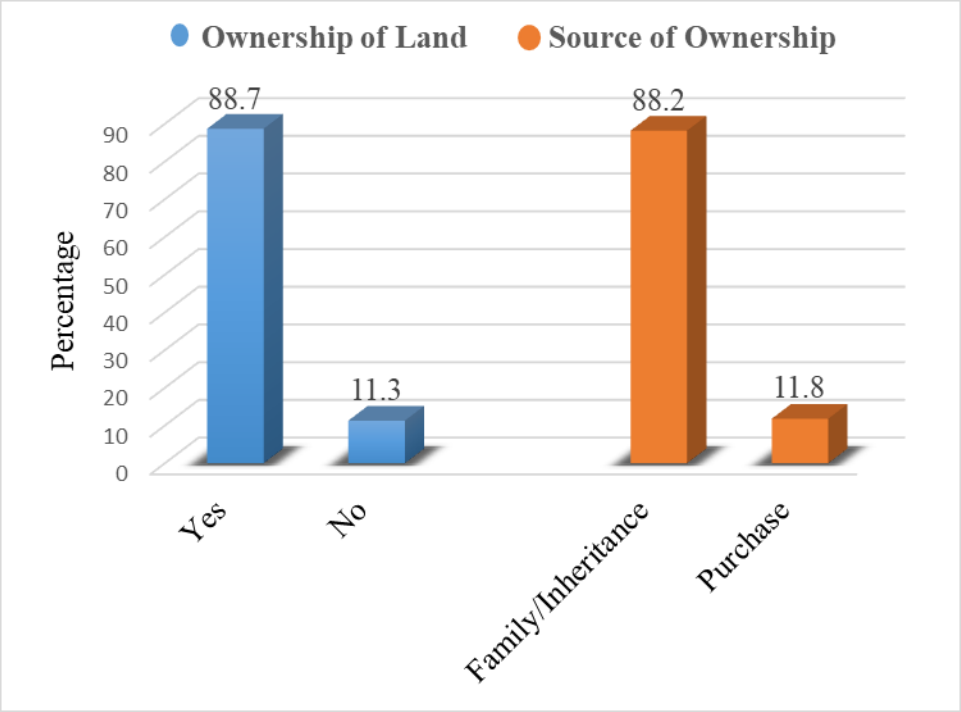

Figure 4.2: Ownership and Source of Ownership of Land

Source: Field Survey, December 2016.

They study gathered that owning a land was a prerequisite to the adoption and practice of agroforestry given, that majority of the women had personal lands which were acquired through inheritance or ties with family (88.2%) or purchased (11.8%) as shown in Figure 4.2. This commensurate with the findings of Bonye and Kpieta (2012b) that land ownership in most parts of Ghana is either family ownership (e.g. acquired through allocation and inheritance) or individual ownership (e.g. through purchase and gifts). The study also revealed that women are not discriminated upon or restricted to access land based on sex, gender or for any other purpose. Women can access

land for agriculture or housing. This is made possible because of the state of land tenure system in the area.

The Land Tenure System in the study area follows the matrilineal society style where inheritance is through the mother's line. Discussions with respondents reflects that of Quisumbing et al., (2001) that in southern and western Ghana land is transferred from a deceased man to his brother or nephew in accordance with traditions. In such instance, women do not possess the inheritance rights to land. However, the system is informally changing into what Kiepta and Bonye (2012a:113) termed as "fully-fledged Western style property right system", where land renting is gaining roots, with more women taking control of land resources.

Like any other African and Akan societies, the Jaman South District falls within the customary tenure system where families acquire land through their ancestry. In effect, a family land belongs to all the members of the family. Thus, as family size increases, a household's share of the land gets smaller (Mugure et al., 2013), since they have to pass on their portion to younger generations. This has led to the division of land into small portions which are hardly enough for household food production. Discussions with key informants revealed that family lands are vested in the *abusaupanin*[5].

A key informant at Drobo revealed that both women and men have access to family lands to plant crops to enable them feed their families and take care of

[5] *Abusuapanin* is the head of an extended family, usually a male who exercising control over all properties of the family. He has the duty of resolving all issues including land among members of the big family.

their households. However, it is a different story all together when cash crops (which is seen as property) are planted. If a male member of the family plants cash or tree crops like cashew or cocoa on a family land, the crop is considered a family property. Thus, after the demise of the farmer, the property would not be given to his children as inheritance in full. Usually, the farm is categorised as share-cropping called *abunu*[6]. Here, the farm is divided into two halves; half is given to the farmer's children as inheritance and half to the extended family.

However, in case a woman member of the family (married or not) uses the land to cultivate economic or cash crops, she would have full access to the crops and all its returns. Even after her demise, the whole farm will be given to her children as inheritance. This is because per tradition, everything a woman has is retained in the family; unlike a man whose children would later trace their lineage through the mother's line. This aspect of tradition and land ownership had propelled many of the women to use the family lands for the practice of agroforestry. This is contrary to patrilineal societies such as in Northern Ghana, where a woman's right and access to land is through his husband. In the Upper East region for instance, women have limited access to and control over land. Also, widows tend to loss access to land unless they have male children, whiles unmarried women rarely have access to land (Kpieta & Bonye, 2012a). However in the study area, women; married, unmarried or widowed all have access to family lands and can even own and

[6] *Abunu* is a share tenancy arrangement in Ghana, where a tenant farmer and his landlord share the proceeds of the farm or the matured farm in two equal parts.

control land through purchase. This is to say that women in the study area are advantageous in access to land unlike their counterparts in other parts of Ghana.

Interestingly, because men are the household heads, they are considered the ones with the title deeds to family lands. This means men make most of the important decisions on the usage and disposal of land, although the women's opinions are highly valued. This supports the claim by FAO (2010a) and Kiptot and Franzel (2012) that men usually have the authority as pertains to tree products that are considered to have high returns.

In many parts of Africa and Ghana, cultural beliefs and traditions limit agricultural practice. Such restrictions may include rituals and ritual prohibitions against planting or using certain trees (Kiptot & Franzel, 2011; 2012). Among some communities in Kenya, women cannot plant trees because doing so may mean ownership of land (Wafuke, 2012), while in some communities, trees belong to both women and men regardless of who plants them. In the study areas, however, there exist no such taboos and cultural norms that prohibit women to plant certain trees or concede ownership of certain trees to men. This explains why taboos are not significant at influencing women's participation in agroforestry practice ($P<0.05$), $P = 0.886$ (see Table 4.13).

Taboos are the inhibition or banning resulting from social custom or emotional aversion, which are declared as sacred and forbidden by people (Diawuo & Issifu, 2015). The only taboo observed by the people is *Foda*/

Nkyida[7]. It is tabooed for people to visit their farms on this day as it is a belief that the gods rest on this day. Failure to do so is believed to bring curse and sometimes death to those that disregard it. Respondents revealed that *Foda* or *Nkyida* do not in any way limit their practice of agroforestry. Some even indicated that such days are necessary for resting. In her opinion, a 28-year-old participant in a FGD in Faaman insisted that the revered days are necessary.

> *It is a day for resting. I think one needs rest, given that all the days were free, some of us would have been going to farm everyday*
>
> (Female Discussant, Faaman, December, 2016).

Some respondents, during FGD in Japekrom however were against that idea of *Nkyida.* They claim because they do other businesses and moreover, they are not residents of communities in which they farm, the prohibited days affect their farm work. In an interview with a 37-year-old woman (food vendor) at Japekrom she indicated that;

> *I don't always get time to go to farm. It is usually annoying to learn that it is Foda when you are preparing to go to farm. This happens because my farm is far from here* (she farms at Kofiko) *as a result I go to farm only once a week* (Personal Interview, Japekrom, December, 2016).

[7] *Foda* or *Nkyida* is a day within the week where it is forbidden for people to go to farm and work. However, men but not women are allowed to go to the farm to fetch food stuffs and to check on their traps but not to work.

The implication of this is that they have to hire labour for most of the farm management activities.

Household decision making was not found to significantly influence women's participation in agroforestry practice (P = 0.216) (see Table 4.13). The earlier analysis from women's participation in farm management decision making indicated that women's opinions on issues related to agroforestry are considered by their male counterparts. For this reason, women did not perceive household decision making as an obstacle to farming. Although in male headed households, men are the major decision makers; their wives, however see nothing wrong with that. According to 63-year-old respondent, women are supposed to support their husbands but as long as husbands respect their wives. She maintained that;

> *Even the Bible says women should help their husbands as much as husbands love their wives. Besides husbands are the heads of the house and we support them in what they do. My husband in particular doesn't prevent me from decisions that are good for the family, so no; it* (household decision making) *is not a problem at all* (Household Female Respondent, Kwameseikrom, December, 2016).

4.4.2 Economic Factors

Agroforestry activities are noted be influenced by the availability of economic resources. The major economic factor identified to be influencing women's participation in agroforestry practice was limited access to capital and credit facilities. Results of the study showed that all respondents (100%) perceived

lack of capital and access to credit facilities as major limitation to the practice of agroforestry. This is expressed in the conceptual framework where capital is considered a major factor affecting the participation of women in agroforestry. The study therefore conforms to the position of Kiptot and Franzel (2012) that access to financial resources such as credit is linked to women's access to property, land, education, and information, hence restricted access impedes their development.

Respondents revealed further that they are not able to access loans since financial institutions are not willing to give loans to smallholder farmers. In a FGD in Gonasua, the women revealed that traders and owners of micro enterprises get loans than smallholder farmers. A 26-year-old female discussant disclosed that;

> *The banks won't give us loans because we don't save with them; they prefer to give loans to traders who bank with them through mobile banking* (called Susu) (Female Discussant, Gonasua, December, 2016).

However, in a key informant interview at Drobo with the Head of Credit at the Drobo Community Bank Limited (DCBL), loans are given to everybody;

> *Loans are given to qualified persons, whether a trader or a farmer and it is normally dependent on the ability of the person to repay* (Key Informant, Drobo, December, 2016).

Notwithstanding this fact, investment in agroforestry activities is often limited by lack of capital, especially for women. Discussions held with the women revealed that some households borrow money from friends and relatives to hire labour which they pay back after harvesting. Respondents indicated however, that they get financial assistance to supplement farming activities through sales of farm produce, remittances, petty trading and others. Analysis of multiple response questions on income sources revealed that 198 respondents primarily derive most of their household income from selling of farm produce (Table 4.14).

Table 4.14: Multiple Response of Source of Income

Source of Income	Frequency
Sales from Farm Produce	198
Petty Trading	87
Remittances	71
Others	52

Source: Field Survey, December 2016.

Farm products sold include products of tree crops such as cocoa and cashew, and other intercrops such as plantain, yam, maize, cassava, cocoyam, and pepper (which is mostly farmed by women in Faaman). Petty trading received Eighty-Seven (87) responses. Activities traded in include selling of second-hand clothes, operation of provision stores and drinking spots, food vending, and buying and selling of food crops (such as pepper). Remittances constituted the third most dominant source of household income with 71 responses from all the communities (Table 4.14). Some household

respondents revealed they have their relatives (sons, daughters, brothers, sisters and husbands) living abroad that bring in money to supplement their household income. In a FGD at Faaman, there was unanimous conclusions from the women that they rely heavily on the remittance to get money to hire farm labour. A discussant indicated that;

> ……*we use the monies they send us to take care of ourselves and more importantly hire labour for farm activities. The money is also used to buy farm inputs such as seeds, cutlasses and hoes* (Female Discussant, Faaman, December 2016).

The last category described as 'others' received 52 responses from all the communities (Table 4.14). This category also includes respondents working in private and public institutions as teachers, nurses, bankers, civil servants, hair dressers and toilers/dressmakers. The study revealed that respondents in this category consider farming a secondary occupation. They are mainly involved in the farming of food crops for household consumption but because of their "access to financial resources", they also embark on farming large acres of tree crops, mainly cashew and cocoa. Respondents here do not usually sell their food crops, unlike those (respondents) having farming as their main occupation and a major source of household income.

4.4.3 Social Factors

The social factors identified by the study are extension and information services and labour. Majority of respondents (73.0%) agreed that lack of

access to extension and information services affect their practice of agroforestry, with only 1.5 percent of respondents disagreeing (Figure 4.3).

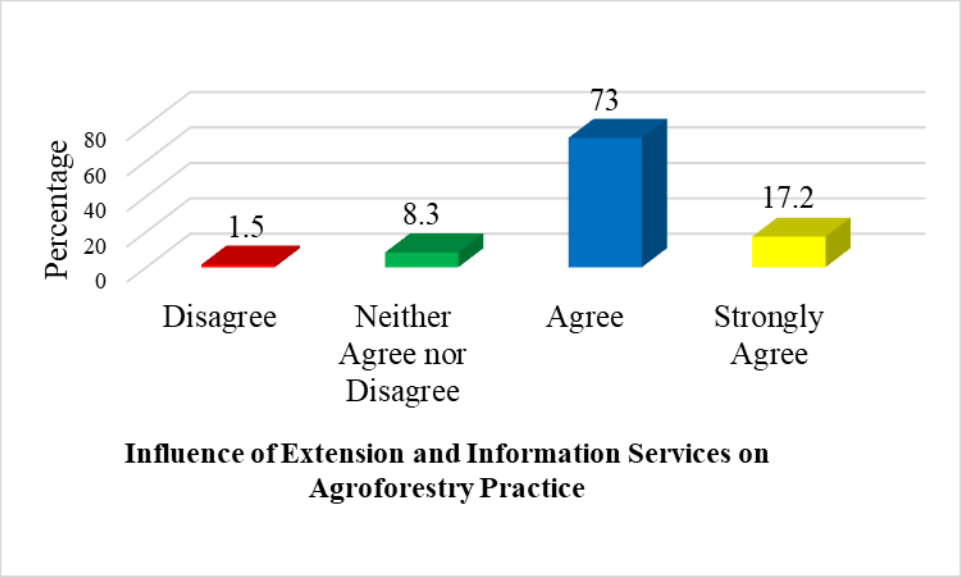

Figure 4.3: Respondents Views on the Influence of Lack of Extension and Information Services on Women's Agroforestry Participation

Source: Field Survey, December 2016.

In addition, more respondents (89.7%) indicated that extension officers have not visited them at all while, 7.3 percent revealed they rarely get extension visits, while 3 percent admitted they get extension service visit yearly (Figure 4.4). These findings cement what Agarwal (2001) posited that lack of access to information on rural activities, which is common among women with little or no education, is a great impediment to women's participation in agricultural and development related activities.

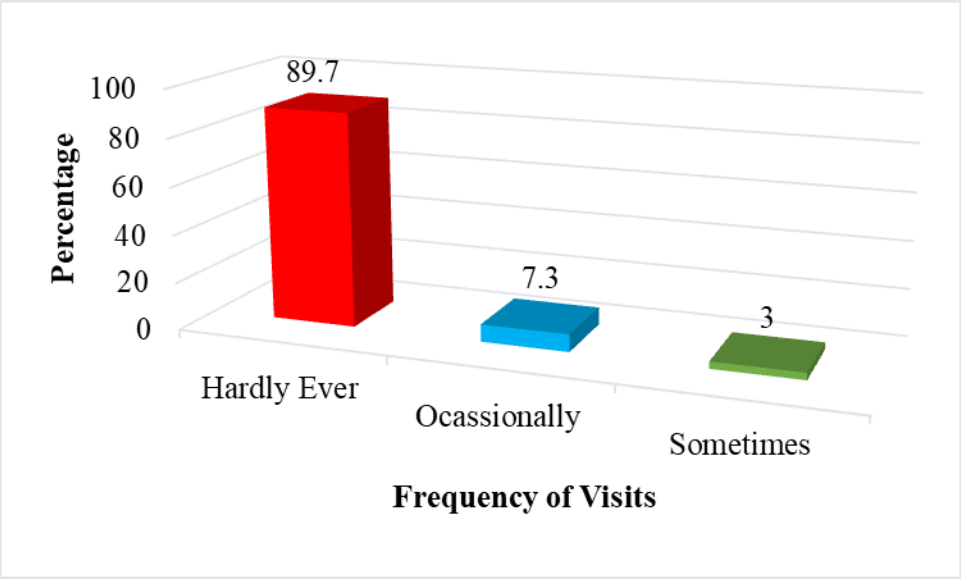

Figure 4.4: Frequency of Extension Visits

Source: Field Survey, December 2016.

Even though women and farmers in general did not get visits from extension officers, their practice of agroforestry was influenced by the need to be self-sufficient on tree farming and their products. In this regard, the study agrees with the findings of Ragland and Lal (1993), who found that the frequency of extension contact with farmers does not have much influence on the adoption of agroforestry technologies.

The study accentuates that labour is the great asset that women have at their disposal. The study revealed that it was only in activities that required much strength, like land clearing and preparations that men seemed to be doing well than women in terms of labour. However, with the presence of men in the households women in male headed households unlike those in female headed

household were able to offset that problem. This contradicts the position of Abbas (1997) that women do not have claim over their men's labour. Labour is therefore not a factor that influence women's practice of agroforestry, P = 0.155 (see Table 4.13). The main source of labour for farming activities is family labour, revealed by 97 percent of respondents, while only 3 percent of respondents said their main source of labour is hired labour (Figure 4.5). Meanwhile, respondents hired labour to supplement the household labour. Activities undertaken by hired labour include, spraying, weeding, pruning, harvesting and transportation of produce.

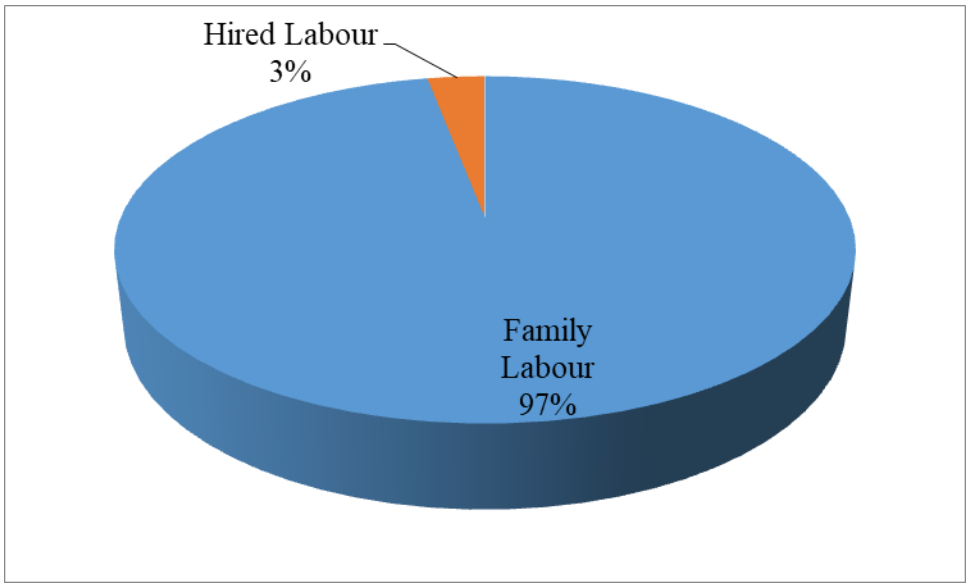

Figure 4.5: Source of Farm Labour

Source: Field Survey, December 2016.

In summary, out of the six social, economic and cultural factors identified to affect women's participation in agroforestry, only access to credit and capital

and lack of extension and information services are likely to impact negatively on women's participation in agroforestry. This means land and land tenure, taboos, household decision-making and activities and labour are not likely to have negative influence on women's participation in agroforestry. These factors according to respondents do not in any way obstruct their practice of agroforestry. In terms of land, respondents have access and in some cases ownership, while labour is one of their greatest assets in agroforestry.

4.5 Stakeholders Involvement in Agroforestry

The study recognises that agroforestry development requires the identification of relevant stakeholders, assessment of their roles and their overall involvement in the agroforestry practice. The study identified stakeholders who were directly or indirectly involved in agroforestry practice in the district. They were grouped into governmental and non-governmental organisations.

4.5.1 Governmental Organisations

Governmental Organisations identified to be involved in agroforestry activities in the study area were the Ministry of Food and Agriculture (MoFA) and Forest Service Division (FSD) of the Forestry Commission.

4.5.1.1 Ministry of Food and Agriculture (MoFA)

The study found that the core mandate of the Ministry of Food and Agriculture (MoFA) is to promote sustainable agriculture and thriving agribusiness through research and technology development, effective extension and other support services to farmers, processors and traders for

improved livelihood. At the District level, the department of MoFA is under the jurisdiction of the District Assembly. The study therefore sought to find out the arrangements put in place to improve women's participation and practice of agroforestry in terms of credit access; extension service and information; land acquisition, technology; and market and market information. Commenting of the roles of MoFA in the development of agroforestry, the District Development Officer in-charge of Management Information System and Women Development in an interview at Drobo revealed that the MoFA provides information on agricultural practice, including agroforestry and its benefits. In such instances, agricultural sensitisation programmes are provided by means of radio programmes and meetings with farmers. He further indicated that;

> *The ministry through radio programmes, farm visits and group meetings educate farmers on what they should do and not do on farming practices, including agroforestry. There is no special package for agroforestry* (Key Informant at MoFA, Drobo, December 2016).

However, commenting on the effectiveness of the ministry in a FGD at Faaman, Gonasua and Kwameseikrom, respondents revealed that MoFA barely perform any role in support of agroforestry practice, hence the ministry has not been effective. Respondent further indicated that general crop and tree farming is suffering from the lack of involvement of MoFA activities. This confirms the revelation by the MoFA official that the ministry has no special package for agroforestry farmers.

Commenting on the claim of respondents that extension officers do not visit their farms, the informant blamed the situation on inadequate logistics.

> *Frankly speaking farm visits are not often because of lack of logistic and personnel capacities* (Key Informant at MoFA, Drobo, December, 2016).

On the provision of extension services, the informant again berated the lack of extension officers in the District;

> *There is low extension officer-to-farmer ratio in the district. Per national standards, the ratio is supposed to be one extension officer to1500farmers (1:1500). However, in the district the ratio is 1:3800 farmers. This gives an excess of about 2,300 farmers on one extension officer* (Key Informant at MoFA Drobo, December 2016).

Given that skilled agricultural workers in the district as at 2010 were 28,068 (GSS, 2010), it is analysed therefore, that there are less than 10 extension workers in the district. The lack of extension officers negatively influence agroforestry activities since farmers are limited in the access to farm information and services. This development makes the ministry ineffective in executing its mandates. The finding also justifies an earlier finding of this study that extension service is a significant factor affecting the participation and practice of agroforestry. The study by Kiptot and Franzel (2012) that farmers (especially women) in sub-Saharan Africa have low access to agricultural extension also confirms the findings. Kiptot and Franzel (2012)

further stipulated that the uptake of agricultural technology is often influenced by farmers' level of contact with extension services.

Meanwhile, the official declined to respond to the ministry's arrangements concerning access to farm credit. This gives the impression that the ministry has nothing in place.

On land acquisition, the key informant revealed that women in the district are not in any way restricted to acquire land, either for agricultural or residential purposes. This also vindicates the earlier finding in the study that land access and land tenure do not influence agroforestry practice in the district. The study reveals again the ministry does not have measures in place to monitor women's access to market and market information. However, there is ready market for agricultural produce.

> *There is market for intercrops and vegetables like pepper. Pepper in particular is grown by most women in communities like Faaman, Adamsu, Jejemireja, Nyamefie, and so on. There is market also for tree crops like cashew and cocoa, but because of their perishable nature; mango, orange and avocado pear suffer in terms of marketing since there is no facility around to process and preserve them. Also, market prices for crop produce especially pepper and cashew is not stable* (Key Informant at MoFA, Drobo, December, 2016).

This opinion supports the sentiments of the respondents that fluctuation in the price of cashew was major problem they were facing.

The ministry has no formal collaboration with other institutions to complement and improve the activities of women farmers. The lack of agricultural NGOs activities in the district could have accounted for this. These make women farmers in the district less fortunate compared with their counterparts in some parts of northern Ghana where NGO activities are diverse. Meanwhile, the ministry was embarking on sensitisation programmes to enlighten women and on the need for backyard farming or home-gardens to supplement household food security.

4.5.1.2 Forest Services Division

The Forest Services Division (FSD) is a branch of the Forestry Commission of Ghana responsible for forestry issues. An official from the FSD revealed that one of the Division's contributions to the practice of tree planting is to educate farmers on tree planting. The FSD official, in an interview at Drobo indicated that;

> *The Division educates farmers on tree tenure, right to compensation on crop destruction during timber felling, conservation of forest resources and timber species on farmlands* (Key Informant at FSD, Drobo, December 2016).

Furthermore, the study found that the FSD trains communities on forest resource management activities. Initially, the FSD was responsible for providing tree seedlings, especially cocoa seedlings to farmers for free, for planting. However, this has stopped of late due limited availability of

seedlings. Farmers therefore have to buy the seedlings from the division and other private individuals, hence posing a challenge for farmers in acquiring seedlings. The fact that FSD does not support farmers with seedlings any longer as part of its mandate makes the Division quite ineffective.

4.5.2 Non-Governmental Organisations (NGOs)

As indicated earlier by the officer at MoFA, there is lack of NGO involvement in the district regarding agricultural related activities. The only NGOs involved directly or indirectly in agriculture activities are the financial institutions. The study purposively identified Drobo Community Bank Limited since it is the only institution in the area involved in supporting smallholder farmers with soft loans.

Drobo Community Bank Limited is a financial institution in the district that aims to be listed on the Ghana club 100. The bank's mission is to provide financial products and services to satisfy the diverse needs of individuals, small-scale enterprises, etc. within it catchment areas. A Key Informant Interview with the Head of Credit of the bank on the arrangements of the bank for farmers, revealed that the bank gives loans to all and sundry provided they qualify. The reason DCBL gives loan to farmers is to;

> *Maintain and expand their farms to enable them get more produce* (Key Informant at DCBL, January, 2017).

DCBL gives loans to all sorts of farmers; cocoa, cashew, poultry and fish farmers. The official claimed that the bank in December, 2016 gave soft loans

to 22 cashew women farmers in Kwameseikrom. This claim was confirmed by 35-year-old beneficiary in an interview at Kwameseikrom;

> *I received GH 1000 from bank which I will use to hire labour and buy pesticides* (Personal Interview, Kwameseikrom, January, 2017).

Although there are no 'special' arrangements that beneficiaries should follow to secure loans, the bank prefers to give loans to farmers (especially women) in group. In a key informant interview, the credit and loan manager of the bank remarked that;

> *In getting the loans however personal guarantors or collateral is required* (Key Informant at DCBL, Drobo, January, 2017).

However, when farmers are in groups or associations, the group as a whole is held accountable in case of default; hence the group becomes the collateral. The Key informant concluded by saying that the financial assistance given to a beneficiary depends on what the money will be used for (i.e. the purpose) and the overall ability of the person to repay the loan (after a careful assessment of the person or group). The amount given usually ranges between GH 1000.00 to GH 10,000.00.

In summary, the study found that MoFA and FSD provides information on agricultural practice, including agroforestry and its benefits and sensitises farmers on appropriate agricultural practices including tree planting. However, none of the governmental organisation (MoFA and FSD) have schemes in

place to ensure women's access to capital and credit. Meanwhile, the DCBL offers soft loans to agroforestry farmers to expand and improve their farms.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents summary of the major findings of the study and the conclusions drawn from the findings. Recommendations are made based on the findings of the study to improve on women's participation in agroforestry in the Jaman South District.

5.2 Summary of Major Findings

The study determined the level of participation of women in agroforestry activities as well as decision making. Key social, cultural and economic factors were identified and measured to ascertain their influence on the practice of agroforestry in the study area. Also institutions were surveyed to identify their involvement towards the development of agroforestry and women in agriculture in general.

More than two-thirds (85.3%) of respondents were active in the practice of agroforestry while 14.7 percent were not practicing agroforestry. Agri-siviculture is the main agroforestry system of practice in the study area. Various forms of technologies such as home-garden, alley cropping, taungya and scattered/dispersed trees on farmlands are practiced. Major tree crops such as *Theobroma cacao* (Cocoa), *Anarcadium occidentale* (Cashew), *Mangifera indica* (Mango), *Persea americana* (Avocado Pear), *Citrus sinensis*

(Orange), *cola nitida* (kola nut) are intercropped with *Dioscorea spp.* (Yam), *Manihot esculenta* (Cassava), *Xanthosoma sagittifolium* (Cocoyam), *Zea mays* (Maize), *Musa sapientum* (Plantain), *Lycopersian esculentum* (Tomato), *Capsium annum* (Pepper), *Abelmoschus esculentus* (Okro), and *Elaeis guineensis* (African Oil Palm). The most preferred tree crop in the study area is cashew, mainly because of the inherent economic values and tolerance to weather conditions and climatic variations.

The study showed that women's participation was high across all the major farm activities particularly in seed preparation, sowing/planting, weeding, harvesting, drying and storage. This was mainly because of women's diverse knowledge on farm management activities. Participation was however poor in activities such as land clearing and spraying/fertiliser application. These activities are noted to be for men, hence low women's participation. Notwithstanding this, women participate in major farming activities in the study area as much as men do.

Women's participation in decision making was measured on four scales; no consideration, only consulted, opinion considered and makes final decision. Analysis across the four communities indicated that decision making in male headed households regarding land preparation, type of tree or crop to farm, time of sowing, determining the farm size and marketing of farm produce were jointly made. Large proportion of women (60.3%) and (57.8%) were of the view that, their opinions are valued by their husbands regarding the crop or tree to plant and the time of sowing or planting respectively. Participation

in decision making in these activities could therefore be described as interaction participation where women have the voice in and influence decision on the farm, leading to empowerment.

However, while women in households headed by females have the final decision making roles, women in male headed households either had their opinions considered or no considerations at all. The study therefore recognises that men are the major decision makers in male headed household and vice versa. Women therefore participate in all levels of the participation ladder. That is, from being asked an opinion on specific farm activities (consultative participation) through to being asked to undertake a task (active specific participation), expressing opinions (active participation), and interaction participation, where women's voice influence decision making in the household, the case of women in female headed households.

Farm size and age of respondents were negatively and poorly correlated with the practice of agroforestry in the study area. Consequently, educational and household statuses were significantly and positively correlated with women's agroforestry practice. It must be emphasised that successful promotion of agroforestry as a solution to land use problems and poverty in the study area would depend on the education of farmers on agroforestry technologies.

It was established in literature that access to land and land tenure, capital, taboos and cultural norms/customs, labour, extension services and information as well as household decision making as the major factors influencing women's participation in agroforestry. However, the multinomial logistic

regression model revealed that only capital and access to credit; and extension services and information were the factors that are likely to influence women's participation in agroforestry in the study area. This finding conforms to conceptual framework that economic and social factors affect women's participation in agroforestry.

Consequently, access to land and land tenure, taboos and traditions, labour, and household decision making had no influence on women's participation in the practice of agroforestry. However, these findings contradicts the claim by the conceptual framework that cultural and some social factors are impediment to women's participation in agroforestry in Africa. The study found that majority of respondents (88.5%) practicing agroforestry owned the land on which they farmed, which they acquired through inheritance/family (88.3%) or purchased (11.7%), with only 11.5 percent indicating they farm on the land on concessional basis. Access to land was therefore not a problem for women practice of agroforestry.

The only taboo or traditional inhibition observed in the study area is *Foda*/*Nkyida* and which respondents indicated does not affect their practice of agroforestry. There are no taboos that prevent women from planting certain tree species or conceding ownership of certain crops to men. All respondents agreed with the conceptual framework that lack of capital and access to credit is a major impediment to the practice of agroforestry. Also, majority of respondents (89.7%) indicated that extension officers do not visit them at all. Meanwhile, 7.4 percent said they rarely get extension visits, while 3 percent

admitted they get extension service visit yearly. Hence, extension service and information was another factor affecting women's practice of agroforestry.

The study identified that labour is not a major factor affecting women's participation. Consequently, the main source of labour for farming activities is family labour (97.1%), while only 2.9 percent of respondents said their main source of labour is hired labour. Analysis from women's participation in farm management decision making indicates that women's opinions in issues related to agroforestry are considered by their male counterparts. For this reason women did not perceive household decision making as an obstacle to the practice of agroforestry.

Furthermore, the study identified three relevant stakeholders involved in promoting agroforestry practice in the district. The Ministry of Food and Agriculture (MoFA) provides information on agricultural practice, including agroforestry and its benefits. Agricultural sensitisation programmes were provided by means of radio shows and meetings with farmers. MoFA however, does not have any scheme in place to ensure women's access to capital and credit. The ministry does not have enough field officers, thereby limiting its field operations. The extension officer-famer ratio stood at 1:3800 instead of national standard of 1:1500. The implication of this is lack of extension visits to farmers. Respondents indicated that MoFA has not been effective in the development of agroforestry in the District since it has no packages such as financial credit to agroforestry farmers.

The Forest Services Division on the other hand, undertakes education on tree tenure, farmers' right to compensation on crop destruction during timber felling, conservation of forest resources and timber species on farmlands.

Also, Drobo Community Bank Limited (DCBL) gives loans to farmers to enable them maintain and expand their farms to be able to get more produce. Interested farmers only need guarantors or collateral security to be able to benefit from such loans schemes. The bank prefers farmers to be in groups or associations, since the group as a whole can be held accountable in case of default in the absence of collateral security for individual farmers.

5.3 Conclusion

The study concludes that more than half of respondents are practicing agroforestry. Agri-silviculture is the main agroforestry system practiced in the study area along with technologies such as home-garden, scattered trees on farm lands, improved fallow, alley cropping and taungya. The common tree crops; cashew and cocoa are intercropped with plantain, cassava, maize, pepper, tomatoes and cocoyam. Agroforestry is practiced mainly because of the economic and environmental benefits.

Women's participation in major farming activities (seed preparation, planting, weeding, harvesting, drying and storage) was high. Meanwhile participation in land clearing and spraying/fertiliser application was average and low respectively, as these activities are perceived as men's activities due to their labour intensiveness. However, women's participation in decision making on key farm activities was high. While women in female headed households had

the final decision making roles, women in male headed households had their opinions valued by their husbands on keys farm decisions. Women's participation in decision making can therefore be described across all the stages in Agarwal's (2001) ladder of participation: consultative participation, active specific participation, active participation, and interaction participation.

The likelihood ratio test for social, cultural and economic factors influencing agroforestry practice indicates that access to land and land tenure, household decision making and activities, labour and taboos and traditions were not likely to hinder women's participation in agroforestry, a situation that contradicts the conceptual framework of the study. Women are particularly advantageous in access to land because the land tenure system in the study allowed them to access and control land. Consequently, capital and access to credit and extension services and information are likely to hinder women's participation in agroforestry practice, hence confirming the conceptual framework of the study.

Furthermore, MoFA and FSD provide sensitisation programmes for farmers and educate farmers on tree tenure and compensation on crop destruction through timber felling respectively. Meanwhile, DCBL gives soft loans to farmers to maintain and expand their farms for more produce.

5.4 Recommendations

5.4.1 Sustaining the Practice of Agroforestry Technologies

The study revealed that some respondents do not practice alley cropping because they see it as waste of land. However, alley cropping has the potential of improving soil fertility as it entails growing food crops between hedges of planted shrubs and trees preferably leguminous species. The hedges when pruned periodically provide biomass which return to the soil, and enhances its nutrient status and physical properties and to prevent shading of growing crops (Opoku-Mensah, 2015). There should be awareness campaign for farmers by MoFA and FSD to adopt alley cropping more.

5.4.2 Improving Women's Participation in Agroforestry Activities and Decision Making

There was high participation in agroforestry activities and decision making by women, which is worth emulating. MoFA and the District Assembly should encourage women in other parts of the district to get involved in agroforestry since it does not only improve the environment but also boost household income and food security. Also, to be able to reduce vulnerability of women in decision making in male headed households, MoFA, FSD, the District Assembly and other relevant stakeholders should sensitise women on agroforestry practice and decision making. Women should be encouraged to take first steps in farming and not to wait on their husbands since land is not a problem in the study area.

5.4.3 Reducing the Influence of Social, Economic and Institutional Factors on Women's Participation

For women to have access financial credit, government and relevant institutions such as MoFA should intervene to encourage the development of rural microcredit institutions with regulations friendly to women.

Women farmers should form farmer groups and also strengthen existing ones to boost their accessibility to financial credit. When women are in groups they could reach extension officers faster than individuals.

To ensure that women get access to extension services, MoFA should train volunteer extension officers, majority of whom should be women.

Extension activities by MoFA on agroforestry practice must address different interest groups, since women are more interested in products such as fruits, fuelwood, and vegetables while men are more inclined toward trees for timber and poles.

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APPENDIX I

Degree of Women's Participation in Farm Activities across all Communities

Degree of Participation	Percentage (%)
Land Clearing	
Always	7.8
Often	38.7
Occasionally	27.0
Rarely	22.1
Never	4.4
Seed Preparation	
Always	20.6
Often	48.0
Occasionally	23.5
Rarely	4.9
Never	2.9
Sowing/Planting	
Always	60.8
Often	32.4
Occasionally	6.9
Rarely	-
Never	-
Weeding	
Always	51.5
Often	27.5
Occasionally	18.1
Rarely	1.5
Never	1.5
Spraying	
Always	1.0
Often	5.4
Occasionally	8.8
Rarely	21.6
Never	63.2
Harvesting	
Always	45.1
Often	46.1
Occasionally	6.9
Rarely	1.5
Never	0.5
Drying	
Always	34.8
Often	49.5
Occasionally	12.3
Rarely	2.0
Never	1.5

APPENDIX II

Household Questionnaire

Research Topic: WOMEN'S PARTICIPATION IN AGROFORESTRY IN JAMAN SOUTH DISTRICT, GHANA

Dear Participant,

This questionnaire is for research work (MPhil Thesis) in the University for Development Studies, Wa. It is intended to explore women's participation in agroforestry practice in the Jaman South District. There is no wrong or right answer and all information provided will be used for academic purpose only and will be treated with maximum confidentiality. Thank you.

Agroforestry is the integration of trees and crops or animals in an agricultural production system.

Researcher's Information

Name of Numerator: ……. Community: ……

Date: ……. Number of Questionnaire: ……

Section A: Demographic Characteristics of Respondent

1. Gender: a. Female [ ] b. Male [ ]
2. Age: a. Below 20 [ ] b. 20-29 [ ] c. 30-39 [ ] d. 40-49 [ ] e. 50-59 [ ] f. 60+ [ ]
3. Educational Background: a. No Formal Education [ ] b. Primary [ ] c. JHS/Middle [ ] d. SHS [ ] e. Tertiary [ ]
4. Status in household: a. Wife [ ] b. Household head [ ] c. Daughter [ ] d. Husband [ ]
5. Number of Children: a. 1-2 [ ] b. 3-5 [ ] c. Above 5 [ ]
6. Do you practice agroforestry? a. Yes [ ] b. No [ ]
7. Farming experience: a. Less than 5 years [ ] b. 5-10 years [ ] c. More than 10 years [ ]
8. Farm size: a. Less than 1 acre [ ] b. 1-2 acres [ ] c. More than 2 acres [ ]
9. Hours spent in the farm per day: a. 3 hours [ ] b. 5 hours [ ] c. more than 5 hours [ ]
10. Number of male farmers in the household: a. less than 2 [ ] b. 3-5 [ ] c. more than 5 [ ]

Section B: Form of Women's Participation in Agroforestry

Women' tree Preference

1. What agroforestry system are you practicing? a. Agri-silviculture [ ] b. Silvo-pastoral[ ] c. Agri-silvi-pastoral [ ]

✓ **Revealed Tree Preference (to a woman farmer)**

2. Which tree species do you plant? (You can choose more than one option) a. Cocoa [ ] b. Cashew [ ] c. Palm tree [ ] d. other (specify)…….....
3. What do you think motivates women to plant those tree species? (you can choose more than one option) a. Fuel wood [ ] b. Fruits [ ] c. Shade [ ] d. Fodder [ ] e. soil management [ ] f. household income [ ]
4. What agricultural food crops do women plant together with the trees? (you can choose more than one option) a. Plantain [ ] b. cocoyam [ ] c. Yam [ ] d. Cassava [ ] e. others……
5. What vegetables do women plant together with the trees and crops? (you can choose more than one option) a. tomatoes [ ] b. pepper [ ] c. onions [ ] d. beans [ ] e. garden eggs [ ]
6. How do the trees women plant affect their food crops? ……
7. What are the major challenges involved in the planting of these trees? ……
8. What animals do you rear together with the trees and crops? (if any) ……

Extent of Participation in various Farming Activities

How do women participate in the following farming management activities?

9. Land clearing: a. Always [ ] b. Often [ ] c. Occasionally [ ] d. Rarely [ ] e. Never [ ]
10. Why the choice? Explain your answer in 1 above……
11. Seed Preparation/Nursery: a. Always [ ] b. Often [ ] c. Occasionally [ ] d. Rarely [ ] e. Never [ ]
12. Why the choice? Explain your answer in 3 above……
13. Sowing/Planting: a. Always [ ] b. Often [ ] c. Occasionally [ ] d. Rarely [ ] e. Never [ ]
14. Why the choice? Explain your answer in 5 above……
15. Weeding: a. Always [ ] b. Often [ ] c. Occasionally [ ] d. Rarely [ ] e. Never [ ]
16. Why the choice? Explain your answer in 7 above……
17. Fertilizer application: a. Always [ ] b. Often [ ] c. Occasionally [ ] d. Rarely [ ] e. Never [ ]
18. Why the choice? Explain your answer in 9 above……
19. Crop protection activities (e.g. pruning, coppicing): a. Always [ ] b. Often [ ] c. Occasionally [ ] d. Rarely [ ] e. Never [ ]

20. Why the choice? Explain your answer in 11 above……
21. Harvesting: a. Always [ ] b. Often [ ] c. Occasionally [ ] d. Rarely [ ] e. Never [ ]
22. Why the choice? Explain your answer in 13 above……
23. Drying: a. Always [ ] b. Often [ ] c. Occasionally [ ] d. Rarely [ ] e. Never [ ]
24. Why the choice? Explain your answer in 15 above……
25. Collection of crop by-product to the home: a. Always [ ] b. Often [ ] c. Occasionally [ ] d. Rarely [ ] e. Never [ ]
26. Why the choice? Explain your answer in 17 above……
27. Storage of produce: a. Always [ ] b. Often [ ] c. Occasionally [ ] d. Rarely [ ] e. Never [ ]
28. Why the choice? Explain your answer in 19 above……

Participation in Farm Management Decision Making

How are women's contributions towards decision making in the following areas treated?

1. Land preparation: a. No consideration [ ] b. Only consulted [ ] c. Opinion Considered [ ] d. Make final decision [ ]
2. Type of crop or tree to plant or grow: a. No consideration [ ] b. Only consulted [ ] c. Opinion Considered [ ] d. Make final decision [ ]
3. Time of sowing: a. No consideration [ ] b. Only consulted [ ] c. Opinion Considered [ ] d. Make final decision [
4. Determining the land size for cultivation: a. No consideration [] b. Only consulted [ ] c. Opinion Considered [ ] d. Make final decision [ ]
5. Determining the types and amount of fertilizers: a. No consideration [ ] b. Only consulted [ ] c. Opinion Considered [ ] d. Make final decision [ ]
6. Purchase of chemical pesticides: a. No consideration [ ] b. Only consulted [ ] c. Opinion Considered [ ] d. Make final decision [ ]
7. Number of hired labour and wages to be paid: a. No consideration [ ] b. Only consulted [ ] c. Opinion Considered [ ] d. Make final decision [ ]
8. Marketing of farm produce: a. No consideration [ ] b. Only consulted [ ] c. Opinion Considered [ ] d. Make final decision [ ]

9. Storage of farm produce: a. No consideration [ ] b. Only consulted [ ] c. Opinion Considered [ ] d. Make final decision [ ]
10. Farm credit: a. No consideration [ ] b. Only consulted [ ] c. Opinion Considered [ ] d. Make final decision [ ]
11. Crop rotation plan: a. No consideration [ ] b. Only consulted [ ] c. Opinion Considered [ ] d. Make final decision [ ]

Section C: Factors Affecting Women's Participation in Agroforestry

1. Do women face constraints to their participation in agroforestry practice?
   a. Yes [ ] b. No [ ]

Please indicate whether you; Strongly Disagree, Agree, Neither Agree nor Disagree, Agree or Strongly Agree to the following identified factors affecting women's participation in agricultural and for that matter agree forestry practice.

2. Access to land and land tenure: a. Strongly Disagree [ ] b. Disagree [ ] c. Neither Agree nor Disagree [ ] d. Agree [ ]e. Strongly Agree [ ]
3. Why do you say land is a problem to your participation?
   ……
4. Do you own the land you are farming on? Yes [ ] No [ ]
5. If yes, how did you get it?
   .....
6. If No, how then did you get the land?
   .....
7. What were the arrangements in securing the land?
   .....

What is the size of the land?
……

What crops do you use the land for?
……

Who decides on the type of crop to use the land for (e.g. the owner)?
.....

Taboos and other traditions and customs: a. Strongly Disagree [ ] b. Disagree [ ] c. Neither Agree nor Disagree [ ] d. Agree [ ] e. Strongly Agree [ ]

a) What taboos, customs or norms in the community affect your agricultural activities?
   .....

How effective are these traditional restricting your maximum participation in agroforestry?

.....

Capital and Credit Access: a. Strongly Disagree [ ] b. Disagree [ ] c. Neither Agree nor Disagree[ ] d. Agree [ ] e. Strongly Agree [ ]

a) What is the source of money for your farm activities?

.....

Are they financial institutions that help farmers in getting credit for farming activities? a. Yes [ ] b. No [ ]

b) If yes, how do you benefit from the assistance?

.....

Extension Services and Information: a. Strongly Disagree [ ] b. Disagree [ ] c. Neither Agree nor Disagree [ ] d. Agree [ ] e. Strongly Agree [ ]

a) How often do you benefit from extension services?

.....

What kind of information do extension officers bring to you on their visits? .....

b) Do they give you information only on agroforestry or agriculture in general?

.....

Labour: a. Strongly Disagree [ ] b. Disagree [ ] c. Neither Agree nor Disagree [ ] d. Agree [ ] e. Strongly Agree [ ]

a) What is your main source of labour on the farm? ……..

Do you hire labour? a. Yes [ ] b. No [ ]

b) For which farm operation do you hire labour? a. Pruning [ ] b. Coppicing [ ] c. Pollarding [ ] d. Weeding [ ] e. Harvesting [ ] f.

i. Other(s)…… ……

c) What is the source of cash if labour is hired?

.....

d) What constraints do you face in tree management as far as labour is concerned?

.....

e) How does labour and management affect your agroforestry practice greatly?

.....

8. Household Decision Making: a. Strongly Disagree [ ] b. Disagree [ ] c. Neither Agree nor Disagree [ ] d. Agree [ ] e. Strongly Agree [ ]

a) What is your position in the household? a. Head [ ] b. Wife [ ]

b) How does your status in the household affect your farming activities?
.....

c) How do you influence decisions concerning farming management and activities?
……

d) What other productive roles do you play aside farming to support the household?
……

e) What are some of the reproductive roles do you do in the household that you can say affect your participation in farming activities?
……

Institutional Arrangements

1. Are you aware of any institutional arrangements in the district that enhancing women's participation in agroforestry? a. Yes [ ] b. No [ ]
2. If yes, what are some of the arrangements?
……
3. If no, what do you think may be the reasons for the non-existence of the institutional arrangements?.....
4. **Constraints to Women's Participation in Agroforestry**

Techno-Institutional Constraints

To what extent does the following factors affect women's participation in agroforestry?

1. Lack of extension programmes for women's development: a. High [ ] b. Medium [ ] c. Low [ ]
2. Lack of awareness and access to NGO programmes for women's development: a. High [ ] b. Medium [ ] c. Low [ ]
3. Low technical know-how of farm women in handling mechanised farm equipment: a. High [ ] b. Medium [ ] c. Low [ ]
4. Lack of adequate information and awareness of modern farming methods for women through relevant institutions: a. High [ ] b. Medium [ ] c. Low [ ]

Socio-Personal Constraints

To what extent does the following factors affect women's participation in agroforestry?

1. Misconceptions that women farmers do not have farming ideas: a. High [ ] b. Medium [ ] c. Low [ ]
2. Societal belief that women are subordinates to their male counterparts in farming: a. High [ ] b. Medium [ ] c. Low [ ]
3. Low self-confidence of farm women in taking farming decisions: a. High [ ] b. Medium [ ] c. Low [ ]
4. Multiple domestic responsibilities of the women: a. High [ ] b. Medium [ ] c. Low [ ]

Economic/Financial Constraints

To what extent does the following factors affect women's participation in agroforestry?

1. Lack of financial contribution to farm operations by the women: a. High [ ] b. Medium [ ] c. Low [ ]
2. Lack of access to credit support groups such as cooperatives: a. High [ ] b. Medium [ ] c. Low [ ]
3. Lack of collateral security required to secure loans to support farm operations: a. High [ ] b. Medium [ ] c. Low [ ]

Key Informant Interview Guide

Arrangements for Improving Women's Participation (Conducted with MoFA and FSD Officials)

This questionnaire is for research work (MPhil Thesis) in the University for Development Studies, Wa. It is intended to explore women's participation in agroforestry practice in the Jaman South District, particularly on institutional arrangements for the improvement of agriculture. All information provided will be used for academic purpose only and will be treated with maximum confidentiality. Thank you.

1. What is the institutional framework governing agroforestry in the district?
2. What arrangements has your institution made in helping agroforestry farmers in terms of the following;
   a. Credit/capital
   b. Information on agroforestry
   c. Extension services
   d. Land acquisition (for example with those practicing taungya)
   e. Technology
   f. Access to market and market information
3. Do you partner with other organisations on issues of agroforestry improvement in the district? a. Yes [ ] b. No [ ]

4. What are the organisations or institutions your outfit collaborates with?
5. What projects do work on, or are working, on or worked on?
6. How did those projects help the farmers, especially women?
7. What are the challenges facing your institution in supporting the practice of agroforestry in the district?

Interview conducted with Drobo Community Bank Limited

1. What is the vision and mission of the bank?
2. What is the rationale of the bank for offering financial assistance to farmers?
3. What is/are the arrangement (institutional) governing the financial assistance given to the farmers?
4. Which type of farmer(s) qualifies for the financial assistance provided by the bank?
5. What are the requirements for accessing the assistance?
6. What happens to the farmer in case of default?
7. How much of financial assistance does the bank give to farmers?
8. Most of the farmers claim the banks in the district prefer to give financial assistance to traders than farmers. How true is this assertion?

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EDUCATIONAL BACKGROUND

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RESEARCH INETRESTS

My Research interests cover Waste Management, Community Development, African Traditional Belief Systems, Natural Resource Management, Climate Change, and Farmers Participation in Agroforestry.

PUBLICATIONS

1. **Diawuo, F. and Issifu, K. A.** (2016). The Role of Manhyia Palace in Traditional Land Resource Conflict Management in Kumasi, Ghana. Africology: The Journal of Pan African Studies, Vol. 9, no1, pp. 202-220.
2. **Diawuo, F. and Issifu, K. A.** (2015). Exploring the African Traditional Belief Systems in Natural Resource Conservation and Management in Ghana, The Journal of Pan African Studies, vol.8, no9, pp. 115-131.
3. **Diawuo, F.** (2017). Ghana, Beware of Climate Change (online). Available: www.modernghana.com/new/753323/ghana-beware-of-climate-change.html
4. **Diawuo, F.** (2016). Communicating Climate Impacts in Ghana (online). Available: www.modernghana.com/news/677432/communicating-climate-change-impacts-in-ghana.html