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CONSUMER PREFERENCE FOR LOCALLY PRODUCED NATIVE TREE PRODUCTS IN NORTHERN GHANA

BUABENG PHOEBE ANCILLA

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CONSUMER PREFERENCE FOR LOCALLY PRODUCED NATIVE TREE PRODUCTS IN NORTHERN GHANA

BY

BUABENG PHOEBE ANCILLA (B.Sc. AGRICULTURE TECHNOLOGY)

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THE THESIS IS SUBMITTED TO THE DEPARTMENT OF AGRICULTURAL AND FOOD ECONOMICS, FACULTY OF AGRICULTURE, FOOD AND CONSUMER SCIENCES, UNIVERSITY FOR DEVELOPMENT STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF PHILOSOPHY DEGREE IN AGRICULTURAL ECONOMICS

FEBRUARY 2023

DECLARATION

Student

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

Candidate:

Signature:…….. Date:…….

Name: Buabeng Phoebe Ancilla

Supervisors

We hereby declare that the preparation and presentation of this thesis were supervised following the guidelines on supervision of thesis laid down by the University for Development Studies.

Principal Supervisor:

Signature:…….…….. Date:…….……

Name: Dr. Sylvester N. Ayambila

Co-Supervisor:

Signature:…….…….. Date:…….…….

Name: Dr. Abdul-Basit Tampuli Abukari

Signature……..…… Date: …….

Head of Department: Prof. Benjamin Tetteh Anang (Ph.D.)

ABSTRACT

The purpose of this study was to assess consumer preference for locally produced native tree products in Northern Ghana. The trees under study were baobab and locust bean. Data was collected from 307 respondents in the Kasena Nankana municipal, Nandom municipal, and Kumbungu districts. Questionnaires were used as instruments for the data collection together with focus group discussions. As there are various locally produced products of baobab and locust bean, consumers were seen to have more knowledge of the health and medicinal benefits of baobab and locust bean but little knowledge of the usage of baobab and locust bean trees. The main reason for the consumption of locust bean products with its main product being dawadawa was its distinct taste and flavor accompanied by the numerous health benefits and the fact that it is a cultural dish. The main reason for the consumption of baobab products with the main products being the leaves either fresh or dry (kuuka) was its affordability and its numerous health benefits, the deliciousness of the soup, and it is cultural dish. A Tobit model with an endogenous regressor model was used to analyze the frequency of consumption of the individual trees products and the factors that determine the consumption of baobab and locust bean. It was observed that there is a close relationship between the frequency of consumption and the factors that determine the consumption of baobab and locust bean. Expenditure was also found to determine the consumption of baobab and locust bean products. Frequency of consumption was also determined by age, household size, region, and savings as consumers prefer. A SWOT analysis was used to analyze the strengths, weaknesses, opportunities, and threats associated with the trading of baobab and locust bean products. The main strength of the baobab and locust bean product was the distinct taste and flavor, the main weakness being the scarcity of trees, opportunities being the uniqueness of products, and threats being value addition. The study recommends aggressive afforestation of these trees as their scarcity remains the biggest weakness to its sustainability.

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Finally, for everyone who contributed immensely to the success of this work may God continue to bless you all.

DEDICATION

I dedicate this work to my parents most especially to my mother Cornelia Owusu-Gyaama for her enormous support throughout my course my siblings and my entire family for the various support rendered me during my course. I say may the Almighty God bless you in everything you do.

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ACRONYMS

CBC	Choice-based conjoint
CVM	Contingent Valuation Method
GDP	Gross Domestic Product
GSS	Ghana Statistical Service
NTFPs	Non-timber forest products
NTPs	Native Tree Products
RP	Revealed Preference
SDGs	Sustainable Development Goals
SP	Stated Preference
TEC	Tobit with Endogenous Covariate
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background

Non-timber forest products (NTFPs) play a significant role in fighting food insecurity across the globe. In recent times, the majority of rural households'

livelihoods depend on Non-Timber Forest Products (Meinhold et al., 2022). For instance, approximately 80% of rural households in developing countries in Asia, Africa, and Latin America engage in the harvesting of NTFPs (Hickey et al., 2016). Angelsen et al. (2014) noted that NTFPs considerably contribute to the income of rural households in developing countries, ranging from 21% to 27%. Despite their importance of contributing about €23.3billion to national economic development per annum in less developed countries, the harvesting and marketing are predominantly rural and informal (Lovrić et al., 2020). NTFPs provide micro and macronutrients for human body development. It also helps in rural households' dietary diversity improvement, especially among marginalized households in rural areas (Garekae and Shackleton, 2020; Hall et al., 2019; Rasolofoson et al., 2018). NTFPs also help in attaining goals one, two, three, and twelve of the Sustainable Development Goals (SDGs).

In West Africa, NTFPs are a crucial component of rural households' livelihoods. They serve as a vital safety net for households all year long, but especially during difficult times brought on by drought (Suleiman et al.,2017). NTFPs such as Locust beans (*Parkia biglobosa*), Baobab (*Adansonia digitata*), Bombax (*Bombax costatum*), Marula (*Sclerocarya birrea*), Jujube (*Ziziphus mauritiana*), and lannea (*Lannea spp*) are common in rural West African and other African countries. These NTFPs are referred to as Native Tree Products (NTPs). Native trees are trees that are indigenous to a particular locality and not introduced to the location. These native trees can be found in Ghana, Nigeria, Malawi, Niger, and Burkina Faso where they are consumed as food and medicine.

The African locust bean is an indigenous tree found in the savannah belt of West Africa specifically Northern Ghana. It is a therapeutic tree that contributes immensely to the diet and income of most rural households (Houndonougbo, et al.,2020). Dawadawa is a high-protein traditional food condiment made from the alkaline fermentation of African locust bean seeds. It's used to flavor soups and stews (Agbobatinkpo, et al., 2019). Most low-income families in Northern Ghana use it literally as a low-cost meat alternative and it contributes to the protein and caloric content of the diet while also giving most locally prepared dishes a distinct flavor (Adewuni, 2016).

Baobab (*Adansonia digitata*) is a non-domesticated savannah tree that grows naturally and is mostly found around human settlements. This tree can be used as food as it is rich in nutrients and therefore contributes significantly to food security and income in both rural and urban areas (Adam, 2017). The fruit pulp of the baobab fruit has a high nutritional value as it is rich in vitamin C, calcium, dietary fiber, carbohydrates, magnesium, and potassium (Dari, et al., 2020). The baobab plant is marketed in the rural and urban markets to generate income for the women who mostly harvest them. The rich leaves of the baobab are palatable to be used as soup "kuuka" and this forms a major part of the diet of rural folks. The surplus dried leaves are stored for future use and this ensures the availability of the baobab leaves throughout the year (Agúndez et al., 2018). The importance of baobab products is supported by the interest of consumers in conservation and improvement programs for baobab resources.

Consumer preference is a subjective phenomenon that primarily concerns an individual's knowledge, and attitude toward a specific product (Siraj, et al., 2022).

Over the years, there has been growing interest in consumer preference concerning increasing and improving the production of those that already exist in the market. For instance, Adenegan & Fatai (2016) found in Nigeria that consumers are willing to pay a surcharge for organically produced and traceable vegetables to ensure safety in the consumption thereof. Other studies include the preferences of rural and urban consumers in Togo regarding the origin (local or imported) and different types of preferred attributes concerning the quality of local rice, such as cleanliness, taste, and texture (Fiamohe et al., 2015); consumer preferences in Niger for different types of millet porridge (Moussa, et al., 2021); and the preferences of livestock farmers for different selection traits of the Azawak zebu sire breed in Niger (Siddo et al., 2015). These studies offer useful results for the design of improved policies dealing with the competitiveness of local varieties or breeds in West Africa.

Several factors can determine people's preference for a product. Consumers' preference for a product is affected by several factors. These include psychographic factors (cognitive, normative, affective), socio-demographic factors (age, gender, marital status, educational status), perceptive factors that might affect consumers' preferences, and many more. With perceptive factors, consumers who are unsure about product quality might use their location as a quality cue. A normative element is a justification supported by rules and values. Additionally, norms and values may influence which products people favor. The demand for a specific meal in a region may be influenced by societal norms as well as individual norms derived from nationalistic sentiments, environmental ideals, and the desire to support regional businesses. Norms can cause a purchasing decision independently of cognitive and affective processes (Li et al., 2021: Henseleit et al., 2009). Cultural aspects, such as

ethnicity, can influence the preferences of local communities for the consumption of NTFPs (Heubach et al., 2013). Moreover, emotional factors might influence the demand for regional food as they are interconnected in some way with ethnocentric and patriotic issues. Also, product quality, prices, availability, and attributes can influence consumer preferences (Moombe et al., 2014).

Consumers derive their pride in consuming quality products because of the perception that quality products carry "an image of social status" (Amoah et al., 2015). Thus, an understanding of the main drivers influencing the consumer demand for a product is important in developing relevant strategies for the commercialization of indigenous tree products and improving the effectiveness and efficiency of production and marketing (Jamnadass et al., 2011). This is because knowledge of consumer needs and desires is an integral part of marketing strategies if products are to be consumer-oriented (Amoah et al., 2015). For this reason, this study sought to understand the drivers and outcomes of consumer preference for two NTFPs; Locust beans (*Parkia biglobosa*) and Baobab (*Adansonia digitata*) in northern Ghana.

1.2 Problem Statement

Over the years, product quality has been of major concern as products speak to themselves and others out of the way they are packaged, handled, and processed before reaching the final consumer (Posavec et al., 2022). Consumer preference for NTPs, on the other hand, is on the rise as tree products contribute significantly to the diet of most people in rural and urban areas. However, a lot of research has been done on the nutritive content of tree products by Ahenkan & Boon (2011) and Vinceti et al., (2013), the medicinal uses of tree products by (Adedayo & Oyun 2017 John-Baptist, 2020; Somvanshi & Saboo,2020) handling of tree products by

Meinhold and Darr (2022) and ways of incorporating it into most foods and food products by Dari & Quaye (2021) but few (Bovenkerk et al., 2023; Shahidah et al., 2019) and others have looked at the marketing, accessibility, affordability, packaging and how consumers behave towards the consumption of tree products in the urban and rural areas. However, despite the number of studies in the field of NTPs, there is still inadequate knowledge of consumer preferences relating to locally-produced native tree products. Also, it is not clear why individuals choose to use a particular product and why they prefer some products to others.

Consumers in Ghana may be choosing products based on the cultural differences inherent in the choice of what we consume within African settings. However, tree products that are consumed in the Northern part of Ghana might not enjoy the same acceptance, market value, accessibility, and affordability in the other parts of the country. Perception on the other hand being a subjective phenomenon affects consumer preference and therefore makes consumers prefer certain products over others. Hence, the study seeks to investigate the consumer preference for locally produced native tree products in Northern Ghana.

1.3 Research Questions

1. What is consumers' knowledge and preference of native tree products in Northern Ghana?
2. What are the factors that determine the frequency of consumption of native tree products in Northern Ghana?
3. What are the strengths, weaknesses, opportunities, and threats associated with the consumption of native tree products in the rural and urban markets?

1.4 Research Objectives

1.4.1 Main research objective

The study seeks to determine consumer preference for locally produced native tree products in Northern Ghana.

1.4.2 Specific objectives

1. Assess consumers' knowledge and preference for native tree products in northern Ghana.
2. Examine the factors that determine the frequency of consumption of native tree products.
3. Understand the strengths, weaknesses, opportunities, and threats of the locally produced native tree products in the rural and urban markets.

1.5 Justification

The study is necessary due to the gap identified in the problem statement section that this research tends to fill, as well as the anticipated general impact on the academic field, national policy, and society at large. Thus, the outcome of this study would add up to or expand the empirical knowledge base on (1) consumers' preference and their knowledge towards the consumption of native tree products; (2) factors that determine the frequency of consumption of native tree products, (3) strengths, weaknesses, opportunities, and threats of the locally produced native tree products in the rural and urban markets in Northern Ghana.

The outcome of the study would expose investors to a fair knowledge of the products of baobab and locust beans consumers prefer on the market. It will benefit the government of Ghana as it can inspire policymakers to integrate the outcome in the

national policy formulation for an increase in the consumption of locally produced tree products. Hence, the study seeks to assess consumers' preference for locally produced native tree products in northern Ghana.

1.6 Organization of the Study

The study is organized into five chapters. Chapter one emphasizes the background of the study, problem statement, research questions and objectives, and justification. Chapter two presents an empirical and theoretical literature review. Chapter three presents the research methodology adopted in this study which includes; the study area, study design, data source, data collection methods, sampling, and data analysis techniques. Chapter four presents the research findings and discussions. Chapter five presents the research conclusions and recommendation.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter discusses related literature on consumer preference for locally produced native tree products in Northern Ghana. The review of relevant and related literature in this chapter is aimed at sharing light on previous studies that are related to the present study. The review discussed some aspects of consumer preference, the frequency of consumption and the determinants of consumption of native tree products and the strengths, weaknesses, opportunities, and threats associated with the locally produced tree products in the rural markets, and a summary of the literature.

2.2 Non-Timber Forest Products

Non-timber Forest Products (NTFPs) are popular natural, biological resources gathered from urban and rural environments for family sustenance, culture, and revenue, making strides in the well-being of mankind (Shackleton & de Vos, 2022). NTFPs extracted from ancient and second-growth ecosystems comprise foods, herbs, fiber, latex, and many other plant and fungus essentials (Stanley et al., 2012). NTFPs, whether intended for household use or business purposes have the potential to enhance the livelihoods of disadvantaged rural populations in developing countries (Avocèvou-Ayisso et al., 2009). Moreover, unlike other damaging kinds of land use including lumbering, quarrying, mining, and agriculture,

the gathering of fruits, leaves, bark, roots, and resin, has a lesser impact on the function and structure of forest areas than other uses. Under optimal conditions, NTFP harvesting is capable of delivering the overall aim of sustainable development, that is "meeting the demands of the present without jeopardizing future generations' ability to meet their own needs" (Stanley et al., 2012).

Since extraction families are sometimes impoverished in rural areas (Pouliot et al., 2012), NTFPs' income can reduce abject poverty while also shifting income distribution. Collectors of NTFPs make money by selling products including latex and herbal blends. They collect unrestricted food in the form of tubers and fruits, get energy from firewood, gather free herbs from plant leaves, barks, and roots, get a free local roof and building poles from palm stems and fronds, and also get free decorative materials from wild orchids and foliage (Mujawamariya & Karimov, 2014). Although not all forest products are marketed, they do supply households with alternate use values that lessen the need for marketplace expenditures. Extractive resources employed in personal consumption and usage, unlike market commodities, must be valued through shadow pricing of a replacement product, the loss of prospective revenues associated with collecting time, or contingent valuation.

Many scholars have discussed ways non-timber forest product collection and trading helps to promote present consumption, long-term poverty reduction, and family safety nets (Van Nguyen & Lv, 2021). Firstly, by eating edible forest products and other sustenance goods, households reduce financial expenditures, decreasing the poverty line of the family.

Furthermore, those employed in the trade and processing of edible NTFPs in peri-urban and rural regions benefit from the goods' secondary ties (Melgarejo & Luis, 2020). Secondly, NTFPs minimize poverty and total household risk by providing income during tough seasons of the year, acting as a type of natural security against financially stormy periods (Pullanikkatil & Shackleton, 2019). A revenue timeline is critical for NTFPs to fill "gaps" and mitigate financial deficits during "hunger seasons" (Pouliot et al., 2012).

Again, for households that do not have any other financially beneficial ways to spend their time, the additional money from NTFPs provides a benefit as well as an incentive for the household to protect the environment.

2.3 Non-Timber Forest Products: A Global Overview

Although timber products are believed to be the primary assets for the forestry sector, optional extra or non-wood commodities, as well as multipurpose forests, have significant ecological (ensuring biodiversity), economic (championing rural competitiveness), and cultural (sustaining old traditions) relevance, particularly at the worldwide level (Belcher & Schreckenberg, 2007; Hernández-Barrios et al., 2015). At the global level, at least 150 NTPs are stated and regarded as being the most significant in terms of business and trade. Mushrooms, honey, forest fruits, medicinal plants, resins, and games are among the most important NTFPs (Vogt et al., 2019).

Citizens in Finland have determined that species diversity, terrain, and non-timber products should take precedence over the real worth of wood products (Gundersen et al., 2016). The gathering and commercialization of NTFP in Europe

have been repetitively lauded for their ability to contribute to rural growth and development. In recent years, the investment in forest fruits (raspberry, dog rose, blackberry, sea buckthorn, blueberry, and many others) has increased exponentially, owing to their medicinal effects and helpful effects on the human body. NTFP financing as a new option with beneficial impacts on the sustainable growth of forest ecosystems has been adopted in the European market (Mosquera-Losada et al., 2018). The economic significance of NTFPs collected by the Czech Republic is premised on shadow market pricing and quantities of the respective goods gathered.

NTFPs are essential and will become even more so in several Eastern, Central, and Northern European nations in the future (Sisak et al., 2016) such as the Czech Republic, Poland, Finland, Slovakia, and Russia. The aforementioned countries' types of NTFPs collected primarily comprise the same conventional forest products as that of the Czech Republic - primarily medicinal plants, forest fruits, mushrooms, and ornamental plants. A large proportion of these commodities are gathered for free by forest guests not just in the Czech Republic but also in countries in Eastern, Central, and Northern Europe. Many of the NTFPs gathered by forest guests can be used to replace related agricultural goods. Nevertheless, the NTFPs can still be considered an important contributor to the economy and a significant market factor in rural areas. Even though the use of NTFPs in many European countries is traditionally and culturally recognized as a very well-known activity, it has only become economically recognized in recent times (Maso et al., 2011; Sisak et al., 2016). Most NTFPs (mushrooms, forest fruits, ornamental plants, medicinal) can be considered an option for agricultural production and advertised as top-quality natural goods created to a great extent without the use of chemicals. Nevertheless, as the

frequency and intensity of NTFP extracting rise, so does the challenge of establishing long-term NTFP planning spatially (Hernández-Barrios et al., 2015). This is because of factors such as product availability, climate change, land use, and management, gathering practices, access to resources, support measures, competition, value chain, demand, certification and labeling, traditional and local knowledge, and attitudes which have been revealed by Schunko et al. (2019) as a limiting factor to the commercialization of NTFPs.

NTFPs are critical to foreign exchange earnings, which is important in most advanced nations (Shrestha et al., 2020). In Nepal, 700 species of plants are medically beneficial, 440 are wild foods, 30 are seasoning ingredients, and the remaining 71 produce fibers, which act as a source of foreign exchange earner (Subedi et al., 2014). Furthermore, a study conducted in Indonesia by Giesen (2015) revealed that NTFPs have a high power to generate capital for rural areas, conserving Indonesia's peatland woodlands and reducing carbon emissions. In Bangladesh. Also, NTFPs sustain rural folks' ability to earn a living based on forests mostly in a protected area (PA), enhancing households' resilience capacity, according to Mukul et al. (2016).

2.4 Predominant Native Trees: Northern Ghana in Focus

Socioeconomically, significant trees can be found scattered throughout agroforestry parklands in Northern Ghana also known as "farmed parklands." These parklands are home to several common tree species, such as the shea (*Vitellaria paradoxa*) and locust bean (*Parkia biglobosa*) trees (Teklehaimanot, 2013). The baobab (*Adansonia digitata*) is also known to dominate in some parts of Northern Ghana. Even though some of these useful trees have been selectively preserved for many decades, it is

believed that recent agricultural intensification and population increase have led to a decline in the total number of trees in these parklands (Odoom, 2021).

Shea and locust bean trees are often kept because of their financial advantages, but they may also be kept due to tenure restrictions that prevent them from being cut down, such as those that apply to migrant farmers. These two species are commonly referred to as assistant native trees because they coexist and have similar geographic distribution ranges in Sub-Saharan Africa, north of the equator, in the Sudanian and Guinean savannah vegetation zones (Poudyal, 2009).

In recent years, shea has become a global commodity due to the increasing demand for shea butter in global markets. Shea butter has long been the primary cooking fat used by people in Sub-Saharan Africa's semi-arid and humid regions, as well as for a variety of ceremonial and medicinal uses. Additionally, the sale of shea's fruits, nuts and locally produced butter is a significant source of cash income for many rural households (Tom-Dery et al., 2018). On the other hand, the locust bean is still widely bartered and used domestically to make a seasoning called "dawadawa," which is used in stews and soups. This tree is still valued for its traditional uses and economic importance in Northern Ghana (Wemegah, 2009).

When making decisions about the management of these trees, farmers must weigh the advantages and disadvantages of having them on their farmlands (Kahan, 2008). While these trees offer advantages beyond just the economic ones, including protection from erosive forces, moisture retention, and higher soil nutrient levels, research has also indicated that they might harm crops when on farms (Akinola et

al., 2020). Therefore, farmers must consider the potential benefits and drawbacks before deciding on the management of these trees.

2.4.1 The Locust bean tree

The African locust bean, *Parkia biglobosa (Jacq.),* is a member of the subfamily Mimosoideae of the Leguminosae family. It is widely distributed throughout the ecoregions of the savannahs in Guinea and Sudan and can be found in 19 African countries. Research into local perceptions of trees in West Africa has found that the African locust bean is one of the species preferred among conserved fruit-bearing trees (Abagale et al., 2013).

Dawadawa, a fermented seed product of *P. biglobosa*, is commonly consumed in many meals, according to a survey of families in Burkina Faso about vegetable consumption and seasonality in two communities (Mogmeng et al., 2020). In the Northern part of Nigeria, *P. biglobosa* trees produce around 201000 tons of fruits in a year (Abagale et al., 2013). It is popular to come across seedpods, dried bark, and a variety of other products made from *P. biglobosa* and other trees being sold in marketplaces in some towns in Ghana (Lelea et al., 2022).

P. biglobosa is used for a wide range of purposes, including medicinal and construction. Tonics and ointments are made from a variety of *P. biglobosa* tree parts and are used to treat a wide range of diseases (Osuntokun, 2021). The peel is also offered for sale on the market for a variety of purposes, particularly during the dry months of the year. Additionally, the seed is fermented to create the spice "dawadawa," which is used as a flavor for soups. Nowadays, the industry

manufactures the fermented beans of *P. biglobosa* into cubes for use in seasoning foods (Ugwuanyi & Okpara, 2019).

The husk extract of *P. biglobosa* has also been used in construction, as a mortar between the ground and locally produced clay tiles, as well as in artworks. *P. biglobosa* husk extract was used by the Women in art and pottery services in plastering mud walls in homes in their neighborhood (Abagale et al., 2013). Additionally, the Karaboro and Gouin potters in Burkina Faso use a plant-based solution created from the husks and pods as a sealer and to give their pots a dark, mottled appearance (Abagale et al., 2013). Extracts from pulp are used with other materials to create organic murals or artworks. The extract of *P. biglobosa's* trunk and pods is used to color sculptures as well as leatherette and cure it. Studies have also found that the husk and bark contain tannin (Musara et al., 2020; Quansah et al., 2019; Sherah et al., 2014; Abagale et al., 2013).

2.4.2 The Baobab tree

The baobab tree (*Adansonia digitata L.*) is a common tree found throughout sub-Saharan Africa and is used for a variety of purposes such as medicine, food, and beverages (Adesina, 2022). There are eight different species of baobab, all of which have large and nocturnal flowers. The *Adansonia digitata L.* species has the greatest geographic distribution on the continent of Africa and can be found in the drier regions of Africa. The other six species are native to Madagascar, while a second species (*A. gibbosa*) is only found there (Sundarambal et al., 2015). The African baobab tree goes by many regional names, including the Monkey bread tree, Baobab, Cream of Tartar tree, upside-down tree, and many more (Rahul, 2015). The baobab tree is incredibly versatile and offers materials for fishing and hunting as well as

food, clothes, medicine, and shelter (Adesina, 2022). The tree's entire body is said to be useful and it has a large taproot that can hold a lot of water. The tree can endure high temperatures and can withstand fire, drought, and low temperatures as long as there is no frost (Zahra'u et al., 2014). This adaptability enables it to thrive in regions with 100-1000 mm of yearly precipitation (Alao et al., 2016).

All parts of the baobab tree are edible, including the root, twigs, tubers, fruit, leaves, seeds, and flowers (Kumar et al., 2022). These components are often used in traditional African recipes in rural places. The fruit is claimed to contain ten times as much vitamin C as an orange and the leaves are rich in minerals and pro-vitamin A. The oils derived from the seeds are also edible due to their fatty acid makeup (Zahra'u et al., 2014). The leaves of the baobab tree are a staple diet for many African people, especially in the continent's center. They are boiled in potash in Malawi, used as fresh veggies in Zimbabwe, and cooked in soups like miyan, and kuuka in Northern Nigeria (Mathaba, 2016). The leaf's nutritional composition includes 11% fiber, 16% ash, and amounts of 13-15% protein, 4-10% fat, and 60-70% carbohydrates. The pro-vitamin A and C content of the leaves is high, making it an excellent source of protein and meeting WHO requirements (Kinuthia, 2018). Baobab leaves are also considered to be a great source of calcium, potassium, iron, magnesium, manganese, zinc, and copper (Ogbaga et al., 2017). The leaves also have anti-inflammatory properties and have been used in traditional medicine to treat a variety of ailments. The bark of the tree is also used in traditional medicine and is believed to have antimicrobial and anti-inflammatory properties (Malabadi et al., 2021; Rahul et al., 2015). The fruit of the baobab tree is also highly valued and is used to make drinks, jams, and powders. The fruit powder is rich in antioxidants,

vitamin C, and dietary fiber. The seeds of the fruit are also edible and are used to make oils and other products (De Caluwé et al., 2010).

In addition to its medicinal and nutritional properties, the baobab tree is also used in construction, dyeing, and other industries (Veeman et al.,2014). The bark of the tree is used to make rope, clothing, and other materials. Wood is also used for construction, furniture, and fuel. The tree's trunk can also be hollowed out and used as a storage container or shelter (Gimba et al., 2020). The tree's large and durable branches are also used to make fences, and the leaves are used to make dyes for cloth (Rabi'u, 2013).

In conclusion, the baobab tree is a versatile and valuable tree that has been used by people in sub-Saharan Africa for centuries. Its various parts are used for food, medicine, construction, and other purposes. Its leaves are rich in vitamins, minerals, and protein and its bark has medicinal properties. The tree's fruit and seeds are also edible and have nutritional value. The baobab tree is truly a "Tree of Life" for many people in Africa, providing a wide range of benefits for their communities.

2.5 Native Tree Products and Livelihoods in Ghana

Recent economic conditions have not significantly altered, poverty rates have not dropped and forests are being damaged at an increasing rate, mostly to the detriment of those who rely on them (Wunder et al., 2014). Nevertheless, this demonstrates how important non-timber forest products (NTFPs) are to the rural sector (Angelsen et al., 2014). Sadly, NTFPs haven't played a significant part in development initiatives, especially in poor nations. Even though it is clear that a sizable portion of the population depends on NTFPs to provide essential food and income in times

of need, this is largely owing to the absence of reliable quantitative data to demonstrate the importance of NTFPs in national and local livelihoods. According to estimates, the local financial value of NTFPs used for commercial and domestic purposes in Ghana may surpass that of lumber (Ghana Forestry Commission, 2012). The reality that there are presently no trustworthy statistics on the economic impact of NTFPs, given their undeniably significant role in rural life, speaks loudly about the sector's marginalization in Ghana. Due to the scarcity of alternative sources of income in Ghana's northern savannah zones, a significant portion of the country's rural population relies on NTFPs (Issaka, 2018).

Significant non-timber forest products (NTFPs) include shea nuts, honey, and baobab pulp, which are sources of income for the majority of rural folks. Many rural residents rely heavily on these products as a source of income, particularly during years when their crops are unsuccessful (Osei-Tutu et al., 2012) due to poor weather, in addition to the prolonged dry period, when agricultural output stops.

Every year, women in the Northern part of Ghana gather wild shea fruits and turn them into butter and other byproducts like detergent. Shea nut butter extracting and processing are two common livelihoods for rural women. The majority of Northern Ghana is home to economic trees including the shea tree, baobab, dawadawa, and acacia. In the Northern and Upper East Regions of Ghana, women are primarily responsible for trading shea and honey, according to a study. These products' sales enable women to support their families (Aikins, 2016).

2.6 Theoretical Overview of Consumer Behaviour

In recent years, various fields such as economics, sociology, cultural studies, and psychology have all engaged in discussions about the consumer. Consumers have a significant amount of power as they control production, drive innovation, and play a role in shaping modern politics and protecting the environment (McCluskey & Swinnen, 2011). According to Jisana (2014), any individual involved in the purchase decision process is considered a consumer. These individuals make purchases for their use or to fulfill the needs of their families. The modern concept of consumers having the right to make choices is embodied by customers (Doshi, 2021).

Consumer behavior refers to how people use their resources such as money, time, and effort to consume goods and services. This includes factors such as what they buy, why they buy it when they buy it, and how often they use it. Consumer behavior can also be described as the actions and decision-making processes that occur before and after a purchase (Qazzafi, 2019). Consumer behavior can also be defined as the behavior buyers exhibit when searching for, purchasing, using, evaluating, and disposing of goods and services that they believe will meet their needs (Yin, et al.,2021). This behavior is influenced by a person's traits and external conditions.

Understanding consumer behavior is a complex and difficult task, making it hard to accurately predict how consumers will act in a given situation (Suomala, 2020). Advertisers aim to change consumer behavior desirably, as the success or failure of their marketing efforts and the company as a whole, depend on it (De Mooij, 2019).

2.6.1 Perspectives of Consumer Behaviour

The methodological and philosophical underpinnings of the traditional viewpoints' investigation of consumer concerns are similar, even though the various areas of consumer behavior they examine are distinct. The conventional perspective addresses a wide array of consumer research issues. The effects of cognition, economy, behavior, motivation, traits, situations, and attitudes are all included in this. In other words, they are built on and follow the principles of a single conventional, positivist approach to consumer research (Pachauri, 2001).

In the field of purchasing behavior, economists were the first to predominate model construction. Early economic theories focused on the act of making a single purchase and the reactions that followed. According to economic theory, purchasing decisions are primarily the product of "rational" and deliberate calculations from economics. Therefore, the individual consumer chooses to spend his or her money on the things that in light of their preferences and relative costs, will provide the highest utility (pleasure). The reasonable viewpoint is built on this principle. While all changes in sales cannot be explained by pure economics (Westing & Albaum, 1975), To name a few, several sub-perspectives within the field sought to offer rational justifications for behavioral, psychological, preference, and aggregate demand variations in behavior.

The behavioral viewpoint stresses the involvement of exterior environmental elements in the learning phase, which is claimed to be what drives behavior in contrast to the economic approach, which emphasizes the significance of internal mental processes in consumer choice-making. The behaviorists view the customer as a "black box," presuming that their actions are conditioned reactions to outside

factors (Voicu, 2013). The behavioral perspective thus concentrates on extraneous environmental cues (like advertising) that prompt customer reaction via learning.

The processing of information has a key part in consumer decision-making, according to the cognitive approach. According to this viewpoint, people actively use information from their surroundings to solve problems and control their environment. The question of whether or when people are genuinely conscious of these processes of learning, meanwhile, is heavily contested (Ateke & Akekue-Alex, 2017). There's some support for unconscious procedural knowledge on the one hand. That is to say, it appears that people do at least some information processing automatically and passively a state known as mindlessness.

According to Barry & Howard (1990), when responding to marketing communications such as advertisements, consumers go through a "variety of stages, notably cognitive, emotional and conative." Since thought precedes both affect and conation, this is the predominant pattern of interaction between the three stages (behavior).

Before beginning the purchasing process, customers have certain attitudes that they already feel. The act of purchasing itself is educational and might result in a shift of perspective. The majority of scholars concur that an attitude is made up of three parts: affect, behavior, and cognition. Consumer emotion is how they feel for an object of attitude, while consumer behavior is what they intend to do concerning that attitude object and consumer cognition is what they believe about that attitude object (Galalae & Voicu, 2013). All three aspects of an attitude are significant but how significant they depend on how motivated the customer is to use the attitude object.

Although consumer researchers have made substantial use of multi-attribute models. These models have limitations in terms of their capacity to generate precise predictions. They believe, for instance, that it is possible to fully identify all pertinent characteristics that a consumer, instance, will consider when making a product selection (Agarwal et al., 2015).

The in-situ impact perspective is premised on the typical circumstances that a customer encounters. Factors other than a product's or person's attributes characterize a scenario. Contextual effects, for instance, could have behavioral (such as entertaining friends), perceptual or experiential, or components (e.g., being pressed for time or depressed) (Kakkar & Lutz, 1981). The extent to which a consumer's ethnic identity or sensed ethnicity is activated during a buying circumstance is one part of the situational role. People are more inclined to choose products based on ethnicity when this relationship is brought up to them.

2.6.2. Consumer Behaviour: the traditional and contemporary models

The various models governing consumer behavior can be categorized as traditional and contemporary (Vijayalakshmi & Gurumoorthy, 2018). The Howard-Sheth, Nicosia, Engel-Kollat-Blackwell, and Stimulus-Response theories, which originated from the classic model, are composed of sociological, economic, educational, and psychological models (Jisana, 2014).

The economic theory of consumer behavior emphasizes the notion that a customer bases their purchasing decisions on the principle of maximizing profits while reducing costs. Therefore, based on economic variables like the consumer's purchasing power and the cost of comparable goods, one may forecast consumer

behavior (Porter, 1974). To optimize the benefits, a buyer might purchase a comparable product that is being offered at a cheaper price. Additionally, as his purchasing power increases, he will be able to buy more things altogether (Schiffman et al., 2013). This paradigm is predicated on the notion that the urge to satiate both learned and basic needs controls consumer behavior. Food, clothes, and shelter are basic needs, whereas fear and guilt are learned needs. As a result, a buyer will typically choose items that will fulfill their wants and make them happy. A hungry customer may decide to forego purchasing a wonderful piece of jewelry in favor of purchasing some food, but she will return to buy the jewelry after her hunger has been filled (Calvo-Porral et al., 2019).

The psychoanalytical approach considers how the conscious and subconscious mind both have an impact on customer behavior. Identity, ego, and super-ego, Sigmund Freud's three levels of consciousness all affect a person's purchasing choices and behavior (Jisana, 2014). A person's subconscious mind may be influenced by a concealed symbol in a firm's name or emblem, leading him to purchase that product rather than one that is similar but comes from another company. The sociological model focuses primarily on the notion that a consumer's purchasing behavior is influenced by his position and influence in the community. The individuals a consumer associates with and the culture that the society as a whole may also have an impact on their purchasing decisions (Sethna & Blythe, 2016). If two people reside in the same neighborhood or go to the same church, they may purchase goods from the same business or brand, even though they may have different purchasing habits given their varied jobs in the firm they work for.

One of the most thorough models of consumer purchasing behavior is the Howard-Sheth model (1969), which makes use of the stimulus-response theory to explain how consumers choose brands over time. The Engel-Kollat-Blackwell model is a model of consumer behavior that emphasizes conscious problem-solving and learning (Tidwell, 2015). The active information-seeking and evaluation processes of consumers are well described by this model, which also illustrates the various decision-making factors and how they relate to one another.

Francesco Nicosia, a specialist in consumer motivation and behavior, propounded the Nicosia model in 1966. The concept creates a connection between the company and its (potential) consumer to explain consumer behavior. The model contends that consumer propensity for a product or service is initially influenced by communications from the company. The customer will view the product differently depending on the circumstances. This might prompt the consumer to look for the goods or assess their qualities. The consumer may respond favorably and decide to purchase the product if the previous step has satisfied them; otherwise, the opposite may happen (Jisana, 2014).

The "black box" of the consumer is opened by marketing and other stimuli, which results in certain purchase/choice decisions. Marketers need to understand what the buyer's "black box" is made of and how inputs are transformed into reactions. The four Ps of marketing is the following: product, pricing, promotion, and place. Major factors and occurrences in the buyer's surroundings, such as those related to economics, technology, politics, and culture, provide additional stimuli. All of these inputs go into the buyer's "black box," where they are transformed into a set of

visible buyer reactions: the product, dealer, brand, time, and amount of the purchase. The salesperson is interested in learning how the customer's two-part black box, consisting of stimuli and responses, works. First, the traits of the buyer affect how that person interprets and responds to the stimulus. Second, the buyer's behavior is influenced by the decision-making process itself (Esser & Donsbach, 2008).

2.7 Consumer Preference – A General Outlook

Consumer preferences are those arbitrary personal choices that enable customers to relate to particular pretty subjective features (Arsil et al., 2018). Customers' preferences are a motivating factor that is reflected positively by their emotional compatibility with a given good, service, or trade arrangement (Voicu, 2013). Individual customers each have a unique set of choices, which in turn depend on location and product characteristics. Regarding the numerous organizational-level operations carried out, understanding consumer preferences is particularly crucial for its sustainability (Cho & Yoo, 2021). One of the factors to consider when determining the strengths and weaknesses of rivals is the degree of consumers 'preferences. The broadcaster can assess the effectiveness or failure of an advertising campaign by comparing customer preferences before and after it runs (Dembu, 2022). A study that provides data on relative non-consumers may focus on their preferences for certain goods or brands because luring them in is a key strategy for raising sales volume to the market's possible upper bounds (Spence, 2021). At one point, theorists tended to restrict preference to the idea of choice. Nevertheless, preference and choice are two quite distinct things; the first is conduct and the latter is a mental state. When a brand and a customer have a long-term connection, the customer learns to link the brand with a symbol and perceives it to be of high quality,

which leads to preferences. Given these long-lasting linkages, a powerful feeling premised on preferences emerges and persists even in the absence of the friendly sign or any other component trait (Voicu, 2013).

Despite being a difficult concept to grasp, it has been shown that consumers' preferences can be measured accurately and that their study can give a more thorough understanding of the choices consumers make when they decide to select an offer over the other, or even when they decide to continue the relationship with the offering party over time. Furthermore, studies have established several concepts related to preference, including the concept of the formed preference, which emphasizes the idea that consumers' preferences are not better defined but rather formed during the process of choosing, and the constructive point of view, which suggests that different tasks and contexts highlight different aspects of the options, the consumer concentrating on different considerations leading to inconsistent decisions (Novemsky et al., 2007).

2.8 Theoretical Concepts of Consumer Preference

Numerous studies in the domain of applied marketing, psychology, economics, and advertising research have focused on consumer choice behavior (Wattoo & Iqbal, 2022). For this reason, the theories of consumer preference are modeled along the paths of psychology and economics. This is obvious considering the various spectrum of scholarly contributions to the field of consumer preferences. An example of typical use of stated preference (SP) approaches is available from the discipline of economics, which served as the foundation for the presumptions made about its application. As was previously said, the model put forth by Pearmain et al.

(1991) also raises the possibility that Fishbein's theory of decision-making, which comes from the discipline of psychology, has an impact on the stated preference concept. Psychology scholars as well proposed some theories such as behavioral theory (Estes, 2014; Pavlov, 2010), and cognitive theory (Howes, 1990).

The two main elements underlying consumer preference in the scope of stated preference is external and internal factors. While the latter reflects consumer awareness of their choices and influences their choices to strategize, the former aims at promoting and restraining market behavior (Pearmain et al., 1991). The "Pearmain" model unmistakably consists of a series of inwardly focused mental components (perception, attitudes, preferences, behavior, and intentions) connected to various individuals' socioeconomic traits and alternative-experience attributes. This explanation of how decisions are made is quite similar to Fishbein's decision-making theory (Pearmain et al., 1991).

During the first half of this century, experiments using fictitious choices were conducted to better comprehend utility theory. But until the early 1970s, this alternative technique for observing customer preferences had not been created in the field of market research for commercial use. Origins of these theoretical scenario-based studies, which were known as "conjoint analysis" at the time, may be found in Davidson (1973) and Louviere et al. (1973).

The majority of consumers' opinion about a product or service is determined by their overall judgment of it. Because of this, it can be sufficing for a market researcher to offer a straightforward question such as, "How do you feel about traveling by train?". However, one issue is that a product or service frequently consists of several features, some of which may be more crucial to different people than others

(Yazdizadeh, 2016). Multi-attribute models have so gained enormous popularity among market analysts. The "functional theory of attitudes" has received increasing attention in recent years as consumer decision-making models (multi-attribute models) attempt to elaborate on how attitudes influence behavior (Katz & Rosen, 1991).

2.9 Stated Preference Versus Revealed Preference

A collection of market research methodologies known as a stated preference (SP) technique enables researchers to learn how buyers value certain service/product features. Respondents are asked to rank, rate, or select between many fictitious product/service situations that are composed of various feature mixtures in the SP. The participants' decisions can be utilized to deduce their value for various traits (Yazdizadeh, 2016). Although SP is now frequently referred to as a tool for market research, the technique has developed within the context of utility theory and demand prediction (Heap et al., 1992). According to Kahneman (1994), "Economic analysis is more amenable to needs and preferences than to hedonic experiences," and "utility is a theoretical construct derived from observed choices." These are the current meanings of these terms in economics and decision research. Since most research has relied on observed choices or revealed preference data, economists have questioned the validity of early studies that employed hypothetical choices (such as those proposed by Wallis and Friedman).

According to Kroes & Sheldon (1988), one intriguing aspect of stated preference procedures is that, due to their experimental nature, they are especially well suited for testing competing theories regarding the functional shape of the function of utility. The apparent differences in reactions that are produced when qualities are

represented in different ways are, however, one component of SP design that has not yet been fully understood. This is an area that is growing more and more crucial as technological advancements provide surveyors more latitude.

Samuelson is credited with coining the phrase "Revealed Preference" (RP) in 1938. He argued that a person's behavior could result from several decisions. According to Samuelson (1938), preferences (or utility functions) can be derived from observable behavior by contrasting it with potential alternatives. To enable the estimation of choice models, this theory has since been refined. Data on revealed preferences are acquired through surveys that inquire about real behavior or by direct observation of subjects. Using revealed preference data, it can be challenging to observe the impact of sufficiently substantial fluctuations in the variables of interest. Therefore, disclosed preference data is often constrained in the range of values of current or previous service attributes. Thus, only a portion of a consumer utility function may be calculated precisely by academics. These methods are challenging to apply for predicting demand for new services because revealed preference data is based on real behavior. Researchers searched for new techniques for estimating consumer utility functions to forecast demand in large part because of some of these issues with RP techniques.

Because it presents a clear contrast to "revealed choice techniques," the phrase "stated preference techniques" has gained popularity. Before 1983, the focus of stated preference methods had been on judging tasks that required respondents to evaluate or assess a variety of attribute combinations connected to a specific decision context. Nevertheless, expressed preference strategies were not widely known until the publication of a study by Louviere & Hensher (1983). The most widely utilized

technique nowadays is thought to be choice-based stated preference techniques (Pearmain et al., 1991). Although the methods gained popularity, economists were suspicious about their reliance on respondents' "stated intentions" as opposed to their actual behavior (Hensher, 1992). Nevertheless, the UK Department of Transport Value of Time Project, stated preference methods outperformed revealed preference data in an outstanding manner (Yazdizadeh, 2016).

The notion of conjoint measurement, which was based on psychophysical principles (Luce & Tukey, 1964; Luce & Suppes, 1965), led to the first persistent application of SP methodologies. Conjoint analysis is the name given to this procedure by marketing scholars such as Shocker & Srinivasan (1974), Green & Srinivasan (1978), Louviere (1988), and Srinivasan (1988) who modified it and used it to research consumer preferences for well-known market products (e.g., carbonated beverages, automobiles) (Rossi, 2016). According to Ben-Akiva et al. (2019), In contradiction to Revealed Preference (RP) techniques, which extrapolate customer choices from observable market growth behavior, Stated Preference (SP) techniques directly elicit consumer preferences. Leading SP techniques include Choice-Based Conjoint (CBC) research and surveys, which are frequently used in marketing to estimate future demand for new or modified products, and Contingent Valuation Method (CVM) elicitations, which are used by environmental economists to determine how much a resource is worth whether it is used, not used, or not used at all (McFadden, 2017).

2.10 Determinants of Consumer Preferences for Local Products

Urban and rural features may have an impact on consumer preferences for regional foods. There are differences between urban and rural residents' preferences for local

foods. Rural customers seem to have even higher rates of knowledge and willingness to look for locally grown products, according to numerous earlier research (Ateke & Akekue-Alex, 2017; Mirosa & Lawson, 2012), although urban consumers are known to have a positive preference for local food (Patterson et al., 1999). This can be due to the proximity of local food sources to rural dwellers, who might also value social and civic concerns more when making food-purchasing decisions (Weatherell et al., 2003). Numerous kinds of research have looked into the elements influencing consumer interest in local foods. Price is notable among such elements (Arsil et al., 2014; Brown, 2003), freshness, food quality, organoleptic, and appearance (Adams & Adams, 2011; Arsil et al., 2014; Zepeda & Deal, 2009). Assistance for the regional farmers and economy, as well as the nation of origin (Brown, 2003; Giraud et al., 2013; Memery et al., 2015), environmental sustainability (Feldmann & Hamm, 2015), ease of preparation (Arsil et al., 2014b) and social environment (Conner et al., 2010) are other variables.

The criteria that people use to identify local food and the pertinent qualities that inspire local food purchases are both influenced by their culture. In the North of England, Tregear & Ness (2005) surveyed 734 participants who resided in two urban and three rural areas. Following situational factors relating to the participant's place of residence (rural/urban), they found attitude-related components.

Furthermore, they discovered that a significant factor influencing public interest in purchasing locally produced food is the level of involvement in farming. At an agricultural show in Massachusetts, 600 urban and suburban consumers were surveyed (Arsil et al., 2018). According to this study, buying locally produced food directly from farmers soon after harvest (freshness) was crucial for customers. Urban

purchasers in Birmingham, UK were the subject of a focus group performed by Penney & Prior (2014). Their research found that although urban purchasers preferred local food, this preference did not always transfer into actual buying behaviors. Instead, factors like freshness, quality, and health are important factors for customers buying local food. In contrast, one of the key factors influencing customer interest in purchasing local food is accessibility.

Numerous types of research discuss the appealing qualities of regional food. Urban customers value freshness, health, and quality concerns in general (Penney & Prior, 2014). Similarly, freshness and quality were listed as the top two reasons to purchase local food by (Hempel, & Hamm, 2016). Consumers who belonged to environmental groups and had attained greater levels of education and income showed a stronger desire and willingness to pay more for local food, according to socio-demographic characteristics. On Java Island in Indonesia, 184 local food consumers from urban and rural areas were interviewed by Arsil et al. (2014) using soft laddering.

According to the research, two key factors influence both rural and urban customers' decisions to buy locally-produced food. They were both affordable and of "food quality." Additionally, urban consumers considered the convenience of preparation and cooking while making decisions on buying. Local food interests in Mikkeli were connected to consumer support for local manufacturing, job development, and economic welfare (Arsil, et al.,2018).

According to a survey by Arsil et al. (2018), urban consumers place a higher value on "Support for local food" than rural customers. "Availability" is a crucial factor in choosing a local meal. Having no access to local produce can be a

prospective obstacle for buyers and consequently has a detrimental effect on local food consumption (Chen, 2020). Urban customers prioritize "food safety" and believe that "local food is free from chemical pesticides, which is one distinction between them and rural consumers. But because "local" and "organic" food is viewed differently by different people, this finding could be biased (Moruzzo et al., 2020).

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter outlines the methods and procedures used to arrive at the stated objectives. It describes the study area, research design, sampling procedure, data collection, and analysis techniques.

3.2 Study Area

Data for this study was sourced from three Local Government (LG) areas of Northern Ghana. These districts are, the Kumbungu District in the Northern Region; the Kasena Nankana Municipality in the Upper East Region; and the Nandom Municipality in the Upper West Region. Northern Ghana comprises five regional boundaries of Ghana. They are the Northern Region, Upper East Region, Upper West Region, Savannah Region and North East Region. These regions according to the 2021 Population and Housing Census (PHC) collectively contain 5,825,879 inhabitants, representing about 19% of Ghana's population. The Northern Region which is the largest of the five regions has a population of 2,310,939 followed by the Upper East Region with a population of 1,301,226. The Upper West, North East and Savannah Regions have populations of 901,502, 658,946, and 653,266 respectively.

3.2.1The Kumbungu District

The Kumbungu district was carved out of the then Tolon/Kumbungu district with L. I. 2062 in 2011. It was inaugurated on the 28th June, 2012 with Kumbungu as its

Capital. The district shares boundaries to the north with Mamprugu/Moagduri district, Tolon and North Gonja districts to the west, Sagnarigu district to the south and Savelugu/Nanton Municipal to the east. The district has a total land mass of 1,599sqkm being one of the smallest districts in the Northern region (GSS, 2014). According to the 2021 Population and Housing Census, the district has a total population density of 71.5 persons per squared kilometer.

The vegetative cover is basically guinea savanna interspersed with short drought resistant trees and grassland. The land is generally undulating with a number of scattered depressions. The soil is generally of the sandy loam type except in the low lands where alluvial deposits are found. Major tree species include the shea nut, dawadawa, mango, which are economic trees and form an integral part of the livelihood of the people (GSS, 2014).

The district is made up of 115 communities with 24 electoral areas (EAs), one (1) Town Council (TC) and five (5) Area Councils (AC). These include; Gupanerigu, Gbulung, Zangbalung, Dalun and Voggu Area Councils and the Kumbungu town council being the administrative capital (Kumbungu District, 2021). According to the 2021 PHC, the total population of the Kumbungu District is 110,586. This comprises an urban population of 27,694 representing 25.04%, and a rural population of 82,892, representing 74.96%. Total male population is 55,291, representing 49.99%, whiles female population is 55,295, representing 50.01%. This shows that male and female population in the district are almost the same, with female just more than men by four (4) inhabitants.

3.22 The Kasena Nankana Municipality

The Kasena Nankana Municipally (KNM) was upgraded by LI 2106 from the Kasena Nankana District which was established in 1988 by LI 1855. It is one of the thirteen districts/municipalities in the Upper East Region of the Republic of Ghana. The Municipality has Navrongo as its political and administrative capital. The municipality lies approximately between latitude 11°10' and 10°3' North and longitude 10°1' West (GSS, 2014). According to the 2021 population and housing Census, the Municipality covers a total land of 865Km² with a total population density of 66.8 persons per squared kilometers.

The municipality shares boundaries to the north with Kasena-Nankana-West District and Burkina Faso. To the east, it shares boundary with Kassena-Nankana West District and Bolgatanga Municipality, to the west with Builsa district and to the south with the West Mamprusi District (GSS, 2014). The West Mamprusi District, south of the KNEM is now in the North East Region as a result of the creation of two new regions out of the Northern Region in 2018 (GSS, 2014).

The Kasena-Nankana Municipality lies within the guinea savannah woodlands. The municipality is covered mainly by the Sahel and Sudan-Savannah types of vegetation comprising mainly of the savannah grassland with short tree and thumps. Common trees found are dawadawa, baobab, shea nut and mango (GSS, 2014). The Municipality, according to the 2021 PHC by the Ghana statistical Service, has a total population of 99,895, comprising of an urban population of 28,736 representing 28.77%, and a rural population of 71,159, representing 71.23%. This shows that the Municipality is largely rural. Male population constitutes 48,658, representing 48.71%, while female population constitutes 51,237, representing 51.29%. The

Municipality has a total household of 23,176, with an average household size of 4.1. Total household population in the Municipality is 94,066 and a non-household population of 5,829 people.

3.23 Nandom Municipality

The district is one of the eleven district that make up the upper west region. The district lies in the North Western corner of the Upper West Region of Ghana between Longitude 2°25 W and 2°45 W and Latitude 10°20 N and 11°00 S. It is bounded to the east and south by the Lambussie and Lawra Districts respectively and to the North and West by the Republic of Burkina Faso. The total area of the district is put at 404.6 square km. this constitutes about 3.1% of the Region's total land area. The district is constituted by 84 communities with 86% of the inhabitants living in rural areas. The Nandom District, administratively, is made up of one (1) Town Council, Three (3) Area Councils and Twenty-two (22) Unit Committees. The population density is approximately 114 per square kilometer. It is the most densely populated district in the region. Its closeness to Burkina Faso offers it a strategic location for international interactions and exchanges (GSS, 2014). The 2021 population and housing census put the population density at 132.8 persons per squared kilometers.

The district falls within the Guinea Savannah belt. The vegetation consists of short grasses with scattered fire-resistant trees such as the share trees, acacia and baobab trees. the vegetation is very congenial for livestock production, which constitutes significantly to household incomes in the district. The greatest influence on the vegetation is the prolonged dry season. During this, period, the grass becomes dry, and subsequent bush burning leaves the area patchy and almost bare of vegetation (GSS, 2014).

The Municipality according to the 2021 PHC, has a total population of 51,328, comprising an urban population of 6,754 people representing 13.16%, and a rural population of 44,574 people representing 86.84%. This clearly puts the place as a rural Local Government (LG) area. The 2021 PHC also reports the total households in the Nandom Municipality to be 9,864 with an average household of size of 5.0 people. Total household population is reported at 49,498 people, and a non-household population of 1,830 people.

3.3 Research Design and Data Collection

The study used a concurrent mixed research design which comprises qualitative and quantitative designs. This study design assesses both exposures and outcomes of interest at the same time and hence can be termed a cross-sectional study design as well. The advantages of this cross-sectional research design are that it is generally affordable, takes little time to execute, and can estimate the prevalence of an outcome of interest because samples are usually drawn from the community. The downside of this research design is that the condition may produce different results if a different time frame is chosen for the same investigation. The study employed a quantitative approach to data collection using an interviewer-administered questionnaire. The questionnaires comprised both closed and open-ended styles of questioning aimed at collecting varying information from different respondents. The merit of the mixed research approach is that it helps you gain a more complete picture than a standalone quantitative or qualitative study as it integrates the benefits of both methods. Again, qualitative data was obtained through focus group discussion

3.4 Sampling Technique and Sample Size

A multistage sampling technique was adopted to select respondents for this study. The first three regions, three districts, and eight communities were purposively selected based on the population of the native trees (Locust bean and baobab) in the regions, districts, and communities. Second, approximately 40 respondents were randomly selected across the eight communities resulting in a total of 330 respondents being interviewed for this study.

Determination of the sample size was grounded on the formula given by Kothari (2004) as illustrated below:

$$n = \frac{pqz^2}{E^2} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where n is the sample size, z is the confidence level ($(\alpha = 0.05)$, p is the proportion of the population of interest who are users of native tree products in the study area. Variable q is the weighting variable and it was calculated as $(1 - p)$ and E was the acceptable error, in other words, the level of precision. p was taken as 0.5 given that a proportion of 0.5 leads to a significant or sufficient and reliable size especially when the proportion is not known with certainty. Thus, q was then given as $(1 - 0.5 = 0.5)$. Furthermore, an error term of less than 10% is generally tolerable (Kothari, 2004). Therefore, the study estimated 10% and the approximate sample size of 97.

$$\mathrm{n} = \frac{1.96^2(0.5)(0.5)}{0.1^2} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$n = 97$$

Following Kothari (2004), it means that any sample size above 97 is tolerable for this study. The study, therefore, targeted 300 respondents.

An additional 30 (10% of 300) questionnaires were added to cater for missing data and non-response. In the end, 307 respondents were recorded with complete information from the administered questionnaires.

Table 3.1: Summary of Sample Distribution

Region	Municipals/Districts	Number of respondents
Upper East	Kasena Nankana	103
Upper West	Nandom	100
Northern	Kumbungu	104
Total		307

3.5 Conceptual Framework

Households' consumption of locally produced native tree products are determined by several factors including institutional factors, household specific factors, knowledge and preference and consumption expenditure. As illustrated in the Figure 3.1

For instance, the age of a consumer would influence the knowledge and preference of locally produced native tree products which will in turn affect the amount the consumer will spend on the products and by extension how often the consumer consumes the products. Older consumers are more likely to have good knowledge and preference for native tree products as compared to younger consumers. Again, education plays a vital role in consumers knowledge and preference because well-educated consumers are likely to be more enlightened about the health benefit and nutritional values of native tree products. Thus, would be more likely to have higher consumption expenditure and by implication high frequency of native tree product

consumption. Other household specific factors like marital status, household size, native tree ownership also affect consumers knowledge and preference, their expenditure and the frequency at which they consume native tree products. Also, institutional factors like market distance influencings their knowledge, preference, consumption expenditure and the frequency of consumption of native tree products.

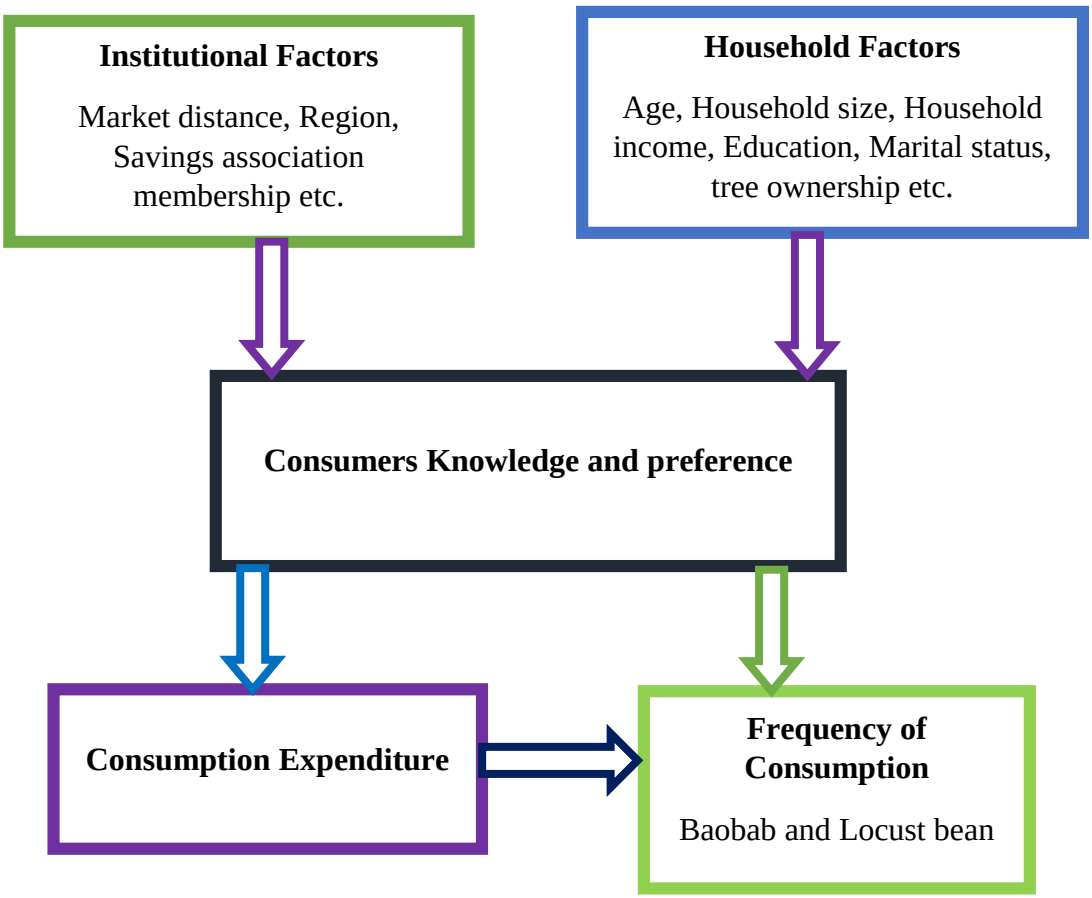


Figure 3.1 Conceptual Framework 2022.

3.5 Method of Data Analysis

The first objective was to assess consumers' knowledge and preference for native tree products in Northern Ghana. This objective was analyzed using descriptive statistics. A five-point Likert scale was used to analyze consumers' knowledge of the tree products. Their knowledge level was ranked as high, moderate, neutral, low

and having no knowledge. This made it possible to tell whether an individual has high, moderate, low knowledge or no knowledge on baobab and locust bean tree products. Descriptive statistics were used to analyze consumer preference and reasons for preference the native tree products in Northern Ghana. Results were then presented in tables and graphs.

3.6.1 Garret Ranking

The second objective was to examine the factors that determine the frequency of consumption. This objective was achieved using Garret Ranking and Tobit model with endogenous regressors.

Garret ranking was used to measure the frequency of consumption of baobab and locust bean tree product on the market. Taking into consideration Garret's ranking model is based on a Likert scale where the number of ranks should be equal to a particular factor where the score is calculated. In this study, there were eight factors with six ranks which is also possible for a Garret ranking to take place. The percentage position is calculated with the Garret formula. The score is then generated using the Garret score table. After which the score value is inserted in the place of the rank for each product. The mean score is then generated and ranked based on the mean score (Ao & Jamir, 2020). The model can be specified as;

$$\text{Percent position} = \frac{100(R_{IJ}-0.5)}{N_J} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. (3)$$

Where;

Rij = Rank given for the ith variable by jth respondents

Nj = Number of variables ranked by jth respondents

3.5.2 Tobit Model with Endogenous Regressor

The Tobit model with endogenous regressors was used to examine the factors that determine the frequency of consumption of native tree products on household consumption expenditure due to the censored nature of the dependent variable. In the study the frequency of consumption is a six-point Likert scale for five products of baobab giving a lower limit of six and an upper limit of thirty, and for locust bean, since there are three products there is a lower limit of six and an upper limit of eighteen. The Likert scale was used to determine how often the households consume baobab and locust bean tree products per month. The frequency of consumption of native tree products is assumed to be endogenous to household native tree products monthly product consumption expenditure. Thus, could correlate to the error term. This is because households who patronize native tree products like baobab leaves, powder, locust bean powder and dawadawa etc. in their consumption, that consumption might affect the amount they spend on the products. An additional variable (instrumental variable) (tree abundance of baobab/locust bean was used to treat the endogenous variable. We assume that the instrument tree abundance would correlate with the household product expenditure but not with the error term and would affect the frequency of consumption through the expenditure. Thus, the IV Tobit model following (Kilic et al., 2009: Wooldridge, 2013) is specified as:

$$y_{1i}^{*} = y_{2i}\beta + x_{1i}\gamma + u_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

$$y_{2i} = x_{1i}\pi_1 + x_{2i}\pi_2 + v_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Where: $i = 1, \ldots, N$

y_{1i}^{*} *the latent dependent variable* ($Frequency\ of\ consumption$)

y_{2i} is a $1 \times p$ vector of endogenous variables (Baobab/Locust bean consumption expenditure)

x_{1i} is a $1 \times k_1$ vector of exogenous variables (socio-economic variables i.e., Age, sex, household size, etc.

x_{2i} is a $1 \times k_2$ vector of additional instruments (Baobab/ Locust bean tree abundance)

Equation for y_{2i} is written in reduced form. By assumption $(u_i, v_i) \sim N(0)$. β and γ are vectors of the structural parameters, and π_1 and π_2 are matrices of reduced-form parameters. We therefore observe

$$y_{1i} = \begin{Bmatrix} a & y_{1i}^* < a \\ y_{1i}^* & a \leq y_{1i}^* \leq b \\ b & y_{1i}^* > b \end{Bmatrix} \ldots\ldots\ldots\ldots \quad (6)$$

The order condition for the identification of the structural parameters is that $k_2 \geq p$. $\sum$ is the block diagonal between u_i and v_i; otherwise, y_{2i} would not be endogenous.

Description of variables used in the regression analysis and their expected signs for its use are presented on table 3.2 below.

Table 3.2: Variable Description

Variable (baobab/locust bean)	Description	Measurement	Expected sign
Region	1- 3 (1=Upper east region, 2=Upper west region, 3=Northern region=base region)	Categorical	-
Age	Years	Continuous	+

Sex	(0= Female, 1=Male)	Dummy	-
Marital status	(0= Unmarried, 1= Married	Dummy	+
Household size	Number of people present in a household	Continuous	+
Years in Community	Number of years stayed in the community	Continuous	+
Years in formal education	Number of years spent in formal education	Continuous	+
Off-farm activity	(1=Yes, 0=No)	Dummy	-
Total yearly income	Cedis (farm income+ non-farm income+remittances)	Continuous	-
FBO	(1=Yes, 0=No)	Dummy	-
Credit access	(1=Yes, 0=No)	Dummy	+
Distance to market (km)	Number of km from community to nearest market	Continuous	+
Access to a baobab tree	(1=Yes, 0=No)	Dummy	+
Level of tree abundance	1-4 (1= Very abundant, 2= Moderately abundant, 3= Abundant 4= Scarce)	Categorical	+
Savings association membership	(1=Yes, 0=No)	Dummy	-
Access to loan	(1=Yes, 0=No)	Dummy	+
Number of times saved before loan access		Continuous	+

3.5.3 SWOT analysis

The third objective was analyze using SWOT analysis. SWOT analysis was used to analyze the strengths, weaknesses opportunities, and strengths associated with the native tree products. The strengths are the internal factors that make baobab and locust beans products stand out on the market. The weaknesses are also internal

factors that affect the trading of baobab and locust beans negatively. Opportunities are external factors that have positive effects on the trading of baobab and locust bean products and threats are what others see to affect baobab and locust bean trading. According to Beka (2011), SWOT analysis is conducted by posing specific questions whose answers will help easy identification of the possible strength, weaknesses opportunities, and threats. These questions include:

Strengths

1. What advantages do baobab and locust bean trading have?
2. What unique about the products?
3. What do consumers in our market see as our strength?

Weaknesses

1. What could we improve on?
2. What should we avoid?
3. What are people in the market likely to see as weaknesses?

Opportunities

1. What are the good opportunities facing us?
2. What are the interesting trends we are aware of?

Threats

1. What obstacles do we face?
2. What is our competitors doing?
3. Are there required specifications for our products?
4. Do we have cash-flow problems?
5. Could any of our weaknesses threaten our business?

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Demographic Characteristics of Respondents: Categorical Variables

Table 4.1 presents the demographic characteristics of 307 respondents in the study area. The table represents categorical variables contained in the data set. It can be deduced that out of 307 respondents, 33.88% of the respondents were from Northern Region, 33.55% were from Upper East Region, and 32.57% were from the Upper West Region. The male and female ratio of respondents is approximately 1:1. Again, only about 9% of the sampled respondents were unmarried. Implying that most households among the sampled respondents were married. It was also recognized that the primary occupation of people in the various communities was farming with 65.15% of the respondents being engaged in it, 22.15% of the respondents were engaged in formal or salary work which involves nursing teaching, extension agents amongst others, 5.54 % were also engaged in petty trading and 7.17% were engaged in other forms of occupation such as grinding meal, tricycle operators, beauticians, and designers. It was also discovered that there are various farmer-based organizations with some of the respondents being a member with others being non-members with percentages of 11.07 and 88.93 respectively. Amongst others, some respondents had access to production credit which is 13.68% and 86.32% did not get access to a production credit. However, being a member of an FBO guarantee a

person access to production credit but in this data set it is quite different as some farmers get credit from individuals and other relatives. This results in a difference in the number of people who get production credit.

Table 4.1: Demographic Characteristics of Respondents (Categorical Variables)

Variable Name	*Frequency*	*Percentage*
Northern	104	33.88
Upper East	103	33.55
Upper West	100	32.57
Sex of Respondents		
Male	153	49.84
Female	154	50.16
Religion		
Christianity	199	64.82
Islam	98	31.92
Traditional	9	2.93
None	1	0.33
Marital status		
Married	280	91.21
Unmarried	27	8.79
Educational level		
Non-Formal	154	50.16
Primary	32	10.42
J.H.S	35	11.40
Secondary/Technical	28	9.12
Tertiary	58	18.89
Primary occupation		
Farming	200	65.15
Formal/salary work	68	22.15
Petty trading	17	5.54
Others	22	7.17
Off-farm occupation		
Yes	183	59.61
No	124	40.39
Native		
Yes	260	84.69
No	47	15.31
Farmer Based Organization		
Yes	34	11.07
No	273	88.93
Production Credit		
Yes	42	13.68

No	265	86.32
Social group		
Yes	128	41.69
No	179	58.31
Savings group		
Yes	116	37.79
No	191	62.21
Loan Access		
Yes	96	31.27
No	211	68.73
Native tree access		
Yes	93	30.29
No	214	69.71
Baobab tree access		
Yes	72	23.45
No	235	76.55
Locust bean tree access		
Yes	78	25.41
No	229	74.59

Source: 2021/2022 field survey

Again, about 37.79% of the sampled respondents were saving group members with 62.21% responding no to saving group membership. This implies a low level of saving group participation among respondents in the study area and this may have implications for their financial freedom and purchasing power. Also, 31.27% of the sampled households had access to the loan as against 68.73% who reported not having access to the loan. This implies that households who want to expand their production or smoothen their consumption in times of food crisis may not have that chance given that less than 50% of households have access to loans. With regards to native tree access, the results revealed that about 30.29% of the respondent had access to native tree products with the remaining 69.71 reporting not having access to the native tree product. This implies a chunk of the respondents had no access to native tree products and this may influence their usage of the products and the benefits of accessing the products. Specifically, 23.45% and 25.41% of the sampled respondents had access to baobab and locust tree products respectively with 76.55%

and 74.59% reporting no access to baobab and locust beans tree products accordingly.

4.2 Demographic Characteristics of Respondents (Continuous Variables)

Table 4.2 presents the demographic characteristics of 307 respondents in the Kasena Nankana Municipal, Nandom district, and the Kumbungu district. The table represents the continuous variables present in the data set. From the demographic analysis, it was deduced that the average age of respondents is 40 years, a maximum age of 80 years, and a minimum age of 20 years. Implying that the age range of the respondents was between 20 to 80 years. The average number of people present in a household is 8 with a minimum of 1 person and a maximum of 40 people present in a household. This implies bigger households' size in the study area and this could have implications on their consumption spending and frequency of consumption of native tree products. The average number of years spent in formal education is 5 years which means most of the respondents have lower level of formal education with few having higher education and this has the potential to influence their knowledge and preference, consumption spending and by extension frequency of consumption as education contributes to consumers understanding of the health benefits and nutritional values of native tree products with a standard deviation of 6.22 which signifies high level of disparity in educational attainment.

Table 4.2: Demographic Characteristics of Respondents Based on Continuous Variables

Variable	Mean	Standard deviation	Minimum	Maximum
Age of respondent	40.28	12.61	20	80

Years stayed in the community	36.53	16.57	1	80
Household size	7.95	4.94	1	40
Total Income	8920.54	10170.32	400	71520
Monthly savings	20.17	32.52	0	200
Number of times saved before loan access	1.76	2.75	0	20
Distance to nearest market (Km)	10.72	4.22	2	50

Source: Field survey, 2022

From Table 4.2, it was revealed that the average total income of respondents was found to be GH¢8,920.54 as some of the respondents are engaged in both farm and off-farm work, hence causing an increase in their average income with a standard deviation of 10170.32 a minimum income of GH¢400.00 and a maximum of GH¢71,520.00 yearly. This implies a high level of income disparity among the sampled households given the size of the standard deviation. This variation could be partly attributed to formal job participation and planting of exportable and more lucrative crops like sesame by some households. It was also revealed that individuals in the community were into savings the average savings amount was GH¢20.00 monthly, with a standard deviation of 32.52 and a maximum of GH¢200.00 monthly to acquire a loan in the process of saving the average number of times one must contribute is 2 times, standard deviation of 2.75 and a maximum of 20 times for one to enjoy the benefit of loan acquisition in their daily activities. Finally, the average distance to the nearest market in the communities was 10.72Km with a minimum of 2 km and a maximum of 50 km. this means that respondents have difficulty

accessing the market given the distance and this may limit their income-generating activities which could contribute to their livelihoods.

4.3 Consumers' Knowledge on Baobab Tree Products

Table 4.3 represents descriptive statistics based on consumers' knowledge of baobab products. The first on the knowledge of baobab emphasized the health benefits of baobab products. 7.17% of the respondents were found to be ignorant, 3.58%, had less knowledge, 0.65%, not being able to rate their knowledge thus neutral, 43.97% had moderate knowledge and 44.63% had high knowledge of the health benefit of baobab products. On an average majority of consumers have moderate knowledge on the health benefits of baobab tree products. Secondly, 7.17% of the respondents were found to be ignorant, 4.23% had less knowledge, 0.98% not being able to rate their knowledge thus neutral, 45.58% had moderate knowledge and 41.04% had more knowledge on the medicinal purpose of baobab products. On average most consumers were found to have moderate knowledge on the medicinal purposes of baobab tree products. Again, it was observed that 66.45% do not know baobab being used as a source of oil for domestic usage,13.36% had less knowledge and 1.65% were not able to rate their knowledge thus neutral, 12.05% had moderate knowledge, 6.51% having high knowledge on the extraction of oil from baobab. A chunk of the respondents had less knowledge on the extraction of oil from baobab tree.

Table 4.3: Consumers' Knowledge on Baobab Tree Products

Knowledge variables	***No knowledge***	***Less knowledge***	***Neutral***	***Moderate knowledge***	***High knowledge***	***Mean***
Health benefits of baobab product	22 (7.17%)	11 (3.58%)	2 (0.65%)	135 (43.97%)	137 (44.63%)	4.15

Medicinal purpose of baobab products	22 (7.17%)	13 (4.23%)	3 (0.98%)	143 (46.58%)	126 (41.04%)	4.10
Oil extraction from baobab	204 (66.45%)	41 (13.36%)	5 (1.63%)	37 (12.05%)	20 (6.51%)	1.79
A good amount of alcohol from baobab	259 (84.36%)	19 (6.19%)	3 (0.98%)	19 (6.19%)	7 (2.28%)	1.36
Environmental conservation	45 (14.66%)	18 (5.86%)	4 (1.30%)	185 (60.26%)	55 (17.92%)	3.61
High international market value	119 (38.76%)	36 (11.73%)	1 (0.33%)	126 (41.04%)	25 (8.14%)	2.68
Foreign exchange	118 (38.44%)	40 (13.03%)	5 (1.63%)	104 (33.88%)	40 (13.03%)	2.70

Source: Field survey, 2022.

It was deduced that 14.66% of the respondents are ignorant of the fact that the baobab tree conserves the environment, 5.86%have less knowledge, 1.30% are indifferent 60.26% have moderate knowledge and 17.92% have high knowledge. On an average most of the respondents had moderate knowledge on the baobab tree conserving the environment and this can be associated to how big the baobab tree is.

In conclusion, it can be observed that consumers are more abreast with the health and medicinal benefit of baobab tree products together with their contribution to the conservation of the environment as they believe some trees conserve the environment which the baobab tree does not play a significant role for some and others disagreeing to it as they also think the baobab tree conserves the environment. They also proved to be less and more knowledgeable about it having high international market value and being a source of foreign exchange. Consumers tend to have no to less knowledge of some of the products that can be derived from the baobab tree such as oil and alcohol.

4.4 Consumers' Knowledge on Locust Bean Products

Table 4.4 below represents descriptive statistics based on consumers' knowledge of locust bean products. The first on the knowledge of locust beans emphasized the health benefits of locust bean products. 1.95% of the respondents were found to be ignorant, 1.30% had less knowledge, 1.30% were not able to rate their knowledge thus neutral, 45.28% had moderate knowledge and 50.16% had high knowledge of the health benefit of locust beans. On an average consumers had moderate knowledge on the health benefit of locust bean tree products.

Secondly, 4.23% of the respondents were found to be ignorant, 4.23% had less knowledge, 0.98% not being able to rate their knowledge thus neutral, 34.85% had moderate knowledge and 55.70% had high knowledge on the medicinal purpose of locust bean products. on an average it points outs that most consumers had moderate knowledge on the medicinal purposes of locust bean tree products.

Table 4.4: Consumers' Knowledge on Locust Bean Products

Knowledge variables	***Ignorant***	***Less knowledge***	***Neutral***	***Moderate knowledge***	***High knowledge***	***Mean***
Health benefits of locust bean product	6 (1.95%)	4 (1.30%)	4 (1.30%)	139 (45.28%)	154 (50.16%)	4.40
Medicinal purpose of locust bean products	13 (4.23%)	13 (4.23%)	3 (0.98%)	107 (34.85%)	171 (55.70%)	4.34
Oil extraction from locust bean	286 (93.16%)	3 (0.98%)	6 (1.95%)	7 (2.28%)	5 (1.63%)	1.18
Environmental conservation	32 (10.42%)	18 (5.86%)	3 (0.98%)	192 (62.54%)	62 (20.20%)	3.76
High international market value	39 (12.70%)	29 (9.45%)	5 (1.63%)	167 (54.40%)	67 (21.82%)	3.63

Foreign exchange	40 (13.03%)	33 (10.75%)	6 (1.95%)	154 (50.16%)	74 (24.10%)	3.62

Source: Field survey, 2022.

It was noted that 10.42% of the respondents are ignorant of the fact that the locust bean tree conserves the environment, 5.86% had less knowledge, 0.98% were indifferent, 62.54% had moderate knowledge and 20.20% had high knowledge. On an average it is notable that consumers have moderate knowledge on the locust bean tree. "*The locust bean tree has a lot of branches so when the wind blows it holds it so that our roofs will not fall".*

In conclusion, that can be said that consumers have moderate to high knowledge of the health and medicinal purposes of the locust bean tree. As these unique benefits are rural and more involved in their daily lives. Consumers seemed to be lost in knowing about some products such as oil that can be extracted from locust beans. It was also made clear that consumers believe particular trees conserve the environment and the locust bean tree is one as it has a high international market value which brings foreign exchange.

4.5 Consumer Preference for Baobab Products

Figure 4.1 represents consumer preference for locally produced baobab tree products in Northern Ghana. From the figure, it was seen that there were five products produced and consumed locally by rural folks. The product includes oil, ornament/saltpeter, spice, local drink/ice cream, and soups.

Oil was found to be extracted from the seeds of the baobab fruit. Approximately 1.30% of the respondents highly prefer baobab oil, 0.65% had a moderate preference

for baobab oil, 0.65% prefer whilst 97.39% do not prefer baobab oil. This is mostly because the availability and awareness level for baobab oil is very low. The ornament was found to be produced from the outer covering of the baobab fruit. As some use it as ornaments such as cups for decoration others use it for saltpeter. It was discovered that 1.95% of the respondents highly prefer it with 98.05% not preferring it with reasons of difficulty in acquisition and having different alternatives. Again, a spice that was found to be made from the seeds of the baobab tree is used mostly in the preparation of the local bra soup where the seeds are pounded and strained and used together with groundnut or without and accompanied with other vegetables. 3.91% of the respondents highly prefer baobab spice, 0.98% had a moderate preference, 0.33% went for normal preference with 94.79% not preferring baobab spice.

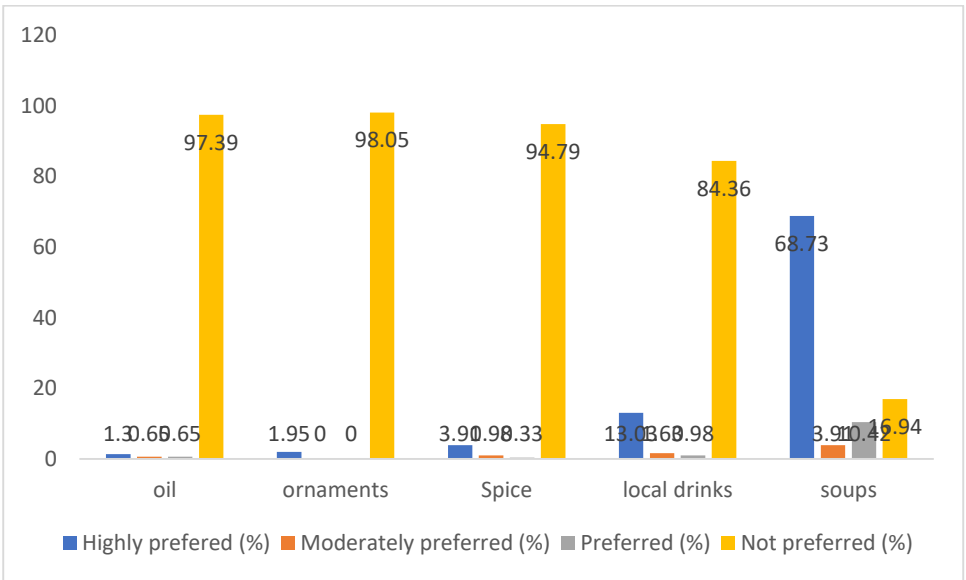


Figure 4.1: Consumer preference for baobab products

Source: Field survey, 2022

Furthermore, it was also revealed that the local drink/ice cream was made from baobab powder with the addition of milk and sugar or without. 13.03% of the

respondents highly preferred baobab local drink/ice cream, 1.63% had a moderate preference, 0.98% prefer baobab drink/ice cream with 84.36% not preferring baobab products. It was also noted that baobab soup which is consumed mostly is prepared with fresh/dry leaves together with other vegetables. 68.73% of the respondents highly prefer this soup which is said to be rich in nutrients, 3.91% prefer the soup moderately, 10.42% prefer it, 16.94% not preferring the soup for reasons of it not being delicious and other reasons best known to them. All these points out that notwithstanding the innovative products and highly health-beneficial baobab products available to the people in the study area, preference for the products among respondents is low. This assertion could be partly attributed to the ready availability of the products all year round and also to the socially ascribed tag of baobab products for the poor. One of the respondents said "*my daughter, hmmm. during those days of hunger households who do not have what it takes to meet their food needs to rely on baobab products like the leaves, the flour to survive but now things are better so no one cares for them again"* another respondent said *"we don't take those products we have enough food so we don't need it"* these responses point out how ignorance of people about the health benefits other importance of the baobab products. Thus, the low preference. the high preference for baobab soup was partly attributed to the scarcity of groundnut, sesame, and other vegetables in the lean seasons that leave people with no option but to depend on the baobab leaves for their soup.

4.6 Reasons for Preference of Baobab Products

Figure 4.2 below represents the main reasons for preference for baobab oil, ornament/saltpeter, spice, local drink/ice cream, and soups. Reasons for consumption of baobab oil include hair and skin nourishment with a percentage of

2.28% and the fact of it being long-lasting at 0.33%. Ornament/saltpeter being the second product on the preference chart had high-quality saltpeter being the main reason for preference being 0.65% of the total respondent and it being affordable also 0.65%. Reasons for preference of the baobab spice were mainly health benefits with a percentage of 1.96% and the reason for it being delicious was found to be 2.28%.

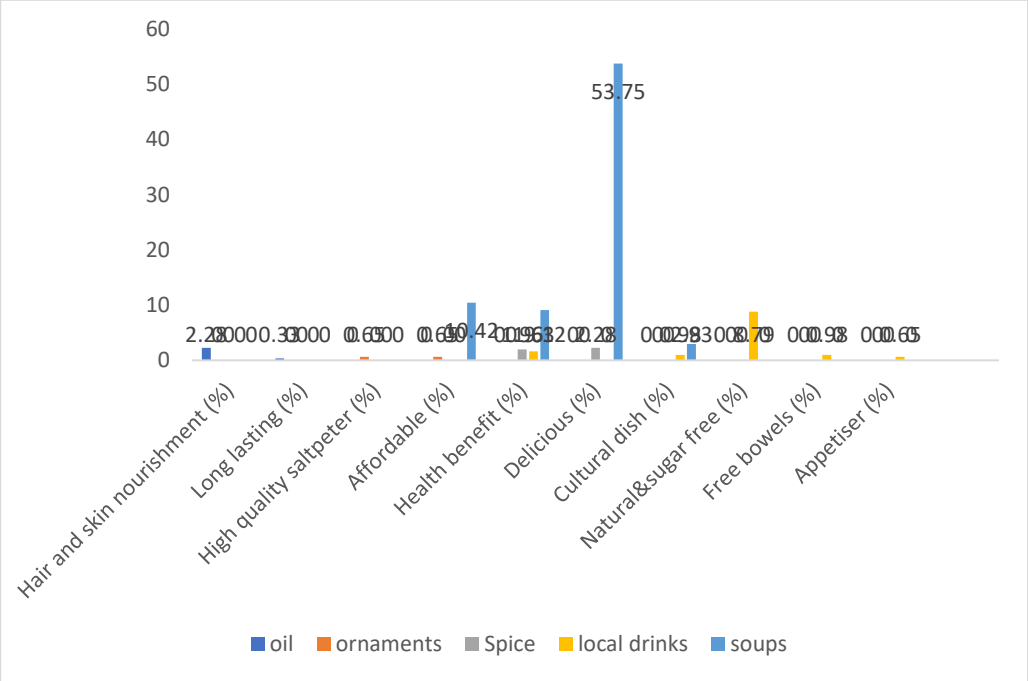


Figure 4.2: Reasons for preference of locally produced baobab products

Source: Field survey, 2022.

Local drink/ice cream had health benefits being one of the reasons for preference of 1.63%, 0.98% for it is a local dish, 8.79% for the reason of natural and sugar-free, 0.98% also for giving them free bowels as baobab is known to contain vitamins which enhances free bowels, 0.65% most of the rural consumers made it clear that taking baobab drink or consuming the powder of the fruit give you unthinkable appetite hence being a reason for preference.

4.7 Consumer Preference for Locust bean Products

Figure 4.3 represents consumer preference for locally produced baobab tree products in Northern Ghana.

The study identified four products consumed among the sampled households in the study area and these products are the locust bean pulp, tea, porridge, and Dawadawa which are the processed fermented seeds of the African locust bean. The graph presents the frequency of preference for locally produced locust bean tree products.

From 4.3, the pulp which is the inner part of the fruit is highly preferred with a percentage of 8.14%, moderately preferred at 0.33%, preferred at 0.98, and not preferred with a percentage of 90.55%. The locust bean tea also had a preference level of highly preferred of 6.84%, moderately preferred of 0, preferred of0.65, and not preferred of 92.51%.

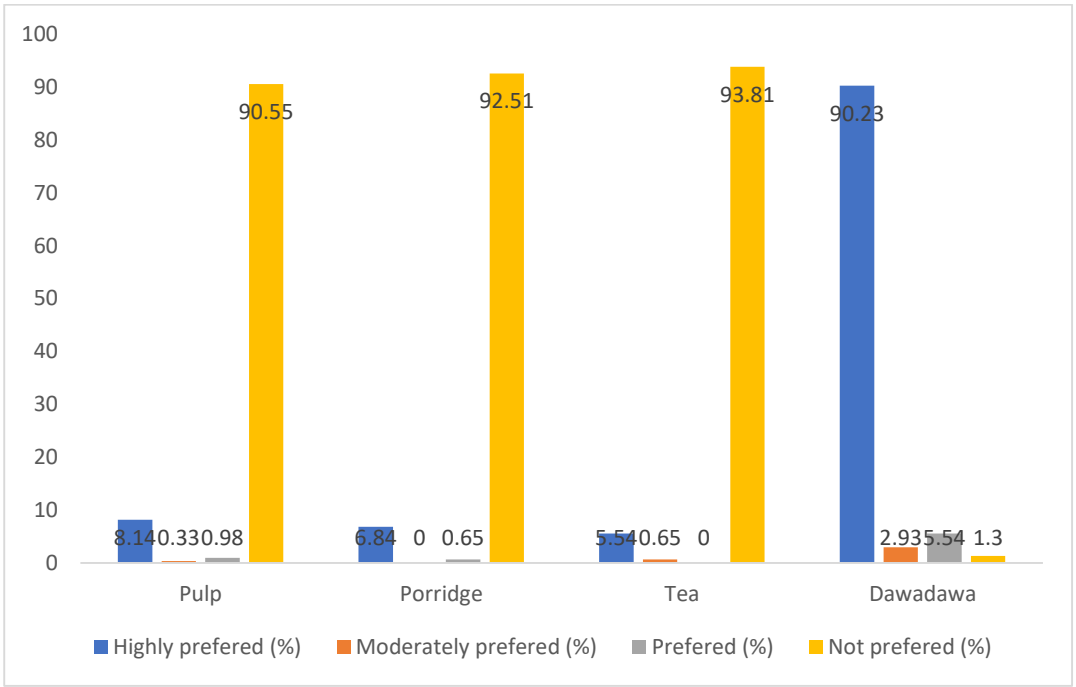


Figure 4.3: Consumers' preferences for locust beans products

Source: Field survey, 2022.

From the figure above locust bean tea also had a preference level of highly preferred of 5.54%, 0.65 moderate preference level, and 98.81 not preferring anything tea from the locust bean powder. The main product of the African locust bean Dawadawa was found to be preferred in all three regions with a high preference level of 90.23%, moderate preference of 2.93%, preferred of 5.54% with 1.3% not preferring Dawadawa with the main reason of bad odor and adulteration of the product.

4.8 Reasons for Preference of Locust Bean Tree Products

Figure 4.4 represents the main reasons for the preference for locust bean tree products. The reasons for preference are based on the type of tree product consumed. Pulp being the first on the list was found to have reasons of preference including health benefits with a percentage of 0.65%. It was made clear by the respondents that locust bean pulp has a lot of health benefits which increases their consumption together with their preference. Again, the pulp was said to have multifunctional usage with a percentage of 7.49%, some of the multifunctional usages include pig feed amongst others. Furthermore, the husk of the pulp was found to be used as local plastering material due to its binding ability with a percentage of 0.98%. Affordable with a percentage of 0.33%.

Locust bean porridge was found to be preferred by most people with reasons of preference being health benefits with a percentage of 0.65%, affordable with a percentage of 0.33%, and color and taste with a percentage of 6.84%. The porridge was discovered to have a bright yellow color with a very sweet taste that requires no sugar in the porridge.

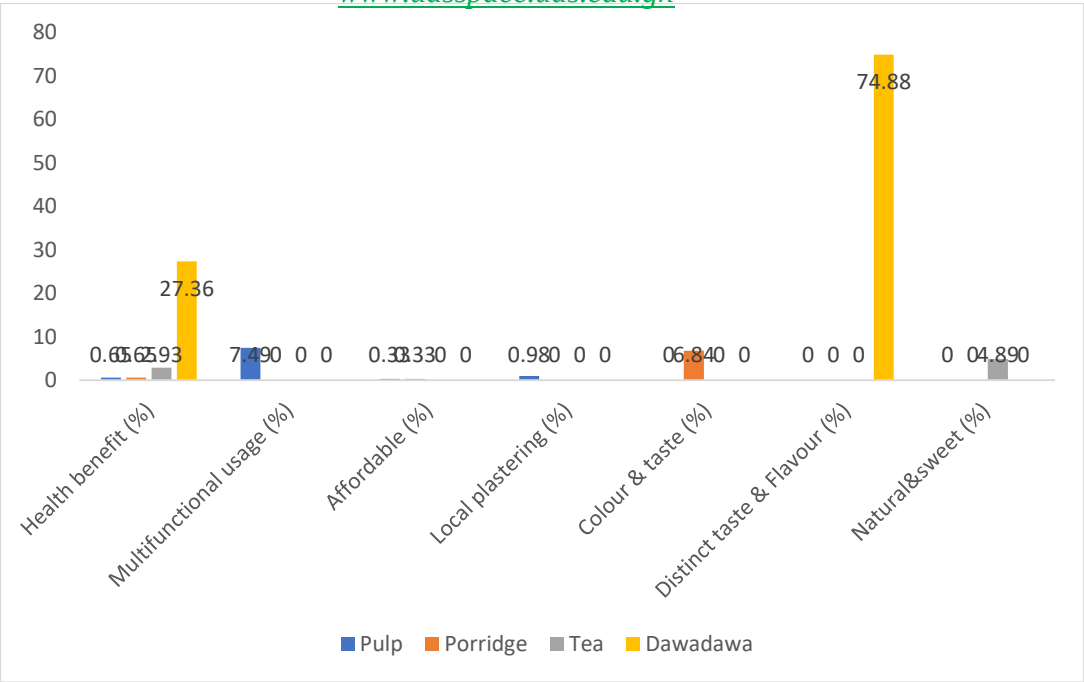


Figure 4.4: Reasons for preference of locust beans products

Source: Field survey, 2022

The locust bean tea was found to be prepared from the powder of the locust bean fruit which is also the pounding of the pulp into powder. The reasons for preference include health benefits with a percentage of 2.93% and the second reason being natural and sweet with a percentage of 4.89%.

Dawadawa the main product of the locust bean tree was discovered to have reasons for preference including health benefits with a percentage of 27.36%, distinct taste, and flavor with a percentage of 74.88% as Dawadawa has the highest consumption with most falling in love with the taste and flavor.

4.10 Consumption Expenditure on Baobab Tree Products

Table 4.5 presents descriptive statistics of monthly household consumption expenditure of Baobab products. The first product the leaves (both fresh and dry) had an average monthly expenditure of GH¢6.47 a standard deviation of 6.49 and a

maximum of 50cedis monthly per household. The seeds also had an average monthly expenditure of GH¢1.01 a standard deviation of 2.56 and a maximum of GH¢14 monthly per household. The seeds of the baobab tree are used in the preparation of soup where they are pounded to get the nut and then used in the preparation of soup as it is said to have a unique taste.

Table 4.5: Consumption Expenditure of Baobab Products

Baobab products	Mean GH¢	Standard deviation	Maximum
Leaves (both fresh and dry)	6.47	6.49	50
Seeds	1.01	2.56	14
Ice-cream	0.87	6.74	100
Local drink	4.17	14.99	100
Oil (non-consumption)	0.48	3.26	35
Ornament/saltpeter	0.21	2.41	40

Source: Field survey, 2022.

Table 4.5 explains the consumption expenditure of baobab products. The local drink which is made by dissolving the baobab powder in water and adding sugar(optional) and milk(optional) has a monthly consumption expenditure of GH¢4.17 standard deviation of 14.99 and a maximum of GH¢100.00 monthly per household. The oil(non-consumption) has an average expenditure of 48pesewas as few households are aware of it and use its standard deviation of 3.26 and maximum of GH¢35.00 per household. This product was found not to be used much as consumers are not aware of them. The ornament/saltpeter is the outer covering of the baobab fruit which is either used as potash or ornament and had an average monthly expenditure of 21pesewas a standard deviation of 2.41 and a maximum of GH¢40.00 monthly per household.

4.12 Consumption Expenditure on Locust Bean Tree Products

Table 4.6 represents a descriptive statistic on the monthly consumption expenditure of locust beans. It can be seen that the locust bean tea has an average monthly consumption expenditure of GH¢1.02 with a standard deviation of 5.85 and a maximum of GH¢80.00 per month. The porridge also being consumed by most rural households have an average monthly expenditure of GH¢1.96 with a standard deviation of 10.07 and a maximum of GH¢120.00 monthly per household. By implication, it is evident that respondents were into the consumption of dawadawa which informed its high consumer spending, and this was followed by porridge and the least tea. This is understandable given that the dawadawa is the main ingredient (spices) in the daily food of respondents and readily available all year round as compared to the powder for making tea and porridge is difficult to store and hardly found at certain times of the year.

Table 4.6: Locust bean products

Locust bean products	Mean GH¢	Standard deviation	Minimum	Maximum
Tea	1.02	5.85	0	80
Porridge	1.96	10.07	0	120
Dawadawa	23.57	22.94	0	300

Source: Field survey, 2022.

The spice Dawadawa is mostly consumed with an average consumption expenditure of GH¢23.57 monthly with a standard deviation of 22.94 maximum of GH¢300.00 per household. The consumption of dawadawa is very high as most rural households cannot have a soup meal without the addition of the incredible spice dawadawa.

4.13 Frequency of Consumption of Locally Produced Native Tree Products

4.13.1 Frequency of Consumption (Baobab Tree Products)

Table 4.7 represent a garret ranking indicating the frequency of consumption of baobab and locust bean product. From the table it can be seen that baobab pulp is highly purchased by consumers with a mean score of 41.66. This is because it is a seasonal plant and not everyone has access to the tree hence a lot of consumers end up buying it for their various uses. It is also known to be cheaper than powder although it contains the powder and the seeds in their raw form. With this, the stress of processing is shifted to the consumer. Processing is quite difficult and requires a lot of technique. Hence, people prefer to make it while others prefer to make it at home. Most households prepare this spice by themselves at home rather than buying it. The second product on the rank is baobab seeds with a mean score of 41.94. This product was discovered to have a lot of consumption yet is less expensive. This product is mostly purchased for household consumption and was mainly used as soup. It is said to have a better taste than groundnut with a lot of health benefits.

Table 4.7: Frequency of consumption of baobab tree products

Products	Percentage	Mean Score	Rank
Baobab powder	6.25	41.66	3rd
Baobab leaves	18.25	41.46	4th
Baobab seeds	31.25	41.94	2nd
Baobab oil	43.75	41.12	5th
Baobab pulp	56.25	42.50	1st

Source: Field survey, 2022.

From Table 4.8 above the third in rank was found to be baobab powder with a mean score of 41.66. This product was purchased mostly for making drinks and ice cream for household consumption. Baobab leaves fourth on the rank of consumption for household consumption with a mean score of 41.46. This product is highly

consumed yet least purchased due to its ability to be long-lasting. Small quantities are enough to feed a household. The least purchased amongst all five products was baobab oil being fifth on the rank with a mean score of 41.12. This product is least purchased and used because fewer households are aware of the products and use them.

4.13.2 Frequency of Consumption (Locust Bean Tree Products)

The product with the first rank was dawadawa with a mean score of 41. The product was discussed to be the most purchased product of the locust bean product it is also the most expensive among the products. The product has a lot of uses and health and medicinal purposes. Resulting in the first purchased yet highly used amongst the other products. The product in the second rank is locust bean seeds with a mean score of 33. This product was found to be purchased and used to make dawadawa for household consumption.

Table 4.8: Frequency of consumption for locust bean tree products

Products	Percentage	Mean Score	Rank
Dawadawa	68.75	41	1st
Locust bean seeds	81.25	33	2nd
Locust bean powder	93.75	20	3rd

Source: Field survey, 2022.

The third product the locust bean powder was found to be less purchased with a mean score of 20. This is because the main aim or usage of locust beans is for the seeds to be processed into dawadawa. The powder is mostly washed away to get access to the seeds or fed to pigs. Few households consume the powder resulting in fewer purchases.

4.14 Determinants of The Frequency of Consumption of Native Tree Products

4.14.1 Determinants of The Frequency of Consumption of Locust Bean Tree Products

The study employed a Tobit model with endogenous regressor to examine the frequency of consumption of locust bean tree products.

Table 4.9 below presents the analysis of parameters that determines the frequency of consumption of locust bean tree products in Northern Ghana. The interest of the analysis is to measure how parameter estimates influence the frequency of consumption of locust bean tree products. athrho2_1= 1.611 significant at 1% implying that the frequency of consumption and locust bean consumption expenditure are compliments and therefore work together as how much you spend on a product determines how often you consume the product, insigma1=1.495 significant at 1% and insigma2=3.134 significant at 1%. The overall significance of the model is tested using the Wald test of exogeneity (corr = 0): chi2(1) = 2.1e+05 Prob > chi2 = 0.0000 indicating that there is a correlation between the errors of the outcome variable (frequency of consumption) and the suspected endogenous variable (Locust bean consumption). This indicates there is the presence of endogeneity between consumption and the frequency of consumption. This affirms that the choice of a Tobit model that accounts for endogeneity is correct for the analysis.

Out of the seventeen parameters used for the analysis, locust bean expenditure, Upper East Region, Upper West region, sex of respondents, marital status, income, years of formal education, farmer-based organizations, access to credit, number of times of contribution before the acquisition of loans, distance to market, locust bean

tree ownership were significant determinants of the frequency of consumption of locust bean tree products in the study areas.

Amongst the variables that turned out to be significant, locust bean expenditure was negative and significant at 1% indicating that an increase in locust bean expenditure will decrease the frequency of locust bean consumption. This implies that the more respondents spend on locust bean products, the lesser the frequency of consumption. It can be observed that all the locust bean products (Dawadawa, locust bean seeds, and powder) are normally used in smaller quantities in soup and other foods. Besides, they are seasonal and are only available in some parts of the year. Due to this, they are bought and stored to be used for a longer time. Hence, their expenditure on it may be increasing, and the frequency of consumption will be less.

The region is categorized into three Upper East, Upper West, and Northern region with the Northern region as the base or reference group, the results revealed a lower frequency of consumption of locust bean products in Upper West and Upper East regions as compared to the Northern region and this was significant at 1%. The results are understandable given the bigger household size nature of the Northern region as compared to the two regions, households in the Northern region will have more to meet their household consumption needs as opposed to households in the two regions. The sex of respondents was also negative and significant at 1%. This implies a lower frequency of consumption of locust bean products among male-headed households as compared to female-headed households. This is quite explicable as most females bear most of the responsibilities in cooking and would most likely understand the contribution and importance of locust bean products to the household diet as compared to their male counterparts.

Marital status was also negative and significant at 1% implying that unmarried people are more likely to consume more locust bean tree products than those that are married. This is not in line with a prior expectation as those who are married are likely to have more mouths (husband and wife, children, etc.) to feed and by extension more locust bean products in preparing the food as compared to unmarried respondents who may be living alone.

Again, income was also positive to the frequency of locust bean product consumption and significant at a 1% level of significance. This implies that income is a positive function of the frequency of locust bean product consumption. Thus, households that have more income consume more locust bean tree products. Since these products are an inevitable part of the local dishes, families that are rich and eat more food frequently also consume locust bean products. Also, the products are seen to be expensive and hence require one to spend more to be able to consume these products.

Years spent in formal education were also found to be positively related to the frequency of consumption of locust bean products and significant at a 1% level of significance. This implies that an additional year spent in school will result in an increase in the frequency of locust bean product consumption by the household. This can be explained by the fact that educated folks are more likely to be equipped with the nutritional and health benefits of locust bean products and therefore, in being conscious of what they eat and their health would go to any length to consume more locust bean products as against non-educated ones as the uneducated folks are more likely to consume other products because others are consuming it all they heard they are good.

It was also discovered that farmer-based organizations have a positive influence on the frequency of consumption of locust bean products. This implies FBO members are more likely to consume locust bean products than their counterparts who are not members. This is expected because FBOs are usually characterized by workshops, training, and capacity buildings among others which is likely to expose members to the benefits of consuming locust bean products. Thus, would have a higher frequency of locust bean product consumption as compared to non-FBO members. Furthermore, the production process of these products is usually laborious and women tend to rely on their social groups to process the products.

Table 4.9: Frequency of consumption of locust bean tree products.

VARIABLES	*Frequency of consumption of locust bean tree products*	*Locust bean consumption expenditure*
Dawadawa expenditure	-0.202***	
	(0.0305)	
Upper East Region	-3.168***	-15.45*
	(0.973)	(7.946)
Upper West Region	-3.020***	-15.05***
	(0.578)	(5.282)
Age of respondent	0.0725	0.254
	(0.0477)	(0.162)
Sex of Respondent	-0.757***	-3.791***
	(0.0752)	(0.528)
Marital Status	-2.469***	-10.63***
	(0.0861)	(3.241)
Income	5.16e-05***	0.000***
	(3.71e-06)	(7.25e-07)
Household size	0.125	0.802
	(0.138)	(0.654)
Years stayed in Community	-0.000407	0.0252
	(0.000262)	(0.0233)
Years in formal education	0.119***	0.767**
	(0.0225)	(0.353)
Off-Farm work	-0.683	-5.186
	(0.872)	(6.059)

Farmer Based organization	0.853**	7.329**
	(0.421)	(3.148)
Credit Access	-0.363**	-3.970***
	(0.174)	(0.101)
Savings Association	-3.329	-19.40
	(3.641)	(17.08)
Contribute times	1.007*	5.915***
	(0.528)	(1.949)
Distance market kilometers	-0.132**	-0.716
	(0.0606)	(0.586)
Locust Bean Tree Ownership	0.352**	-1.306
	(0.178)	(0.830)
Tree Abundance		**1.603*** **
		(0.154)
Constant	19.84***	30.91***
	(1.861)	(10.58)
athrho2_1		1.611***
		(0.00353)
lnsigma1		1.495***
		(0.0923)
lnsigma2		3.134***
		(0.0900)
Observations	307	307

***** p<0.01, ** p<0.05, * p<0.1**

Wald test of exogeneity (corr = 0): chi2(1) = 2.1e+05 Prob > chi2 = 0.0000

Source: Field survey, 2022.

Access to credit was also negative to the frequency of locust bean consumption and significant at 5% which means that households who had access to credit had lower consumption of locust bean products as compared to those who do not have access. This means that the credit that was accessed was for purposes other than consumption. Most of these credits are for farming purposes or business.

Savings is positive and significant at 5%. Saving gives the household future income to spend on household needs like locust bean products. It also gives them the chance to be able to access capital for other business activities. This makes them richer and hence spend frequently on locust beans product. Distance to market was also found

to be negative to the frequency of locust bean products consumption and significant at 10%. This implies that an increase in market distance will decrease the frequency of consumption of locust bean products. This is common knowledge given that households have to buy most of the products from the market. Thus, households that are far from the market may not be able to access the products for consumption as compared to those closer to the market.

Tree ownership was also found to be positive and significant at 5% indicating that households who owned locust bean trees consumed more of the tree products. This is in line with prior expectations because we expect that those who owned native trees will have access to the product at lower cost and without a struggle. Again, the product would also be readily available to them since the trees belong to them. Thus, would such sampled households would consume the product more frequently. A respondent Ama said "*my friend this tree is our gold ooo hummm we harvest and process it ourselves for our household use we don't buy maggi because the money is not even there. So we even sell some to buy other food needs so its our main ingredient we use it in almost every food we prepare. If we didn't have the tree, we would have struggle to buy it and use like we do".* Another respondent said "*my daughter because we own the tree we usually harvest it and those who prepare dawadawa will come and take in exchange for the processed dawadawa".* These responses are evident that ownership of the tree contributes to the frequency of consumption of the product.

However, the age of respondents, household size, years stayed in the community, off-farm work, and savings association membership was found not to be significant.

Implying that these parameters have little or no effect on the frequency of consumption of the African locust bean in Northern Ghana.

4.14.2 Determinants of Consumption Expenditure on Locust Bean Products

Households' locust bean product consumption expenditure is determined by a combination of factors. From the results as presented in Table 4.10 estimated that respondents from Upper East and Upper West Regions were less likely to spend more on locust bean tree products as compared to those in Northern region. This meet prior expectations because the trees are abundance or found in these two regions. Hence, it is expected that they would spend less in getting the product as compared to those in Northern region who have to pay for transportation and other cost involved in bring the product to the region. Both variables were significant at 1%.

Sex of respondents also turned out negative and significant at 1% indicating that female headed households are more likely to spend on locust bean tree products as compared to male headed households. This can be linked to the facts that most female prefer to consume delicious meals and always want to prove that their meals taste better. Locust bean filled with it distinct taste and flavour increases it consumption in female headed households.

Marital status was found to be significant and negative to household locust bean tree product consumption expenditure. The implies that married people spend less on the consumption of locust bean tree products as compared to those who are not married. This deviated from expectations because we expect that males if cannot process the

products on their own when married through their spouse can do so and would spend more on the product given the number of mouths to be fed as compared to the unmarried ones. Also, it is expected that married households enjoy more delicious meals than the unmarried ones as most men prefer to compare and boast of their wives being the best cook. It is also known to win this competition dawadawa ought to be present in your meal.

Income on the other hand turned out to be positive and significant at 1%. This means that households with higher income were likely to spend more on locust bean tree products than those with lower income. This is understandable given expensive nature together with the high quality of the locust bean tree products consumers will always spend more on a good when their income increases. Thus, higher income households may go extra to look for quality rather than quantity and may end up spending more on locust bean tree product as compared to low-income earners.

Furthermore, the study found that the number of years spent in formal education was a positive function of locust bean product consumption expenditure and this was significant at 5%. This understandable given that educated folks are likely to have good knowledge of the nutritional and health benefits of the products and would spend on the product to meet health and nutritional benefits. Thus, would spend more on the consumption of the product as compared to the less educated ones as they turn to look for alternative due to reasons of either it being expensive or adulterated or they feel they have to try something new.

Similarly, FBO participation was found to increase household's locust bean product consumption expenditure and this was significant at 5%. This implies that FBO

members are more likely to spend more on locust bean products consumption than non-members. This makes accurate given that most FBOs benefits from workshops and training programs that enlighten them on the nutritional benefits of native tree and other readily available foods that have good health and nutritional benefits and therefore given their understanding and knowledge would spend more on the products to stay well-nourished and healthy.

Also, credit access was found to have a negative influence on locust bean product consumption expenditure. This means that households who have access to the products are likely to spend less on locust bean tree product as compared to those who do not have access. This means that the credit that was accessed was for purposes other than consumption. Most of these credits are for farming purposes or business.

Moreover, the number of times one contributes to get loan was also positive to household locust bean product consumption expenditure and this was significant at 1%. This implies that when the number on times one contributes to get loan increases, their spending on the product will also increase. This is understandable given that households who have the capacity to contribute to acquire loan would have enough to spend on locust bean products. This is because households will only contribute to acquire loan if they have the means or want to engage in ventures that generates return which has the tendency to contribute to their spending on the locust bean products.

Finally, the abundance of the tree, in this case the locust bean trees in the region and community was significant and positive to locust bean consumption expenditure.

This is contrary to expectation because we expect that when the trees are in abundance it will translate to readily availability of the product in the area and that will in turn translate to low cost and by extension low spending on the products. but it understandable given that buyers usually move into communities where products are in abundance during the harvesting period to buy the products making them scares and even more so, its abundance does not translate to ownership and for that matter consumers may still have to spend more to get the products.

4.14.2 Determinants of the Frequency of Consumption of Baobab Tree Products

The study employed a Tobit model with endogenous covariates to examine the frequency of consumption of baobab tree products. Table 4.10. below presents the analysis of parameters that determines the frequency of consumption of baobab tree products in Northern Ghana. The interest of the analysis is to measure how parameter estimates influence the frequency of consumption of baobab tree products. athrho2_1=1.111 significant at 1% implying that the frequency of consumption and consumption expenditure are compliments and therefore work together as how much you spend on a product determines how often you consume the product, insigma1=1.561 significant at 1% and insigma2=2.778 significant at 1%. The overall significance of the model is tested using the Wald test of exogeneity (corr = 0): chi2(1) = 19.85 Prob > chi2 = 0.0000 which indicates the two equations are not independent and must be estimated together and not separately. Thus, there is an indicating that there is a correlation between the errors of the outcome variable (frequency of consumption) and the suspected endogenous variable (Baobab consumption expenditure). This indicates that there is the presence of endogeneity

between consumption and the frequency of consumption. This affirms that the choice of a Tobit model that accounts for endogeneity is correct for the analysis. The consumption expenditure was instrumented with abundance of the tree in the area. The instrument was significant with consumption expenditure and insignificant with frequency of consumption.

Out of the seventeen parameters used for the analysis; baobab expenditure, upper west region, age of respondents, sex of respondents, number of years lived in the community, farmer-based organizations, credit access, savings association, number of times contribution before the acquisition of loans, distance to market had a significant influence on the frequency of consumption of baobab products in the study areas. Amongst the variables that turned out significant baobab expenditure turned out to be negative and significant at 1% indicating a negative relationship between the frequency of consumption of baobab products and baobab expenditure. Firstly, the seasonality of the baobab products could explain this result. The leaves which are one of the products for making soup blossom all year round, hence recording a low frequency of consumption. Secondly, the fruits from which oil, drinks, and ornaments are made are harvested at a specific time in the year making their frequency of consumption low.

The region is categorized into three Upper East, Upper West, and Northern region with the northern region as the reference, the Upper East region was found to be negative and significant to the frequency of consumption of baobab tree products. This implies that households in upper east regions were consuming baobab products less frequently compared to households in the northern region. This contradicts prior expectations because we expect that households in Upper East who are readily

exposed to the products due to the abundance and lower cost will have a higher frequency of consumption of baobab products. But the results are understandable given that the Northern region is more advanced and exposed to the modern use of the product coupled with its bigger household size and population in general, thus having a higher frequency of consumption of baobab products.

Age was also positive and significant at 5% indicating that older people consume more baobab products as compared to younger people. This is understandable because the consumption of baobab products comes in different forms in the study area which include mixing with hot water and flour and preparing TZ, among others which are mostly patronized by the older folks as against ice cream and drinks which are for the younger folks and seem not common in the area. Thus, the higher consumption among the aged.

It was also discovered that the sex of respondents was negative and significant at 1% implying that females frequently consume baobab products more than males. Since these products are more related to cooking activities, which is the main responsibility of women, the result is expected. The number of years stayed in the community was also discovered to be negative and significant at 5%. Households who have lived for a lesser number of years in the community consume more baobab products than older tenants as the new households are perhaps new to baobab and tend to prefer it due to its delicious nature.

Off-farm work was also positive and significant at 1%. Indicating that households involved in off-farm work such as petty trading are more likely to consume more baobab products. This makes sense because households who participate in off-farm

work are likely to generate extra income which could be spent on food in general and baobab products in particular. Thus, higher consumption of baobab products among participants than among non-participants.

Being a member of farmer-based organizations increases household consumption of baobab products significantly at 1%. This implies that being a member of farmer-based organizations allows one to acquire certain benefits which improve their standard of living and eventually increase their income and expenditure. Again, FBO members are likely to be exposed to the health benefits of native tree products and their importance through training and workshops and this could trigger their increased consumption of baobab products.

Access to production credit was found to be negative and statistically significant at 1% implying that households who have access to production credit consume less of baobab products as compared to non-credit accessors. Similar to the findings under the locust beans, these credits are usually meant for a specific activity like supporting business, farming, fees, etc. They are less likely to be accessed for consumption purposes, hence the frequency of baobab consumption may not be positively related to access to credit. Belonging to the savings association was also found to be negative to the frequency of baobab product consumption and significant at 1%. This implies that households who participate in savings associations have a lower frequency of baobab product consumption than their counterparts. This is in line with a prior expectation because we expect that households who participate in savings associations would have fewer funds available for spending, given the conditions that the membership comes with. Sometimes compulsory daily or weekly

savings are required and may not leave households with enough income for consumption in which the baobab products are included.

Table 4.10: The Frequency of Consumption of Locally Produced Baobab Tree Products

VARIABLES	*Frequency of consumption of Baobab*	*Baobob exp*
Upper East Region	-1.183***	-6.449***
	(0.240)	(0.821)
Upper West Region	-0.895	-4.473***
	(0.671)	(0.753)
Age of respondent	0.0509**	0.112***
	(0.0212)	(0.0417)
Sex of Respondent	-1.331***	-6.516***
	(0.463)	(1.525)
Marital Status	-1.184	-5.091**
	(1.353)	(2.529)
Income	5.08e-05	0.000134
	(8.08e-05)	(0.000152)
Household size	0.0692	0.325***
	(0.0571)	(0.0357)
Years stayed in community	-0.0458**	-0.0425
	(0.0230)	(0.0424)
Years in formal education	0.0692	0.590
	(0.0791)	(0.518)
Off-Farm work	0.502***	-2.002**
	(0.125)	(0.999)
Farmer Based organization	1.857***	8.502***
	(0.322)	(1.324)
Credit Access	-0.559***	-5.303***
	(0.192)	(0.553)
Savings Association	-4.055***	-15.77***
	(1.006)	(4.361)
Contribute times	0.715***	3.039***
	(0.0942)	(0.344)
Distance market kilometers	0.141***	0.000967
	(0.00960)	(0.429)
Baobab expenditure	**-0.277*** **	
	(0.00562)	
Baobab Tree ownership	0.101	-5.164***
	(0.770)	(1.980)
Level of Abundance Baobab		**2.224*** **
		(0.0685)
Constant	28.67***	13.90***
	(0.992)	(5.384)

athrho2_1		**1.111*** **
		(0.249)
lnsigma1		1.561***
		(0.242)
lnsigma2		2.778***
		(0.200)
Observations	307	307

***** p<0.01, ** p<0.05, * p<0.1**

Wald test of exogeneity (corr = 0): chi2(1) = 19.85 Prob > chi2 = 0.0000

Source: Field survey, 2022.

The number of times saved before loan access was also positive and significant at 1% loans are given based on the number of times you save could be explained by the fact that the number of times a household save is occasioned by their income and higher income is more likely to influencing household consumption including baobab. Again, an increase in the number of times households saved enhances their loan access capacity and the amount they can access, thus, could be used to smoothen consumption including baobab and income-generating ventures which will further boost household income and by extension, consumption. Distance to market was also found to be positive and significant at 1% indicating that as the distance to market increases, the frequency of baobab product consumption increases. With the motive that the market is far from the house, you tend to buy more to prevent a shortage. Also, due to the seasonality of baobab products consumers prefer to buy and store and consume during the lean season, hence the low frequency of patronage.

However, Upper West region, income, marital status, household size, years spent in formal education, and baobab tree ownership were found not to be significant. Implying that these parameters have little or no effect on the frequency of consumption of baobab products or not in Northern Ghana.

4.14.3 Determinants of Consumption Expenditure on Baobab Products

Households' product consumption expenditure is determined by a combination of factors. From the results as presented in Table 4.11 Revealed that respondents from Upper East and Upper West Regions were less likely to spend more on baobab products as compared to those in Northern region. This meet prior expectations because the trees are abundance or found in these two regions. Thus, its is expected that they would spend less in getting the product as compared to those in Northern region who have to pay for transportation and other cost involved in bring the product to the region. Both variables were significant at 1%.

Also, the study found that male headed households spend less on baobab products as compared to female headed households and this was significant at 1%. This is understandable given the processes involved in processing the product for consumption males may not be in position to go through the processes as against females. Again, male headed households are exposed to resources and may not values products from the tree given that it is classified as food for the poor and therefore may not spend more on the product.

Marital status was found to be significant and negative to household baobab product consumption expenditure. The implies that married people spend less on the consumption of baobab products as compared to those who are not married. This deviated from expectations because we expect that males if cannot process the products on their own when married through their spouse can do so and would spend more on the product given the number of mouths to be fed as compared to the unmarried ones.

Furthermore, household income was significant and positive to baobab product consumption expenditure. This means that households with higher income were likely to spend more on baobab products than those with lower income. This is understandable given that consumers will always more of a good when their income increases. Thus, higher income households may go extra to look for quality rather than quantity and may end up spending more on the product as compared to low-income earners.

Additionally, the study found that years of education was a positive function of baobab product consumption expenditure and this was significant at 5%. This make send given that educated folks are likely to have good knowledge of the nutritional and health benefits of the products and would spend on the product to meet health and nutritional benefits. Thus, would spend more on the consumption of the product as compared to the less educated ones who at times ascribe the products from baobab for the poor.

Similarly, FBO participation was found to increase household's baobab product consumption expenditure and this was significant at 5%. This implies that FBO members are more likely to spend more on baobab products consumption than non-members. This makes sense given that most FBOs benefits from workshops and training programs that enlighten them on the nutritional benefits of native tree and other readily available foods that have good health and nutritional benefits and therefore given their understanding and knowledge would spend more on the products to stay well-nourished and healthy.

Also, credit access was found as a negative function of baobab product consumption expenditure. This means that households who have access to the products are likely to spend less on the product as compared to those who do not have access. This means that the credit that was accessed was for purposes other than consumption. Most of these credits are for farming purposes or business.

Moreover, the number of times one contributes to get loan was also positive to household baobab product consumption expenditure and this was significant at 1%. This implies that when the number on times one contributes to get loan increases, their spending on the product will also increase. This is understandable given that households who have the capacity to contribute to acquire loan would have enough to spend on the baobab products. This is because households will only contribute to acquire loan if they have the means or want to engage in ventures that generates return which has the tendency to contribute to their spending on the baobab products.

Finally, the abundance of the tree, in this case the baobab trees was significant and positive to baobab consumption expenditure. This is contrary to expectation because we expect that when the trees are in abundance it will translate to readily availability of the product in the area and that will in turn translate to low cost and by extension low spending on the products. but it understandable given that buyers usually move into communities where products are in abundance during the harvesting period to buy the products making them scares and even more so, its abundance does not translate to ownership and for that matter consumers may still have to spend more to get the products.

4.15 Results of the SWOT Analysis

4.15.1 Results of the SWOT Analysis (Locust bean)

The third objective was to analyze the strengths, weaknesses, opportunities, and threats of the locally produced native tree products in the rural and urban markets. This objective was analyzed using strengths, weaknesses, opportunities, and threats (SWOT) analysis of the locally produced native tree products in the rural and urban markets. Figure 4.5 below presents focus group discussions on locust bean trading in the Kasena-Nankana Municipal, Nandom district, and Kumbungu district. Health benefits known by both consumers and traders make consumption of locust bean products to be highly consumed. Some of the health benefits include the prevention of stroke which is locally tested and it is a source of protein which is scientifically tested. Natives emphasized the fact that the consumption of fermented locust beans improves the nutritional content of their meals which increases the consumption of the locust bean and its products.

The second strength is the distinct taste and flavor of the processed locust bean seeds. This attribute makes the product stand out amongst other products on the market as the taste is irreplaceable and most people cannot enjoy their daily meals without it. As one consumer stated "as *for me I cannot eat my soup without dawadawa. You know erh when you don't add dawadawa to your soup there is no aroma."* Another also stated that "*if you want your husband to give you something just put a generous amount of dawadawa especially if its ayoyo and my sister while he is eating be funning him whatever you request for if you ask, he will give you".*

The locust bean plant is a multipurpose plant with almost all the parts of the tree having either medicinal or economic benefits. The main part of the plant sold on the

market with multipurpose usage is the pulp, the husk of the pulp is used as a condiment of local cement when mixed with cow dung, the pulp has a yellowish powdered coat which is processed into powdered form and further processed into tea or porridge, some buy it and add to corn and used in the preparation of TZ it is said to be sweet and good for the body and also consumed to take care of hunger. As one trader stated "*mostly during the season of harvesting of locust bean there is no food so when you get the pulp you beat it to extract the powder and use it for porridge for the children so they don't go out begging its quite a disgrace when you can't feed your children in the morning"*

With high marketing opportunities specifically for processed seeds due to their attributes, traders can decide on the price to be sold, and since the demand is also high consumers always want to purchase original dawadawa before it runs out of season. "*you don't need to talk too much when you are selling original dawadawa as people are even rushing to buy so you can sell it at any price you want because you know the quality of what you are selling and those buying also know what they are buying"*

Furthermore, the products of the African locust bean can easily be identified on the market due to its nature and the rate of purchase is extremely high making it very competitive on the market. Traders who are engaged in the locust bean trade are profit earners and would always want to continue trading for its numerous market benefits and profit.

Weaknesses associated with the trading of locust bean products are the internal factors that affect trading negatively. Based on the focus group discussions, a lot of weaknesses were identified and discussed in the figure below.

The scarcity of trees was identified to be the main weakness as there has been a rise in tree felling which are mostly native trees for reasons such as the high absorption of nutrients in the soil. This is the main contributing factor to the scarcity of trees which gradually results in scarcity of products.

The second most important weakness is the unpleasant odor of the processed locust bean seeds. During the discussions, the women clarified that the bad or usual odor of the beans is normal as there are extremes in the odor. Those with extreme odors are not purchased despite the high demand for the products. They continued to express their views saying the unpleasant odor is a result of over-soaking the seeds in water during the processing period, menstruating during the processing period, and engaging in sexual activities during the processing period the main reasons for the bad odor. Due to the processing, they sometimes buy from the main processors and these processors mix the ones with unpleasant odors which affects marketing as they all tend to exhibit unpleasant smells. "*we all know that dawadawa smells but sometime the smell eei hmmm supper and its just because some women don't follow the rules of processing like when you are in your menses you don't make dawadawa and when you have intercourse with you husband you don't make it but some women still make it and it affects the original scent of the dawadawa"*

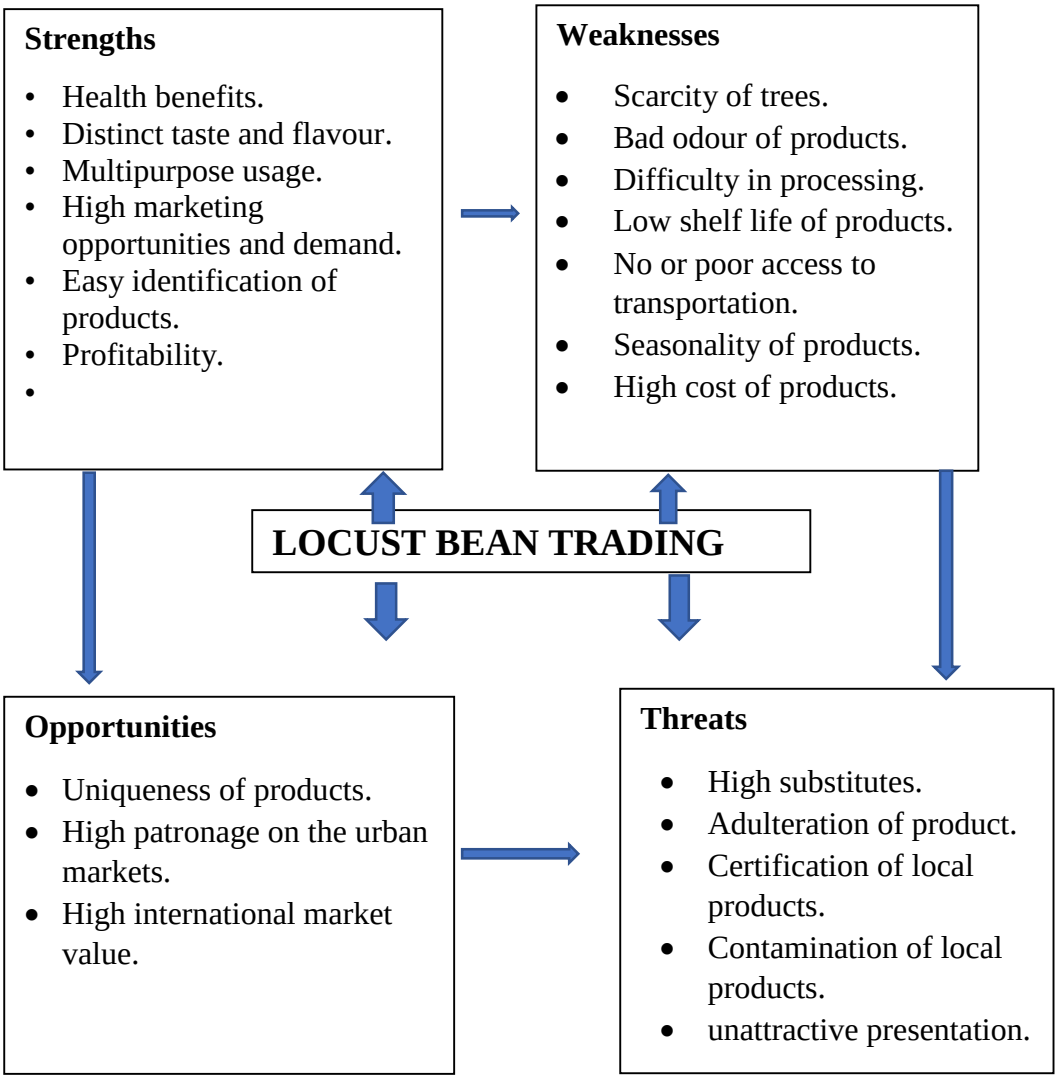
Difficulty in processing. Processing involves a lot of activities such as boiling, pounding, and many others. The women made it clear that the pounding process is

so stressful that sometimes there is contamination and rotting of the cooked beans. The process involves the use of a lot of water and getting access to water is always an issue that affects the quantities produced. Again, the low shelf life of the products, the powder which is used as flour, tea, and porridge cannot be stored for longer periods, the longer it stays the more worms grow in it. Same with processed beans require drying virtually every day or they become moldy and develop worms. This affects trading as traders have to keep drying the spice or powder all the time. This also exposes the products to dust and contamination.

Moreover, poor access to transportation is the main problem for traders in urban areas. The women emphasized the fact that the communities in which the products are found are so rural that it's always difficult to transport the products to the market. Seasonality of products. The locally produced products depend on the trees and these trees are harvested once a year and they easily go out of season. Indicating that these products are mostly found on the market when they are in season.

High cost of products, the locust bean products are the most expensive due to several factors that go into the processing process.

Figure 4.5: SWOT Analysis (Locust bean)



Source: Field survey, 2022.

The figure above continues to address issues raised and discussed during the focus group discussions. This section talks about the external factors that affect the trading of locust beans both positively and negatively.

Firstly, we discussed the opportunities for locust bean trading. The opportunities are said to be the positive external factors that make trading the African locust bean easy and possible.

The uniqueness of products. This is a result of the fact that the products are known to be natural, and organic together with several health and nutritional benefits that are present in the products. The women expressed their view of consumers outside Ghana prefer spices made from the African locust bean as compared to other spices. Making it stand a chance on the international market amongst other spices.

High international market value is based on reasons emerging from the uniqueness of the products with high purchasing power and high patronage making it more profitable in terms of trade. There are some external factors affecting the trading of the products negatively. These factors make trading difficult as the risk of losing customers is high together with the originality of the products.

The most critical amongst them is the adulteration of products as a lot of people now buy the African locust bean and in adding value, the taste and aroma are adulterated through the usage of chemicals and packaging purposes to increase the shelf life. Consumers tend to buy them and gradually label processed beans as impure products. Some also mix beans with groundnut or soybean to increase the quantity and make it less expensive making it difficult to differentiate between original locust

beans and adulterated beans. A consumer stated that "*as for me I have stopped using dawadawa because you buy it and come home and you realise is not original dawadawa or you can taste and smell ashed in it so I rather buy maggi than buy dawadawa".* Again, the African locust bean has higher substitutes like seasoning cubes and adulterated beans from groundnut and soybean making the product less competitive in some parts of the season. As discussed, the local producers have less or no knowledge of the value addition of the products which presents the products just as they are with no clue on what can be done with them aside from being a local spice.

The unattractive presentation of locust beans was also found to be one of the greatest threats as local producers have inadequate ideas on how to present the locust bean products both in the rural and urban markets. They are only presented in basins and exposed to flies, dust, and other contaminants which can affect the purchase and consumption of these products. Consumers however see attractive packaging as a threat as they are sometimes deterred from buying the locust bean products due to the poor way of presentation

Due to the lack of packaging products of the African locust bean are contaminated and buyers tend to touch almost all the beans presented to them introducing various bacteria and germs on the surface. When the products are tested, they are always found to be contaminated and cannot be sold on the international market. All these are a result of the lack of certification of the products. Certification is what these tree products lack which retards and regresses trade to the healthy and beneficial local spice on the international market. Certification being it that there are no government or private institutions that see to it that the locust bean products are following the

required harvesting a processing procedure that authenticates their trade like that of shea which presents the product as either organic or conventional.

4.15.2 Results of the SWOT Analysis (Baobab)

Figure 4.6 below presents results from focus group discussions held in the Kasena-Nankana Municipal, Nandom Municipal, and the Kumbungu District. The first part of this discussion was based on the strengths associated with baobab trading. The health benefits associated with the consumption of Baobab products make trading interesting as there is always a rise and fall in the consumption of baobab and its products. The health and nutritional benefits are what primarily keep the consumption and trade going. These health benefits include the solution to anemia, cough, and flu together with other respiratory infections. The women explained that baobab has a high mineral which they do not know how to classify but they aid in free bowels and prevent constipation.

Distinct and unique taste being another strength talks more about the powder which some have a sour taste others have a very sweet taste. The sweetness however cannot be compared to any other product on the market as well as the sourness. Multipurpose usage of the baobab tree comes with different uses and serves different purposes. These uses include the leaves being used as soup as it is very slippery, the pulp or outer covering of the fruit also used as saltpeter and soap, the powder is also used as a local drink or ice cream, and the seeds are also used as soup. These uses encourage trading as all the parts of the tree are marketable.

High demand for baobab products as it stands the products are purchased highly by rural folks, companies, and urban assemblers. Mostly the products are purchased before harvesting.

Source of income due to the nature of trade the women made it clear that they can get a lot of money especially if your trade with ORGISS Ghana because there is a premium and they also give you money to buy the products from the farmers or if you have the tree then the money given to purchase all goes to you. A sack of Baobab fruit cost GHS 50. However, these women can purchase the products from the farmers at GHS 40-35 and make a profit of either GHS 10 or GHS15 per sack. This income generated helps to improve their livelihood and also increases their stay in business as there is always money for a business. A trader stated "*if not for orgiis you can send baobab powder to the market and no one will buy but now we know that orgiss will buy so we keep protecting hand harvesting because their price is good"*

Weaknesses associated with baobab include scarcity of trees. The baobab tree can mostly be found in Upper East Region. In this region, it can be said to be abundant and regions like the Upper West have just a few of the trees with little or no use, and the same is in the Northern region. In these two regions, it can be said that the baobab tree is scarce. The scarcity of trees also makes the products scarce and decreases trade as there are only a few products on the market.

Moreover, poor access to transportation is the main problem for traders in urban areas. The women emphasized the fact that the communities in which the products are found are so rural that it is always difficult to get access to transportation in going and transporting the products to the market.

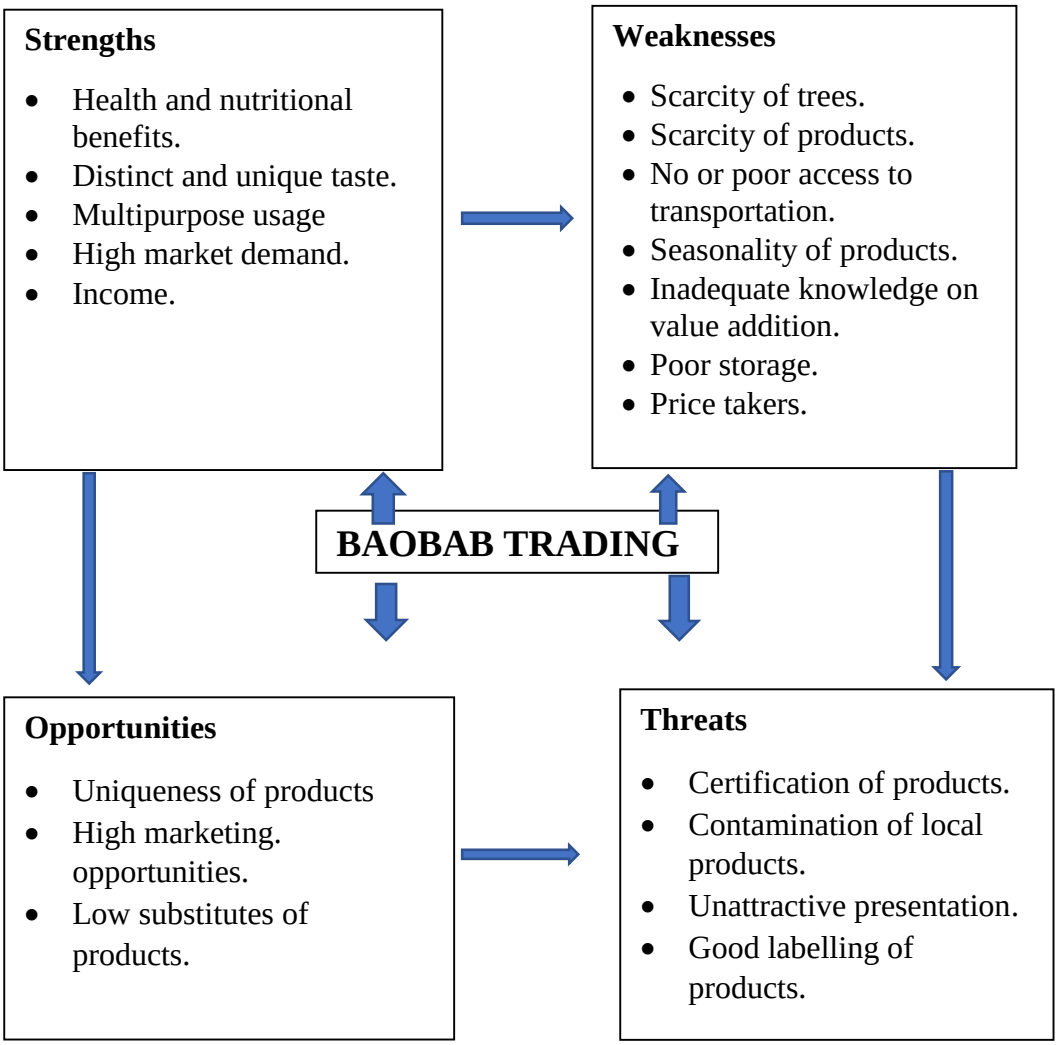
The baobab trees fruit and are harvested once a year as seasonality of products forms a factor. This makes the trade to be concentrated to only some part of the year

whereas in the other parts of the some of the perishable products disappear from the market. The women complained a lot about not being able to add value locally to the products which are only available in their raw state. This makes trade difficult as the products are seasonal and value addition would increase the shelf life of the product and also increase the profit made from trading.

Poor storage of baobab products highly affects trade as products go bad during the trade or upon reaching the final consumer. This affects marketing as consumers tend to buy less and reduce the risk of spoilage and insect infestation of the baobab pulp and powder. The women continued to make it clear that baobab as it stands has a high shelf life but on their part of storage tend to lose customers as products are in bad condition.

Aside from all factors, the price of the baobab products is determined by consumers making traders price takers and other people who are engaged in buying. In rural communities, products are bought based on taste. Price is also determined out of the taste which leaves the rural traders with no say in pricing. They also do not have other options, therefore, complying with the prices given to them due to poor or no access to transportation. As one trader stated "*apart from the drink we don't know what the baobab is used for so you can't sell it as you want so the buyers who know what is used for will always cheat you on the market and it's not like when you bring it home you can consume everything so you just have to sell it cheap and come home"* This makes trade confined to only specific places and reduces the number of buyers who come around. If the products are not sold on time they are highly affected by rain as storage is a problem.

Figure 4.6: SWOT Analysis (Baobab)



Source: Field survey, 2022.

This section discusses the second part of the SWOT table which considers the opportunities and threats. The uniqueness of products is considered the most

important amongst other opportunities as baobab products are highly irreplaceable in both rural and urban markets. The uniqueness is found in taste, appearance, and usage. The use of this tree is multifunctional and is highly purchased when in season.

The second most important amongst the list of opportunities was high marketing opportunities. It was discovered that there are a lot of opportunities related to the marking of baobab products as all parts of the tree have high patronage on the market together with other processed products of the baobab tree. These opportunities are so much that traders can make more money and also bring more products to the market. Low substitutes for baobab products. The products come in ways that are very difficult to have substitutes in terms of taste and health benefits. The women made it clear that hardly can you replace a baobab with any other tree as it's unique in several ways.

Threats affecting trade negatively arise out of external factors. These threats include the certification of products. Certification is what these tree products lack which retards and regresses trade despite the healthy and beneficial usage of baobab on the international market. Most traders are less abreast of what certification is and why their products have to be certified before their products can be sold in supermarkets and other urban shops.

Contamination of products as buyers tends to touch almost all the products presented to them introducing various bacteria and germs on the surface. The products are also exposed to all the dust in the environment as they are always presented in basins. Some buyers even dip their fingers in them to taste them before buying the products. During the processing, the products can be contaminated as there are no special ways

of extracting the powder or oil locally to prevent contamination. When the products are tested are always found to be contaminated and cannot be sold on the international market. Attractive packaging was also found to be one of the greatest threats as local producers have inadequate ideas on how to present the baobab products both in the rural and urban markets. They are only presented in basins and exposed to the housefly, dust, and other contaminants which can affect the purchase and consumption of these products. Consumers are mostly moved by what they see. Non-attractive packaging drives customers away and affects trade negatively. Good labeling and attractive packaging are mostly followed by labeling as labeling differentiates the baobab products to identify the sweet ones from the sour ones. This also allows consumers to know the right procedure used in the preparation of the baobab juice as there are mostly no measurements as to how to prepare the juice with the powder.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the conclusions and recommendations of the study concerning the key findings of the study.

5.2 Conclusion

From the research, the following conclusions can be drawn following the results discussed in the study. While many are knowledgeable of the health and nutritional value of Baobab, most are not aware of its capacity to produce oil and alcohol. Similarly, the nutritional and medicinal benefits of locust beans are widely known while very few are aware oil can be extracted from them. Among the five baobab products, most respondents preferred the soup prepared from it to any other product, followed by the drinks prepared from it. The main reason for this preference according to the finding is its delicious nature of it, its health benefits, and its affordability. Of the four-locust bean product identified, dawadawa is the main preference, while the other three are not considered by the respondents except for very few. The distinct taste of dawadawa and its perceived health benefits are the main reason for the preference for dawadawa as a product of locus beans.

In terms of expenditure on native tree products, the baobab leaves which are used for soup are the highest followed by the local drink extracted from them. For locus

beans, dawadawa which is a main ingredient in soup preparation records the highest household expenditure. The leaves and powdered leaves of baobab are the most frequently used product because they are ingredients in the soup which is frequently used by the people in the study area. In the case of locust beans, dawadawa takes the lead in terms of frequency of usage.

Factors that determine the frequency of consumption of locust beans are the locust bean expenditure, upper east region, upper west region, sex of respondents, marital status, income, years of formal education, farmer-based organizations, access to credit, number of times of contribution before the acquisition of loans, distance to market, and locust bean tree ownership.

In the case of baobab, the frequency of consumption is determined by baobab expenditure, upper west region, age of respondents, sex of respondents, number of years lived in the community, farmer-based organizations, credit access, savings association, number of times contribution before the acquisition of loans, and distance to market.

Locust beans and baobab products are highly recognized on the local market with their main problem being an adulteration of products and inadequate knowledge together on value addition which does not allow the products to sail through well on both the local and international markets.

5.3 Recommendations

Chiefs and NGOs should come up with training programs to train and educate consumers and traders on the various product that can be derived from baobab and

locust bean products such as oils and alcohol. There should be a campaign by the Food and Drugs Authority on the adulteration of these products to preserve their health and nutritional benefits as well as increase their international market value.

Companies should come up with products that will suit what consumers prefer in both baobabs and locust bean products. Government and other institutions in collaboration with the chiefs should embark on aggressive afforestation of these trees, to make their benefits sustainable. Further study should be done on value addition and how to improve on the already existing products of baobab and locust bean.

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APPENDICES

Questionnaire

NB: *This survey questionnaire is aimed at soliciting data for my MPhil Thesis on the topic;* ***Consumer Preference for Locally Produced Native Tree Products in Northern Ghana.*** *This forms part of the requirements for the completion of my*

MPhil program. Your responses to this questionnaire would remain confidential and anonymous and would be used for only academic purposes; hence you are kindly requested to provide genuine responses. It is my fervent hope that your responses would help me conclude necessary for medium to long-term improvement of the Ghanaian Agricultural Sector.

Please key or circle the appropriate response where applicable.

Questionnaire No.	Date	Respondents Phone No.	Household ID

Region	District	Community	Religion

SECTION A: SOCIO-ECONOMIC BACKGROUND

1. Type of respondent: 1. Household 2. Trader 3. Consumer
2. Sex of respondent? 1. Male 0. Female
3. Marital status of the respondent? 1. Married 2. Single 3. Divorced 4. Widow/widower
4. Age of the respondent in years? ……..
5. Are you a native of this community? 1. Yes 0. No
6. If no, what number of years were spent in the community? …….. years.
7. Household size? ……
   7.1 the number of adult men (above 15 years) …….
   7.2 Number of adult women (above 15 years)
   7.3 Number of children ……

8. What is the highest educational level of the respondent? 1. Non-formal education 2. Primary 3. JHS 4. Secondary/Technical 5. Tertiary
9. Years in formal education …….
10. Which religion do you belong to? 1. Christianity 2. Islam 3. Traditional 4. others-specify …….
11. What is your primary occupation? 1. Farming 2. Petty trading 3. Formal work (salary worker) 4. Others specify …….
12. Estimate your monthly/yearly farm income.

Type of farm occupation	Size of farm	Income
1. Poultry		
2. Fishing		
3. Farm 1		
4. Farm 2		
5. Farm 3		
6. Farm 4		
7.		

13. Estimate your monthly/yearly-farm income.

Source of non-farm activity	**Monthly income**	**Yearly income**

14. Did you engage in off-farm work last year? 1. Yes 0. No
15. Who owns or finances the business? 1. Self-2. Spouse 3. Friend 4. others specify …….
16. If yes, how much income did you earn from your off-farm work? ……..
17. Distance to nearest market in kilometers? …….
18. Distance to nearest market in minutes ……
19. Did you get access to production credit last year 1? Yes 0. No
20. Do you belong to any farmer-based organization? 1. Yes .0. No
21. Do you belong to a community/social group? 1. Yes 0. No
22. Do you belong to the native tree products processors group? .1. Yes 0. No
23. Do you belong to the village savings and loans association?? 1. Yes 0. No
24. If yes, how much in total do you contribute per month? ……
25. Did you access a loan from the village and saving loans association? 1. Yes 0. No
26. How many times can one contribute before accessing a loan from the village saving and loans association? …….

Harvesting of Baobab and Locust beans and trading

27. Do you harvest the baobab tree products? 1. Yes 0. No
28. If yes, what is the level of abundance of baobab tree products? 1. Very abundant 2. Moderately abundant 3. Abundant 4. Scarce
29. How often do you harvest? 1. Very often 2. Once a year 3. Twice a year
30. Who is entitled to harvest the native trees? 1. Everyone 2. Landowners 3. Family of land owners 4. Tree owners
31. Do you harvest at a fee or for free? 1. harvest free 0. Harvest with fee
32. If at a fee how much per harvest? ……..

33. Where do you harvest the native trees? 1. Farmland 2. Wild (forest/bush) 3. House
34. Who owns the trees? 1. Family head 2. Community chief 3. Tree chief 4. District Assembly
35. Are you engaged in selling baobab tree products? 1. Yes 0. No
36. If yes which of the following baobab products do you engaged in selling?

Food products	**Response: 1. Yes 0. No**	**Qty sold**	**Unit price**	**Revenue**
1. Leaves(kuuka)				
2. Fresh drink				
3. Local ice-cream				
4. Seeds				
5. Powder				
6. Oil				
7. Bark				
8. Pulp				
9. Cups				

37. Which places (markets) do you sell the products? Traders only

Market option	**Response: 1. Yes 0. No**
Farm gate	

Rural/community market	
District market	
Regional market	
Roadside	

38. Do you process the tree products on your own before selling? 1. Yes 0. No
39. Who normally purchases native tree products?

Actor	**Response: Yes (1), No (0)**
Consumers	
Rural itinerant traders	
Rural assemblers	
Urban assemblers	
Companies	
Processors	

40. Which of the baobab tree products are more profitable (monetary value)? 1. Leaves (kuuka) 2. Fresh drink [ ] 3. Local ice cream [ ]4. Seeds [ ] 5. Powder [ ] 6. Oil [ ] 7. Bark 8. Pulp [ ] 9. Cups 10. Others specify …….
41. Give reason for your choice ……...
42. Do you harvest the African locust bean tree products? 1. Yes 0. No
43. If yes what is the level of abundance of the locust beans product? 1. Very abundant 2. Moderately abundant 3. Abundant 4. Scarce
44. How often do you harvest? 1. Very often 2. Once a year 3. Twice a year
45. Do you harvest locust beans at a fee or for free? 1. Harvest free 0. Harvest at a free
46. If at a fee how much per harvest? ……..

47. Where do you harvest the native trees? 1. Farmland 2. Wild/bush 3. House
48. Who owns the trees? 1. Family head 2. Community chief 3. Tree chief 4. District Assembly

SECTION B: CONSUMERS' KNOWLEDGE AND PREFERENCE FOR NATIVE TREE PRODUCTS IN NORTHERN GHANA.

49. Indicate your awareness/knowledge and preference level of the following statements of baobab consumption *Please tick where applicable.*

*Note **knowledge level**; 1. No acknowledgment 2. Less knowledgeable 3. Neutral 4. Fairly knowledgeable 5. Very knowledgeable*

	Knowledge level				
STATEMENT	**1**	**2**	**3**	**4**	**5**
1. Health benefits of baobab products					
2. Baobab products can be used for medicinal purposes					
3. Oil can be extracted from baobab					
4. There is a good amount of alcohol that can be extracted from baobab					
5. Baobab tree contributes significantly to the conservation of the environment					
6. Baobab products have a high market value in the international market					
7. Baobab products contribute significantly to being a source of foreign exchange					

56. Indicate your awareness/knowledge and preference level of the following statements of locust bean consumption. *Please tick where applicable.*

*Note **knowledge level**; 1. No knowledge 2. Less knowledgeable 3. Neutral 4. Fairly knowledgeable 5. Very knowledgeable*

STATEMENT	1	2	3	4	5
1. Health benefits of locust bean product					
2. Medicinal purposes locust beans					
3. Oil can be extracted from locust bean					
4. Locust bean tree contributes significantly to the conservation of the environment					
5. Locust bean products have a high market value in the international market					
6. Locust bean products contribute significantly to being a source of foreign exchange					

50. Which of the following baobab food products do you prefer?

***Preference level**: Highly preferred 2. Moderately preferred 3. Preferred 4. Not preferred*

Food products	Do you consume this product? 1. Yes 0. No	Do you prefer this product? 1. Yes 0. No	If yes, your preference level
Soups			
Local drink			
Spices			
Oil			
Bowls and cups			

51. What are the main reasons for preference?

……
……
……
……

52. Which of the following locust bean products do you prefer?

***Preference level**: Highly preferred 2. Moderately preferred 3. Preferred 4. Not preferred*

Food products	**Do you consume this product? 1. Yes 0. No**	**Do you prefer this product? 1. Yes 0. No**	**If yes, your preference level**
Spices (Dawadawa)			
Tea			
Porridge			
Pulp			

53. What are the main reasons for preference?

……
……
……
……

54. On a scale of 1-5 how often do you purchase the following products in the market?

Tree products	**Frequency of patronage**

Baobab powder	
Baobab leaves	
Baobab seeds	
Baobab oil	
Baobab pulp	
Dawadawa	
Locust bean seeds	
Locust bean powder	

1= everyday 2= once a week 3= once a month 4= every market day 5= once a year 6= not at all

SECTION D: CONSUMPTION OF THE NATIVE TREE PRODUCTS.

55. Consumption of locust bean products per month

Locust bean products consumed	**Yes/ No**	**Qty(bowls)**	**Qty(Gh)**
Food			
Porridge			
Tea			
Spices			
Dawadawa			

Medicine			
Leaves			
Bark			

51. Consumption of baobab products per month

Baobab products consumed	**Yes/ No**	**Qty(bowls)**	**Qty(Gh)**
Food			
Ice cream			
Drink			
Oil			
Oil (consumption)			
Oil (non-consumption)			
Spices			
Seeds			
Medicine			
Leaves			
Bark			
Ornaments			
Ornaments			

56. How many years have you been consuming baobab products?

……

……

57. How many years have you been consuming locust bean products?

……

…….

58. How has your consumption of locust bean products been for the past 2years? 1. Increased consumption 2. Decreased consumption 3. Stable consumption.

59. How has your consumption of baobab products been for the past 2 years? 1. Increased consumption 2. Decreased consumption 3. Stable consumption

SECTION E: ANALYSIS OF THE STRENGTHS, THREATS OF THE WEAKNESS, AND OPPORTUNITIES FOR FOR NATIVE TREE PRODUCTS IN THE RURAL AND URBAN MARKETS.

Checklist for group discussions

Region ----------

District ----------

CommunityName ----------

Name of group ----------

Date ----------

ACQUISITION AND MARKETING OF NATIVE TREES PRODUCTS

Ask separately for baobab and locust beans or you do not need the details?

1. Do you harvest native tree products at a fee or for free?
2. If at a fee how much?
3. For free why?
4. The population of sellers of the products in the community?

5. Which category of people are engaged in selling native tree products?
6. Which places (markets) do collectors sell the products?
7. To whom do collectors sell the native tree products?
8. Do you process the tree products on your own before selling?
9. Who normally purchases (value chain actors/channels) the native tree products?
10. Which of the native tree products are more profitable and why?
11. How much do you earn out of selling native tree products? Per what quantity?
12. Which of the native tree products do people mostly consume in the community? Why?
13. Do consumers prefer native trees? If yes/no why?
14. What knowledge do consumers have on the nutritional components of native tree products?
15. What do consumers mostly like about the tree products?
16. What do they dislike about the tree products?
17. What do they mostly consider in purchasing tree products?
18. Do you think something should be done to improve baobab products? 1. Yes 0. No
19. If yes/no why?
20. Do you think something should be done to improve locust bean products? 1. Yes 0. No
21. If yes/no why?
22. What do you think can affect the marketing of tree products?
23. What do you foresee to be a challenge for native tree products in five years to come?

NATIVE TREES ACCESSIBILITY

24. Are the native tree products accessible to everybody for collection in this community?
25. Where do you harvest/collect the native tree products?

26. Have native tree species decreased/increased for the past 10 years? Give reasons
27. Who is responsible for managing the native species in this community?
28. Has there been the planting of native tree species in the community? If yes, who are they?
29. How are the trees are doing?
30. Are there any taboos for harvesting or eating native tree products in the community?
31. Are there any bye-laws for protecting or preserving the native trees in the community?

SUPPORTS DERIVED FROM BEING A MEMBER OF A BAOBAB OR LOCUST BEAN TRADING GROUP

32. Do you have baobab and locust bean trading groups? Yes/No
33. Do you have access to credit?
34. If yes/no why?
35. How often do you have access to credit?
36. Do you have any savings and loans one can access in times of difficulty?
37. If yes, how is it managed?
38. How much do you contribute?
39. How long do you contribute before you will be allowed to take a loan?
40. Aside from saving are their other dues paid? If yes how much?
41. What are some of the benefits derived from being a member of the trading group?

STRENGTH

42. What makes native tree products unique?
43. Do people come from different regions to purchase tree products?
44. If yes, how often and why?
45. What are the main reasons for buying the NTPs

- Taste
- Flavor
- Income
- Benefits

- Price
- Others

WEAKNESS

46. Does scarcity of products affect purchases on the market?
47. Does the odor of the products prevent you from buying them sometimes?
48. Does poor storage facility which makes the products go bad influence your taste for the products?
49. Does the distance from your residence to where you can get the products to influence your choice of the products being consumed?
50. Is there awareness of the usefulness of the NFTs?

OPPORTUNITIES

51. What makes native tree products stand out in both the rural and urban markets?
52. What is the demand for tree products both in the rural and urban markets?
53. How can we improve on the poor packaging of the tree products?
54. How can we improve the bad smell of locust beans (dawadawa)?

THREATS

55. Does a decline/scarcity in the trees affect marketing?
56. Do you think locust bean products will decline on the market due to the presence of other supplementary products?
57. If yes, why?
58. How competitive are the tree products in the rural and urban markets?
59. Are there substitutes for these products?
60. What are these products?

SECTION F: CONSTRAINTS ASSOCIATED WITH THE AVAILABILITY AND ACCESSIBILITY OF THE LOCALLY PRODUCED TREE PRODUCTS IN THE RURAL AND URBAN MARKETS.

Using a Likert Scale of 1, 2, 3, and 4, indicate whether you 1=Strongly Agree, 2= Agree, 3=Neutral/not certain 43= Strongly Disagree 5= Disagree to the following statements.

60. Please tick where applicable

PROBLEMS WITH BAOBAB PRODUCT	**1**	**2**	**3**	**4**	**5**
Bad roads to urban centers or cities					
Scarcity of products					
High cost of products					
Low patronage of products					
Lack of modernized storage					
Adulteration of products					
Low shelf life of products					
Poor standardization of product					
Acquisition of products is mostly difficult					
Lack of certification					
Lack of training on NTP processing (value addition)					

61.

PROBLEMS WITH BAOBAB PRODUCT	**1**	**2**	**3**	**4**	**5**
Scarcity of tree					
Scarcity of products					

High cost of products					
Low patronage of products					
Lack of modernized storage					
Adulteration of products					
Low shelf life of products					
Inadequate knowledge of tree products