

# Beekeeping as a livelihood option for smallholder farmers in Yoni Bana Chiefdom, Tonkolili District



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## ABSTRACT

*Beekeeping is an important source of income in the Northern province of Sierra Leone. However, smallholder farmers' beekeeping practices were heavily influenced by the traditional system, and they sold their honey to local vendors at the local market.*

*According to the findings, beekeeping was a male-dominated activity, and livelihood assets such as social, human, natural, physical, and financial capital pushed farmers to diversify into beekeeping. Access to market information, available markets, equipment sources, knowledge of normal apiary management procedures, beekeeping expertise, and fodder availability all affected honey output. The key production and marketing constraints were discovered to be insufficient production knowledge and skills, pests and diseases, the predominance of informal marketing channels, and low product quality.*

*Lack of expertise in marketing and production are the main knowledge gaps that need to be filled. Additionally, farmers need to be educated on how to include beekeeping in agricultural production while still getting the best results. If beekeeping is to be utilized as a strategy to alleviate household poverty, development partners should concentrate on increasing beekeeping production and commercialization.*

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## LIST OF ABBREVIATIONS

SEP	Strategic Entrepreneurship Programme
SL	Sierra Leone
SLF	Sustainable Livelihood Framework
SLIEPA	Sierra Leone Investment and Export Promotion Agency
FAO	Food and Agricultural Organisation
WFP	World Food Programme
SLPMC	Sierra Leone Produce Marketing Company
UNDP	United Nations Development Programme
KTBH	Kenya Top Bar Hive
NGOs	Non-governmental Organisations
SNV	Netherlands Development Organisation

# **CHAPTER ONE: INTRODUCTION AND BACKGROUND TO THE STUDY**

## **1.0 BACKGROUND INTRODUCTION**

Beekeeping is the management of honey bees for the production of honey, beeswax, and other bee products for both personal and commercial purposes. It comprises about 20,000 species, some of which live alone and others in groups. Honeybees may interbreed and hybridize with other species, which leads to their rapid global spread. Elsewhere there are bee species such as *Apis Dorsata*, *Apis Cerana*, *Apis Florae*, and *Apis Mellifera* (GBKA n.d.).

Due to its high nutritional value, besides its taste, honey is an attractive product for most people to consume. Honey is a high-calorie, high-nutritional-value food that contains sugar, protein, free amino acids, minerals, trace elements, enzymes, and vitamins. Fructose, glucose, and dextrose are taken straight into the bloodstream and supply energy to the body. Honey also contains trace levels of various antioxidant chemicals. These comprise substances such as chrysin, pinocembrin, vitamin C, catalase, and pinobanksin. Any honey's unique composition is determined by the flowers that the bees that make the honey can access. The honey can be mixed to get various types of honey, including poly floral honey, mono floral honey, or honeydew, depending on the floral sources. Honey's pH ranges from 3.2 and 4.5 (Bredbear 2009).

Honey is also an attractive product to most producers. Firstly, beekeeping is a non-polluting agricultural activity that does not need cultivated land. As a non-land-based activity, beekeeping does not compete for local resources (Adjare 1990). Secondly, beekeeping requires little capital and offers rapid returns. Through the process of pollination, this method of farming helps farmers to maintain food security by enhancing the yield of crops and other flowering plants. Honey bees contribute to 80 percent of agricultural pollination (Conarad 2007). Thirdly, for most suppliers, beekeeping functions as byproduct generation and value addition complementing beekeepers' income (Ashfaq 2006).

Beekeeping can be done by a wide range of people due to the before-mentioned advantages. Those factors make that beekeeping can be practiced by those who are not typical farmers and can be enjoyed as a hobby or social activity. It is an activity that can be conducted by men and women, people of all ages, and individuals with disabilities. Because of these unique traits, beekeeping provides employment options for a wide range of community people who use accessible natural assets to support their lives (UEBP, 2005). It is a lucrative industry that is not severely affected by drought and does not require a lot of technical knowledge, labor, and capital. Beekeeping is



therefore one of the best practices identified for improving the lives of poor agricultural communities (Bunde & Kibet 2013). Overall, beekeeping is an essential component of agriculture and rural development. At the home level, it offers a variety of rural people security in terms of nutrition, finances, and the environment.

Whereas honey is an attractive product to consume and produce, honey production is also good for nature. Bees are the only livestock capable of harvesting nectar and pollen without having to compete with other species. According to Lamessa (2007), bees feed on nectar and gather pollen from flowers, and then the nectar is transformed into honey by a variety of enzymes. In order to cover full and empty cells and create nests, gums and glue are gathered from plant secretions or wounded plant parts.

Unfortunately, today honeybees are overworked, plagued with parasites, exposed to chemicals, and poorly adapted to their working conditions. The production of honey by bee colonies is determined by the race of the bee species, the number of bee colonies, the kind and amount of bee flora plants, the region of the nation, and other environmental variables. In an ordinary year, a normal bee colony may produce 80 to 120 pounds of excess (harvestable) honey and 10 to 18 pounds of pollen (Lance 2003).

## 1.1 CONTEXTUAL BACKGROUND

According to Ellis (1988), communities in developing countries are more vulnerable to climate change impacts due to their high exposure to natural hazards, direct reliance on climate-sensitive resources such as plants, trees, animals, water, and land, and limited capacity to adapt to and cope with climate change impacts. In Sierra Leone, agriculture is the primary activity that employs the majority of rural residents for food production and income generation (rvo 2018). However, as a result of present uncertainties in rainfall patterns caused by global climate changes and poor land management techniques, agricultural yields have been decreasing over time, leaving many households with insufficient food or income to meet their basic household necessities (IFAD 2019) and hence lead to major shock due to their lack of ability to respond.

Tonkolili district is one of the four districts in the northern part of Sierra Leone with a population of 557,257 (Statistics Sierra Leone 2021). The area is known for its mango production, as well as several perennial and annual crops that supply honey flora throughout the year. Unfortunately, this district also has high incidence of drought, and high levels of poverty and food insecurity. The last three years, the region has seen erratic rainfall and drought, affecting crops and livestock, which are the main livelihood sources of residents. According to the poverty index data issued by the government of Sierra Leone and the United Nations Development Programme (UNDP) in 2019, 85.4

percent of households in Tonkolili district lived below the poverty line, and severely food insecure (WFP 2020).

### **1.1.1 Beekeeping in Sierra Leone**

This study about beekeeping will be conducted in Sierra Leone. Unfortunately, reliable data on beekeeping is lacking in Sierra Leone. In Sierra Leone, there has been no reliable data on the specific category (species) of honey bees – even the FAO bee project in Koinadugu has not captured this fine background in their annual activity reports, which is useful for setting the framework for further academic studies and assessments.

Little is known about consumers and suppliers as well. Yet, from other developing countries, lessons can be drawn. Khan and Khan (2018) found that for Pakistan, while people of all ages consume honey, children under the age of 12 and the elderly population over the age of 50 are mainly regarded as the target market for honey and honey products, due to its relatively high cost. Honey in Sierra Leone is mostly retailed for 1 USD or less a pint. Whereas honey bee production is attractive for commercial purposes, most farmers are more interested in other commercial activities due to the lack of knowledge and skills, resulting in relatively low production nation-wide. The study of Beyene and David (2007) in Ethiopia shows another consequence of lack of training: a significant portion of the beeswax produced in rural regions of Ethiopia is typically squandered because of a lack of knowledge about its market worth, costing both the individual beekeeper and the nation as a whole immeasurable advantage. A related challenge is the subpar quality of bee products. Besides the lack of training, most rural beekeepers lack resources for beekeeping, including financial resources to invest in beekeeping, product packaging, and market transportation, in order to increase their profits. These factors cause beekeepers to sell their wares locally for less money than they would in the domestic commercial marketplaces in order to meet their needs (Melaku et al. 2008).

There are no institutions or research facilities in Sierra Leone dedicated to maximizing beeswax production and commercialization. Njala University (SL), an agriculture university famous for its benne mix project, and The Agriculture Research Institute (Rokupr, SL), have done little or nothing in capturing bee production in the country development plan for food sufficiency. Unlike the FAO, the ministry of agriculture had not yet initiated programmes and strategies to maximize honey production, management and marketing. This is the same with other constituent bodies, including the Sierra Leone produce marketing board (SLPMC), Sierra Leone Import Export Produce Authority (SLIEPA), Chamber of Commerce and other local and international

agencies. All have not given due attention to the marketing research of bee products to generate information for stakeholders and policy actions.

## 1.2 PROBLEM STATEMENT

Climate change and unfavorable economic trends have affected the lives of smallholder farmers in the Yoni Bana Chiefdom, Tonkolili district. Drought and irregular rainfall have all contributed to crop failure and food insecurity. Farmers are forced to sell their assets such as land at very low prices as a coping strategy during the lean season thereby reducing their livelihood asset base.

SEP Investment Services (see [www.sep-sl.org](http://www.sep-sl.org)), the commissioner for this study, intends to undertake beekeeping as an intervention aimed at increasing income and overall well-being of small-holder farmers, but lacks knowledge of the factors that are important for beekeeping as one of the livelihood strategies in Yoni Bana chiefdom, Tonkolili District.

## 1.3 JUSTIFICATION OF THE STUDY FOR SEP INVESTMENT SERVICES

As mentioned before, 85.4 percent of households in Tonkolili district live below the poverty line (UNDP 2019). Due to recent occasions of drought and erratic rains livelihoods are further challenged through crop failure.

Beekeeping was identified by SEP Investment Services because it can be easily integrated with many other livelihood activities (Ashfaq 2006) which farmers in Yoni Bana Chiefdom are involved in currently. This is a livelihood strategy that has great potential to alleviate poverty since it can be undertaken with little capital, and training and can excel when there is drought.

SEP Investment Services, the commissioner for this study, is concerned with this recent development and is considering beekeeping as an intervention that could help to alleviate the food insecurity and poverty caused by climate shock (erratic rains and drought). Despite being a livelihood activity done in many parts of the northern province, beekeeping is not widely practiced in Yoni Bana Chiefdom, the location for the targeted intervention. In order to plan the intervention, the commissioner would like to understand the factors that are limiting small-holder farmers in Yoni Bana Chiefdom from undertaking beekeeping as a livelihood activity.

## 1.4 OBJECTIVE OF THE STUDY

The objective of this study is to understand the factors that are important for beekeeping as one of the livelihood strategies for smallholder farmers in Yoni Bana Chiefdom, Tonkolili District.

By understanding the factors, the intervention in beekeeping can be tailor-made for Yoni Bana Chiefdom, which in the end turns out in a better impact, both socially and economically. Therefore, with the findings of this study, the intervention is expected to be more sustainable.

## 1.5 RESEARCH QUESTIONS

### **Main Research Question**

What are the important factors for beekeeping as one of the livelihood strategies for smallholder farmers in Yoni Bana chiefdom, Tonkolili District?

### **Sub-questions**

- a. What are the important livelihood assets for beekeeping practice in Yoni Bana Chiefdom?
- b. What are the constraints and opportunities for beekeeping in Yoni Bana Chiefdom?
- c. How does vulnerability context affect smallholder farmers for beekeeping in Yoni Bana Chiefdom?

## 1.6 SCOPE OF THE STUDY

The scope of this study is to investigate the feasibility of beekeeping as a livelihood option for smallholder farmers in Yoni Bana Chiefdom, Tonkolili District. The scope will target seven villages underlining the operational areas of SEP Investment services.

## CHAPTER TWO: LITERATURE REVIEW

### 2.0 INTRODUCTION

This chapter will examine the relevant theoretical foundations on which this study is built. The Sustainable Livelihoods Framework (SLF) offers a comprehensive framework for understanding the complex multi-dimensionality of poverty. It is used in this study as a tool to identify the assets available and their impact on beekeeping for smallholder farmers and the factors that are important for beekeeping as one of the livelihood strategies in Yoni Bana Chiefdom, Tonkolili District. This analysis focuses on the vulnerability context and the various assets in SLF pentagon. Each of these will be described concisely because the presence or lack of these assets determines the level of vulnerability in the livelihood perspective.

### 2.1 SUSTAINABLE LIVELIHOOD FRAMEWORK (SLF)

The analyses and presentation of this work are based on the core principles of Sustainable Livelihoods Framework. SLF neither takes a bottom-up or top-down approach, but takes a holistic approach involving all levels. Chambers (1992) defines livelihoods as "capabilities, assets, and activities essential for one to make a living." Humans can live a long and healthy life if they can cope with and recover from stress and shocks. The livelihood of rural people is dependent on access to many forms of assets. The existing social, institutional, and organizational environment gives assets weight and worth (policies, institutions and processes). This setting has a significant impact on the livelihood alternatives accessible to people in pursuit of their desired beneficial livelihood result, such as increased well-being (Kollmair et al. 2002). In short, the SLF is about resilience of humans (in a certain vulnerability context), which is dependent on various assets, influenced by policies, institutions and processes, and giving certain livelihood outcomes (see Figure 1). These will be outlined below.

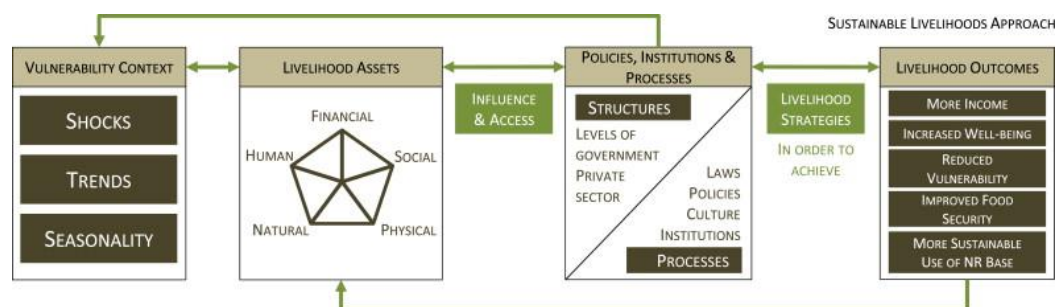


Figure 1 Sustainable Livelihood Framework (Science Direct n.d.)

### **2.1.1 Vulnerability Context**

Seasonality, trends, and shocks that impact people's livelihoods are referred to as the vulnerability context. One distinguishing feature of these dimensions is that they cannot be controlled by local people in the short and medium term (DFID 2000). Trends are made up of elements that are prone to change as well as those that will most likely continue on their current path. Vulnerability is determined by how a household's livelihood will be affected by a certain danger and its ability to deal with its consequences, or in other words their resilience (DFID 1999). There is a vulnerability state presently in Yoni Bana Chiefdom caused by drought and irregular rainfall which has contributed to crop failure and food insecurity. Farmers are forced to sell their assets such as land at very low prices as a coping strategy during the lean season. Vulnerability is a term that assesses the exposure and sensitivity of communities and families to future shocks (Chambers 1992). The degree of vulnerability is measured by their capacity to deal with hazards such as economic fluctuations, droughts, and crop failure. Finally, the asset base and livelihood methods adopted by households or communities determine whether and to what extent they are able to cope with shocks and trends (Huatala 2010).

### **2.1.2 Assets**

#### Natural Assets

The natural assets are the natural resources which people can use to provide in their livelihoods, including land, water and forests (Ellis 2000).

In the case of beekeeping, natural assets consist of bees, flowering plants, and water. The nectar and pollen from flowers are consumed by bees, and the nectar is eventually transformed into honey. Plants are harvested for their gums and resins, which serve as habitat for nesting sites. Bees are a natural resource that may be found in the wild.

They get honey ingredients anywhere they can, thus natural regions, wastelands, and even land-mined places have value for beekeeping. As a result, beekeeping as a livelihood resilience approach is feasible in dry environments. It is a good supplement to, but not a replacement for, other crops. Bees are the only livestock that can collect nectar and pollen without competing with other creatures (Lemessa 2007).

The most essential part of beekeeping is maintaining the continuity of natural capital through plant pollination. When bees visit flowers, they are not only gathering food for today, but also ensuring future generations of food plants through pollinator activities. According to Veronica (2011), beekeeping fits in nicely with many other livelihood activities and the natural resources that they rely on, such as forestry, agriculture, and conservation efforts. Pollination is the most economically significant value of

beekeeping, although being hard to measure. Flowering plants and the bees that pollinate them are mutually reliant. It is obvious that beekeeping contributes to the preservation of natural capital. While it has been a regular element of village agriculture across the world in the past, there is a need to guarantee that it is preserved as such.

### Human Assets

Human assets include human resources or resources attached to humans which enable them to provide in their livelihood, including skills, knowledge and good health (Ellis 2000).

As stated in the previous chapter, beekeeping does not require significant strength, and therefore various people from the community can participate. Yet, skills are relevant when it comes to beekeeping. Many communities have traditionally had strong beekeeping, honey production, and other skills. The Ethiopian case study found that women use beekeeping products to generate secondary goods. Women in various African nations manage their Tej (honey wine) sector (Belie 2009). Women frequently make and sell honey beer. This has introduced human capital into the community, and the greatest projects identify existing capabilities and build on them to ensure long-term sustainability and progress (Mathewos, Algaresh, & Gizaw 2004).

### Physical Assets

Physical assets are defined as the basic infrastructure required for people to provide in their livelihood, including tools and equipment used (Ellis 2000).

When it comes to beekeeping, people have beekeeping equipment such as hives. However, failing to have other types of capital to sustain the physical asset (beekeeping) would jeopardize the project's viability. Materials utilized in the beekeeping project must be created locally in order for it to prosper. This might also benefit local residents' livelihoods. The enterprise can encourage numerous societal sectors such as village traders, carpenters, tailors, container-makers, and sellers. One of the most helpful objects in beekeeping equipment is the modest plastic (Nicola 2004).

### Social Assets

Social assets include social resources which help people to provide for their livelihood, including relationships or membership in certain groups or corporations. Horizontal ties are relationships with people like yourself, whereas vertical ties are relationships with more powerful people, for example from the government (Ellis 2000).

Social networks and commercial integration are critical for the growth of beekeeping. The network enables beekeepers to assure bee safety, processing, and marketing

assistance. Access to higher level networks (vertical ties) enables the beekeepers and firms to create contact with national and international networks, obtain market information, and training sources, and raise knowledge of the trade and its opportunities (Bradbear 2009).

### Financial Assets

Financial assets are defined as the flow of money which is helping people to provide for their livelihood. This can be either in the form of savings or as loans (Ellis 2000).

Financial resource is critical for the development of a beekeeping enterprise. This would allow for successful product packaging and production. Credit is required for beekeeping societies to manage collecting centers, purchase goods from producers, and sell in bulk. Significant financial assets, on the other hand, are not required for subsistence beekeeping, however, having access to financial resources may be vital for a family. According to Mathewos et al. (2004), a good beekeeping project will try to guarantee that all accessible financial assets are considered without relying on those that are not. Too many initiatives, for example, have relied on the importation of the beeswax foundation used in frame hives, making this hard for beekeepers without financial resources.

## 2.2 LIVELIHOOD STRATEGIES/OPTIONS

According to Wamalwa, Ondieki-mwaura, and Ayuke (2018), livelihood strategies are a variety of activities, capitals, and access that all work together to determine the standard of living attained by rural families. Kassie (2017) defines livelihood activity as a way to make a living. Most households engage in a variety of livelihood strategies to ensure survival in the case of failure in one or more of them; this is a type of self-insurance.

According to Harman et al. (2015), rural households in developing countries often employ one of four types of livelihood strategies: on-farm or farm alone, off-farm combined with farm, non-farm combined with farm, or a mix of all four. The elements of rural livelihood are divided into three categories: on-farm or off-farm location, wage employment or self-employment, and sector. On average, rural households participate in three to four different activities. The main ones include often raising cattle, marketing, irregular labour, gathering firewood and charcoal, brewing, and processing gari. Farm alone operations include mostly crop and animal production; off-farm activities include firewood and charcoal burning, casual labor on the farm; and non-farm activities include beekeeping, brewing, gari processing, business, kiosk, and hotel employment, mining activities, mason and carpenter work.



Forest resources are vital assets on which the majority of people rely for a living. Some people utilize it for subsistence purposes such as firewood, charcoal, and food, while others use it for lumber, medicine, beekeeping, or animal grazing. According to the literature, as much as 20-25 percent of rural people derive their income from natural capital, and impoverished households often engage in more low-return natural or environmental resources and frequently fail to accumulate capital from that (Vedeld et al. 2004).

According to Clauss, B. (1983), beekeeping is a different form of income-generating activity that can raise the standard of living in rural communities. It is an essential component of agriculture and rural development. At the home level, it offers rural people security in terms of nutrition, finances, and the environment. It is an additional activity that generates revenue. As a non-farm activity, this one does not compete for local resources. Through a number of resources, it benefits human life FAO (1990). In Sierra Leone, honey is used as food, medicine, and an income source in farming households.

There is growing recognition that the rural economy is more diverse than just agriculture or farming (Csaki and Lerman 1996). The number of rural families has grown beyond what agriculture farming can sustainably offer for them (Artemyan n.d.). Families who rely on subsistence farming are now constrained by unstable living conditions and exposed to risky scenarios, forcing them to become risk managers. Because of this, rural households look for many non-farm sources of income and sustenance (Litsegrd and Billquist 2008). In terms of the number of individuals or rural families in Sub-Saharan Africa who depend on non-farm sources of income, it is found that over 30% of the population derives some of their income from those sources (Ellis, Ellis and Frank 2000). According to a research conducted in Honduras, due to the extreme weather unpredictability, non-farm or off-farm activities may become the most prominent adaptation options for agricultural operations. Despite the fact that rural households are turning to off-farm and no-farm activities to meet their needs, financial gaps limit their participation, whereas educated and wealthier households take advantage of the opportunity of their human and physical capital to participate more in these activities (Marrit van den Berg 2006).

The livelihood concept emphasizes tenacity in sustaining rural households' assets, especially capital assets, as a requirement for survival. Rural livelihoods in Sierra Leone, as in other poor nations, rely on five capitals for survival: natural, physical, human, social, and financial. All of these capitals are essential for a sustainable existence (Heffernan and Misturelli 2002). Rural household analysis is challenging since they engage in a variety of economic activities and so make their livelihood by integrating a web of activities and linkages. Households in rural regions diversify their livelihood activities to generate income and better cope with adverse agricultural conditions (Israr et al., 2014). Though rural families in third-world countries pursue a

diverse variety of livelihood activities, there is a widespread belief that various livelihood strategies exist to some extent among households (Wamalwa, Ondieki-mwaura and Ayuke 2018). A survey conducted in China by (Xu et al. 2015) indicated that natural assets, specifically land, have a negative connection with the household choice of livelihood strategy at the 1% level of significance. According to the data, the more land a household has, the more likely it is that it prefers only farming. According to the same report, skilled labor has a substantial favorable link with farming alone. It stated that skilled labor households will pursue non-farm activities rather than farming as a strategy.

## **2.3 PRODUCTION AND MARKETING OF HONEY IN SIERRA LEONE**

### **2.3.1 Style of beekeeping**

Many Sierra Leoneans practice a traditional technique of beekeeping that has been passed down through generations. Basically, there are two kinds of hives in Sierra Leone. The local cylindrical basket, log, and gourd) and the modern hive (Kenya Top Bar Hive (KTBH), Langstroth, cab hive).

#### **Traditional Beekeeping Method**

Traditional beekeeping is Sierra Leone's oldest and most popular practice. In practically every section of Sierra Leone, thousands of bee colonies are nurtured using the same old traditional beekeeping practices. There are two forms of beekeeping, according to Nuru (2001): forest beekeeping and backyard beekeeping. Forest beekeeping, which is popular in the country's north, involves hanging traditional hives on trees in the deep forest. In comparison, backyard beekeeping is less prevalent and has better management in other regions of the country. Various traditional beehives are typically used when doing traditional beekeeping. The cylindrical traditional hive is the most prevalent. The hive could only be opened from one end in the past, but more recent versions with detachable closures allow for opening from both ends. The most common types of traditional hives in Northern Sierra Leone are cylindrical-shaped hives prepared from canes and tree trunks. However, the type of hives varies from place to place in the country depending on the type of locally available material used to construct hives.

#### **Modern Beekeeping Method**

Modern beekeeping involves the use of mobile frame hives. It produces more honey than traditional hives. It has a significant advantage in producing high-quality honey in huge quantities. The modern hive is made of rectangular and square boxes of higher grade timber and is made up of bodies of hive, which are rectangular box hives stacked on top of one another in a layer. The number of box layers varies from season to season based on the amount of the bee colony population. The moveable frame hives

enable colony control and the employment of cutting-edge technologies. Despite the fact that modern hives produce great yields and high quality honey, they demand a substantial investment and expert labor. As a result, it is out of reach for smallholder farmers. In comparison to traditional hives, modern hives are exceedingly complicated and difficult to build, yet they are easily transportable (Mehari 2007).

**Cylindrical baskets:** According to the bee development journal (2011), the cylindrical baskets (local hive, see Picture 1) is out of raffia canes. By covering them with a thick layer of either cow dung or a clay and cow dung mixture, these baskets are transformed into bee hives. The basket is coated in a thick covering of dried grass and fastened with raffia rope after drying in the sun for three days. The cylindrical basket has two discs that are used to seal off either end. These discs are made by weaving raffia cane pith into two pieces. The disc has two holes drilled into it that act as entrances for the bee colony that is intended to live there. This type of hive is predominant in the North of Sierra Leone.

**The Kenya Top Bar Hive:** The KTBH was introduced in Sierra Leone by Bees Abroad as a project for farmers in Barri Chiefdom, Pujehun District (The British Bee Journal, 2020).

**The CAB Hive:** Like the KTBH, the CAB hive was also introduced by The Hive Group, a company from Kenya (see Picture 2).



*Picture 1 Cylindrical basket hive (local hive) hanging on a tree (FAO TECA 2011)*



Picture 2 CAB hive (The Hive Group 2018)

Table 1 Production capacities of different hives (SNV 2009)

Type of hive	Average prod. (kg/season)	Seasons/year	Optimal production/year	Variance
Traditional/Local	5.6	2	15	25%
Kenyan Top Bar	10	2	26	23%
Langstroth	14	2	60	53.3%

### 2.3.2 Placement of beehive

Raffia rope is used to secure the basket hive, which is suspended high in the branches of a large tree. Depending on how far the canopy spreads, one tree can support up to five colonies. In January and February, beekeepers put up their hives in order to capture the swarms of bees that are prevalent in the forests during that time of year. The farmers prepare for the honey harvest, or "pulling honey," in March and April, two to three months after the hives have been colonized.

### **2.3.3 Harvesting of honey ('Pull honey')**

For local hive beekeepers, the operation begins with lighting a torch of fire made with dry palm fronds or grass. One member of the gang climbs the tree armed with a cutlass and a long, strong rope. As quickly as possible, the grass cover of the hive is cut open to expose the inner basket cylinder. This is then slashed length-wise to expose all the combs. The fate of the few bees that are not killed is anybody's guess. Unlike local hive beekeeping, in which beekeepers descend on a bee's house (hive), burning the residents and collecting all the stores, the KTBH and Langstroth beekeepers enter by the back door, empty the store cupboard, and leave the family sleeping, which I believe the bees prefer (The British Journal 2020).

### **2.3.4 Processing of honey**

For native and KTBH beekeepers, this farm-level semi-processing is typical and included honey extraction from combs. The self-drip or double cooking pan are used in the process. Producers or honey bulking agents utilize simple tools like spoons to squeeze honey from the combs of modern KTBH and Langstroth hives. Nearly all beekeepers engage in some sort of semi-processing, with the exception of those who directly sell or give honey to their neighbors. However, this process is likely to degrade the quality of honey by introducing contaminants and foreign substances, treating it in an unclean manner, and using dishonest beekeepers.

### **2.3.5 Gender roles in Beekeeping**

According to research, beekeeping is mostly a male-dominated activity in the majority of African countries (Mujuni et al. 2012; Nel and Illgner 2013). In most African communities, males are the primary decision-makers (Angel-Urdinola and Wodon 2010). Women not only have lesser decision-making ability, but they have traditionally lacked ownership and control of important livelihood assets and have been denied educational and economic opportunities in comparison to their male counterparts (Malhotra and Schuler 2005). Because of gender disparities and inequality, development programs affect male and female beneficiaries differently (Mburu et al. 2017).

Furthermore, women frequently face cultural and societal barriers that prohibit them from engaging in and benefiting from development projects such as beekeeping. Some of these limitations include a lack of time, a fear of bee stings, and the difficulty to lift and gather from traditional beehives (Chemurot 2011). Women's poor engagement in beekeeping has been ascribed to their fear of bees as well as home responsibilities, which renders women's time unsuitable for beekeeping (Boahen et al 2016). However, research indicates that the status of women's non-involvement in beekeeping is



changing, with women increasingly taking up beekeeping as an income-generating activity (Macoloo et al. 2013). Knowledge how beekeeping might improve women's livelihoods requires an understanding of the consequences for their livelihood security.

Gender roles in beekeeping differ from one country to another. This is because different countries have different cultural practices and beliefs that impact the roles allocated to men and women who do beekeeping, either directly or indirectly. In Sierra Leone, according to the bee development journal (2011), women are forbidden to climb trees and therefore cannot mount hives (traditional) or harvest honey. Their role includes processing and marketing of the honey while the males are responsible for waving or carving the hives, mounting, feeding the bees, maintaining the hives, and harvesting the honey.

### **2.3.6 Marketing**

Honey is used as food and a source of income in Northern Sierra Leone. Honey production makes up around 50% of the entire family cash income of small-scale beekeeper farmers, according to Shenkute et al. (2012). Middlemen traders in nearby markets are their main customers. As usual, the price of honey rises in other months of the year and falls during the primary harvesting season in April. Despite the numerous benefits that honey may offer the local beekeepers, the producers are still dealing with a number of obstacles that might possibly hinder the production of honey and the financial support it provides for their livelihoods. According to Chagwiza (2014), some of the difficulties that producers face includes the low price of honey, limited access to credit, a lack of support, private traders who cheat on weight and price, a lack of capital for an organization to buy all of our honey, transportation issues, a lack of buyers, and the inability to receive timely information.

### **Transportation**

While some honey is purchased directly from beekeepers at the farm gate by middlemen or bulking agents, other beekeepers transport honey from the farm to neighboring bulking centers, which are mostly made up of local shops. Motorbikes are the most popular mode of transportation.

## **2.4 CONSTRAINTS OF BEEKEEPING**

The significance of environmental, technological, commercial, and institutional constraints in beekeeping has been highlighted in existing research. According to Qaiser et al (2013), the main ecological or environmental, and biological limitations of beekeeping are inadequate bee feed, a lack of space for expansion, chemical poisoning, predators, pests, diseases, and colony death. Honey bees are not an

exception and are attacked by pests, predators, and parasites, as have other organisms, who are prone to infestation and attack from natural enemies. These typically result in defaulting and poor output (Ritter and Akwatanakul, 2006). Pests are easy to deal with since they are quickly spotted, have immediate impacts, and beekeepers are frequently familiar with their treatments. According to Mahaman and Harizan (2002), the principal pests of honeybees include toads, wasps, mice, braula, beetles, wax moth, ants, birds, lizards, and insect eating animals. Diseases, in addition to pests and parasites, were a serious worry in beekeeping, particularly those affecting the brood since they quickly diminish the colony (Meixner, M.D, 2010). The most prevalent brood illnesses are American foul brood, European foul brood, chalkbrood, and sacbrood.

Lack of knowledge about effective management techniques for tropical bee races and species, a lack of qualified trainers and training opportunities, a lack of dissemination of new research information, particularly that relating to disease control, and inadequate beekeeping equipment were among the technical constraints (Bradbear, N. 2009). While insufficient production knowledge and abilities are the main technical barriers to beekeeping output (Namwata et al 2013). Most beekeepers lacked information about using modern hives and figuring out when to harvest (Kimaro et al 2013). Although advanced technology is not necessary for beekeeping in reality, capacity building is necessary to teach beekeepers about pertinent management methods. According to Illgner and Nel (1998) in South Africa, beekeepers' high levels of illiteracy frequently impede capacity growth. Additionally, illiterate beekeepers are unable to maintain accurate records for each colony, which are essential for managing apiaries properly.

Market inaccessibility, pricing volatility, and a lack of grading procedures were recognized as trade/marketing constraints on beekeeping in Ethiopia, denying beekeepers an incentive to produce high-quality goods (Ejigu et al 2009). Furthermore, the cost of bee goods fluctuated greatly depending on the goodwill of various purchasers. Marketing constraints include a lack of organized market channels, transportation issues, a lack of private sector engagement in market growth, and a lack of acceptable technology for processing and packaging bee products (Gichora et al 2001). In rural and distant locations, where recycled bottles of drinking water and whiskey were used as packing materials, a lack of adequate packaging materials was more prevalent (Hilmi et al 2012). For selling bee products in towns, cities, and export markets, these packing materials are inappropriate. Additionally, the quality, safety, and product presentation are all compromised by this type of packaging (Martha B, 2004).

Institutional barriers include weak producer associations, a lack of skilled staff and laboratories to support the business, and policy inconsistencies and disputes across many sectors within the Ministry of Agriculture and Forestry (MAFS). The absence of regulations to safeguard the sector, emphasize safety procedures, and provide enough

statistical data to inform planning and operations. The availability of this data would entice and reassure potential investors and direct the development of financially successful beekeeping initiatives and programs. Moreover, this would make it easier to extend loans to beekeepers, beekeeping equipment makers, processors, merchants, and retailers. Additionally, it was shown that progressive beekeepers' associations had institutional difficulties, such as group members' lack of commitment and difficulty sustaining partnerships with other agencies (Singh and Sekhon 2014).

Other difficult-to-classify beekeeping constraints were disputes among beekeepers and their neighbors, including beehive theft (Mujuni et al 2012). Beekeepers in certain locations had to hunt for secluded spots to house their bees since non-beekeepers shown a fear of bees and wouldn't allow beehives to be placed close to their crops. Few researches have been done in Sierra Leone, despite the fact that several studies have explored difficulties in the beekeeping industry. Additionally, the studies done in Sierra Leone were carried out in different areas beyond the focus of this thesis, had smaller sample numbers, and failed to classify the constraints. The goal of the current study was to clearly distinguish between the main production and marketing beekeeping constraints in the Yoni Bana Chiefdom.

## 2.5 ECONOMIC IMPORTANCE OF BEEKEEPING

Beekeeping provides several benefits for our nation's smallholder farmers. It has a significant role in enhancing beekeepers' well-being. For instance, it improves the socioeconomic standing of prosperous beekeepers in the region who perform subsistence agriculture. Beekeeping has a significant impact on developing nations' ability to supplement farmers' household income. This indicates that the family has enough food. According to Tessega (2009), the following are some additional benefits of beekeeping;

- Beekeeping may be practiced by smallholders and landless households. The hives take up relatively little space, and bees may collect nectar and pollen from anywhere in the environment, thus beekeeping can be done in both wild and cultivated settings.
- Bees are cosmopolitan in that they can adapt to a broad variety of environments. Beekeeping can be undertaken in lowland locations where livestock husbandry and agricultural production may be limited for a variety of reasons.
- Beekeeping may coexist with other agricultural activities as long as it does not compete for resources.
- Bees do not disrupt the natural balance in the same way as crop production and animal husbandry do.
- The initial and ongoing costs of beekeeping are relatively low, with little risk. Even with few resources, beekeeping is doable. Bees may be gathered in the



wild, the equipment can be created locally, and the experience can be tailored to the environment.

- Honeybees pollinate plants all around the world. This is a critical activity in the development of many crops and fruits. As a result, beekeeping is extremely essential in the agricultural sector.
- Beekeeping can be done by the entire family (men, women, and older children). This means that it aids in the efficient utilization of family labor.

## 2.6 DEFINITIONS OF KEY TERMS

**Small-holder farmers:** Smallholders are small-scale farmers, pastoralists, forest keepers, fishers who manage areas varying from less than one hectare to 10 hectares. Smallholders are characterized by family-focused motives such as favouring the stability of the farm household system, using mainly family labour for production and using part of the produce for family consumption (FAO 2012).

**Livelihood option/strategy:** Livelihood strategies are the combination of activities that people choose to undertake in order to achieve their livelihood goals. They include productive activities, investment strategies and reproductive choices. A major influence on people's choice of livelihood strategies is their access to assets and the policies, institutions and processes that affect their ability to use these assets in order to achieve positive livelihood outcomes (Alinovi, D'Errico, Mane & Romano 2010).

**Beekeeping:** Beekeeping is the management of honey bees for the production of honey, beeswax, and other bee products for both personal and commercial purpose. It comprises about 20,000 species, some of which live alone and others in groups (GBKA n.d.).

## 2.7 CONCEPTUAL DESIGN AND OPERATIONALIZATION

The operationalization of the livelihood concept is presented in Figure 2 below.

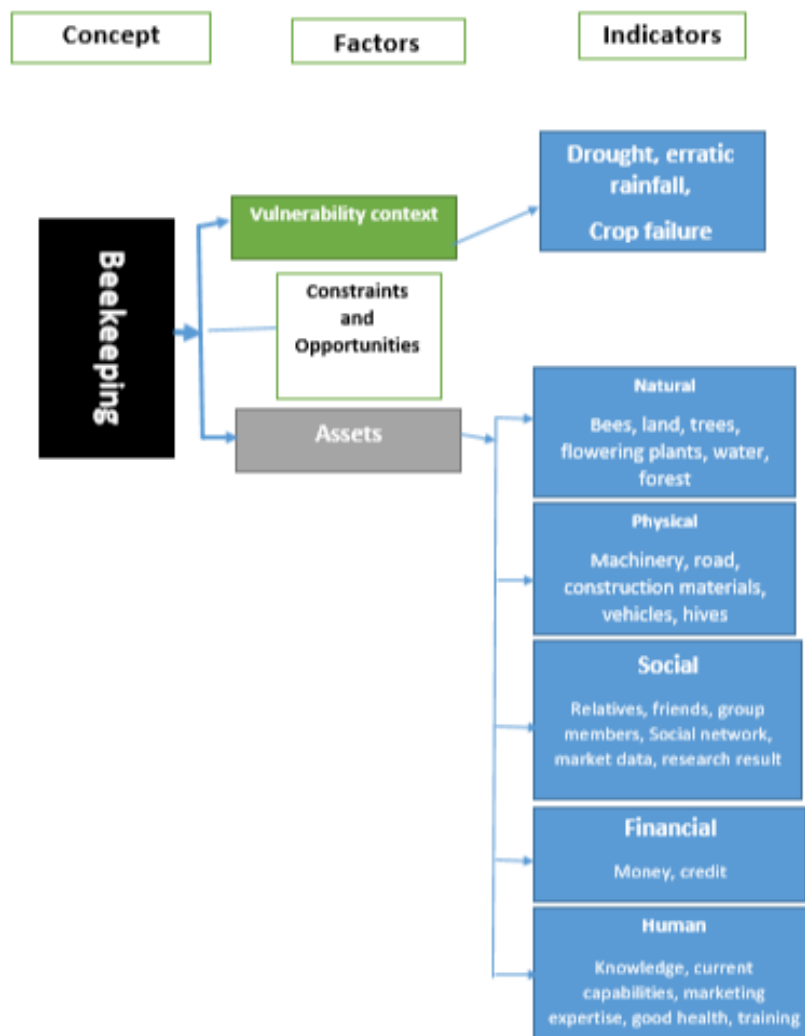


Figure 2 Operationalization of livelihood concept adapted from SLF (Author July 2022)

## CHAPTER THREE: METHODOLOGY

### 3.0 INTRODUCTION

The methodology for this study is provided in this chapter. The research design and strategy, sample method, sample size, research tools, data collection procedures, data analysis, and ethical issues will be examined.

### 3.1 THE STUDY LOCATION

This research was carried out mainly in Yoni Bana Chiefdom in the Tonkolili District in Northern Sierra Leone (see Figure 3). Yoni Bana Chiefdom is the largest chiefdom in Tonkolili District, consisting of twelve (12) sections and located along the Masiaka-Bo route. Hills may be found in several parts of the chiefdom, including Sebereh Hill, Magbosie Hill, and Rokimbi Hill. The district used to be covered with thick forest but because of farming, bio energy activities and bush slashing the forest has gradually overtaken by grassland (Sam & Zhiqiang 2018). The district experience two seasons, the rainy season lasting from April to October and the dry season from November to March. However, climate change has had a significant impact on the rains, causing the area to experience irregular rainfall. The rainy season is ideal for agricultural activities and the rearing of livestock. Tonkolili district's soils are primarily loamy and quite productive. They are ideal moisture-holding dark loams that have good drainage.

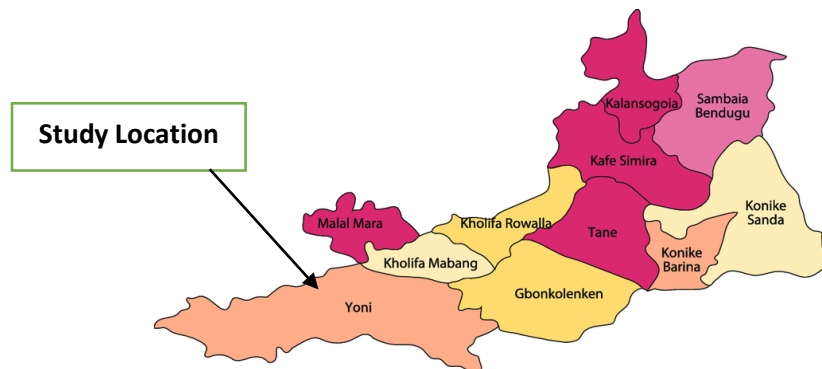


Figure 3 Map of Tonkolili District showing the eleven chiefdoms (Lakoh n.d.)

### 3.2 RESEARCH DESIGN AND STRATEGY

A case study was used as the primary research tool for this study. A unit of analysis is described through a case study. According to Baxter in Hay (2010, p 81), "case study research involves the examination of a single instance or limited number of instances of a phenomenon in order to examine in-depth nuances of the phenomenon as well as contextual impacts on and interpretations of that event A case study research approach was used to obtain a better understanding of beekeeping as a livelihood option for smallholder farmers in Yoni Bana Chiefdom, Tonkolili District. A case study researcher's

primary data sources are often interviews, focus group discussions, and documentary materials. The operationalization of the research is presented in Table 2 below.

*Table 2 Operationalization of research*

<b>Main research question</b>	<b>Sub-research questions</b>	<b>Source of information</b>	<b>Method of data collection</b>
<i>What are the important factors for beekeeping as one of the livelihood strategies for smallholder farmers in Yoni Bana Chiefdom, Tonkolili District?</i>	a. What are the important livelihood assets for beekeeping practice in Yoni Bana Chiefdom?	Farmers and Key informants	Semi-structured interviews and observations
	b. What are the constraints and opportunities for beekeeping in Yoni Bana Chiefdom?	Farmers and key informants	Semi-structured interviews
	c. How does vulnerability context affect smallholder farmers for beekeeping in Yoni Bana Chiefdom?	Farmers and Key informants	Semi-structured and observations

### 3.3 SAMPLING METHOD

Two sampling methods were used employed, Participants Purposive and stratified random sampling. Purposive sampling entails the researcher making a conscious selection about which individuals and sample size will assist in data collection (Agula et al. 2018). This approach was chosen because it is straightforward, practical, and allows for generalization based on the facts. Furthermore, it saves time, is cost-effective, and improves the reliability of the data collected (Denny and Weckesser, 2018). Purposive sampling was used for key informants because of their knowledge and role in the general livelihood situation in Yoni Bana Chiefdom. Stratified random sampling for selected respondents for semi-structured interviews to cater for equal representations of households. A total of 40 farmers and 3 key informants were interviewed for data collection.

### 3.4 DATA COLLECTION TECHNIQUES

The information was obtained from both primary and secondary sources. The primary data was gathered using self-designed semi-structured interviews (see Appendix 1), while the secondary data was gathered through a review of the available literature. The research assistant conducted interviews in the study setting.

Each respondent was interviewed for 30 minutes. The researcher also designed a semi-structured interview guide, which was utilized to collect data from the study's key informants. A key informant interview was conducted with the district Agriculture officer, a marketing officer from the Sierra Leone Produce Marketing Board and a forest officer from the Ministry of Agriculture. An interview conducted with the district Agriculture officer to obtain in-depth information about the livelihood assets available in Yoni Bana Chiefdom, the constraints (production) and opportunities for beekeeping, and the vulnerability context of farmers, while interviews were conducted to gather detailed information on the marketing constraints of beekeepers and assets that are important for beekeeping in Yoni Bana Chiefdom with marketing officer and forestry officer respectively.

The study also conducted semi-interviews with 40 smallholder farmers to understand the vulnerability context that affects them, their beekeeping knowledge, constraints and opportunities for beekeeping, and the assets available to them for beekeeping. With respondents' permission, audio recordings and photographs were collected during interviews.

While analyzing the data collected by the research assistant, the researcher noticed that a few of the semi-structured questions were either inadequately answered or not answered at all by some of the smallholder farmers, so the researcher had to request

the research assistant to do a follow-up interview which lasted for two days. During the field visits, an observation approach was also used to examine family members' assets (natural and physical) and livelihood activities.

### 3.5 DATA ANALYSIS

In order to create a clear description of a topic in the final stages of analysis, qualitative data must be organized in a way that helps the researcher formulate themes, refine concepts, and link them together. Qualitative data is a collection of fragments from interviews, reports of participant observations, and focus group discussions (Baarda & Law et al, 2014). According to Baarda (2014), the grounded theory approach is one that many qualitative researchers adopt. Following the five processes of grounded theory—fragmenting the data, relevance, open coding, axial coding, and selective coding—data analysis was dissected and organized. With the use of open code, the what, why, and how of the information acquired were answered.

### 3.6 ETHICAL CONSIDERATIONS

In this study, the research assistant obtained consent from the participants and made it clear that the identity of the smallholder farmers would be kept confidential. The research assistant went through the required processes to get permission and clearance from the village chiefs (see Picture 8 in Appendix 2) to conduct the research in the Yoni Bana Chiefdom. The research assistant enforced confidentiality and emphasized that the research was strictly academic in order to prevent respondents from viewing it as a prelude to government or donor aid programs.

### 3.7 LIMITATIONS TO THE STUDY

This study had certain challenges. These challenges included poor network/internet connectivity due to unprecedented rainfall this year and the illness of the research assistant in the field as a result of mosquito bites. Despite these obstacles, the researcher was nonetheless able to complete the task at hand. The network connectivity situation was addressed by the researcher and his assistant by staying up late at night when most of the internet subscribers had slept allowing a bit of stable connection, while the illness from the mosquito bites was addressed by admitting the patient (research assistant) in a nearby village clinic and booking a local guest house for the research assistant (see Picture 6 in Appendix 2).

## CHAPTER FOUR: RESULTS

### 4.0 INTRODUCTION

The findings of the study on beekeeping as a livelihood option for smallholder farmers in Yoni Bana Chiefdom, Tonkolili District, are presented in this chapter. It begins with information on the area's demographic statistics and answers to the research questions. The findings from semi-structured interviews are provided in the form of tables, graphs, quotes from farmer interviews, and field photographs.

### 4.1 SOCIO-DEMOGRAPH CHARASTERISTICS OF RESPONDENTS

A total of 40 semi-structured interviews with smallholder farmers in Yoni Bana Chiefdom were conducted. This was done to collect information on beekeeping as a source of livelihood for smallholder farmers in Yoni Bana Chiefdom. The response rate for semi-structured interviews by smallholder farmers was 100%. The socio-demographic data also includes the gender makeup of the respondents, their age, marital status, educational level and household size.

#### 4.1.1 Sex composition of respondents

The sex composition of respondents is presented in Figure 4. Males and females were evenly represented in the 40 semi-structured interviews conducted. Smallholder farmers interviewed in Yoni Bana Chiefdom engaging in beekeeping include 9 males and 3 females and non-beekeepers comprise of 11 males and 17 females.

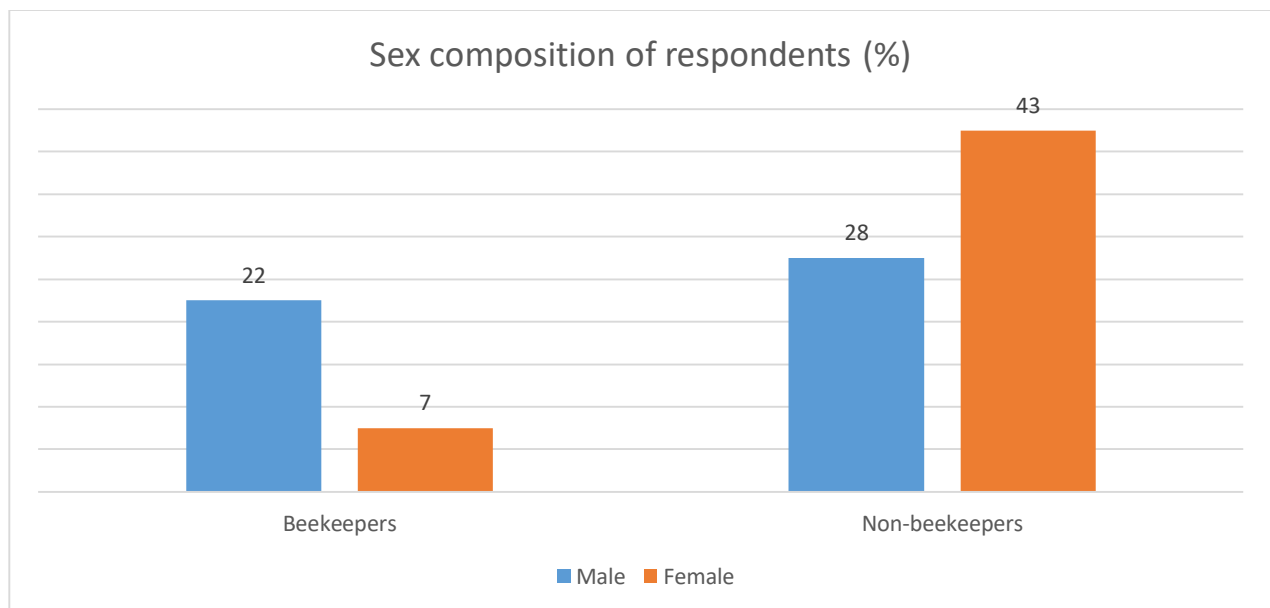


Figure 4 Sex composition of respondents for beekeepers and non-beekeepers (Author July 2022)

### 4.1.2 Age composition of respondents

The age composition of respondents is presented in Figure 5. Middle-aged farmers engaged in beekeeping aged (36-55 yrs.) made up 48% of the selected farmers, and because these farmers have families to support, they are completely engaged in beekeeping as an extra source of income to increase food availability and stability in their households. This is also due to the fact that beekeeping can be practiced side by side with other agricultural activities. The age group 56 yrs. and above accounted for 36% of the total beekeepers interviewed. These are the most vulnerable since they can no longer work in formal jobs due to their age therefore, they rely on honey production and other agricultural activities to survive, and the youths (18-35 years old) made up 16% of beekeepers, the low number of youth beekeepers may be attributed to youth migration to urban cities for white-collar jobs. While 42% of the non-beekeepers are made up of the youths (18 - 35yrs) who are engaged in farming and other income-generating activities such as commercial bike riding and mining. 35% of the non-beekeepers were middle-aged (36 – 55yrs.) and 23% of the aged (56+yrs).

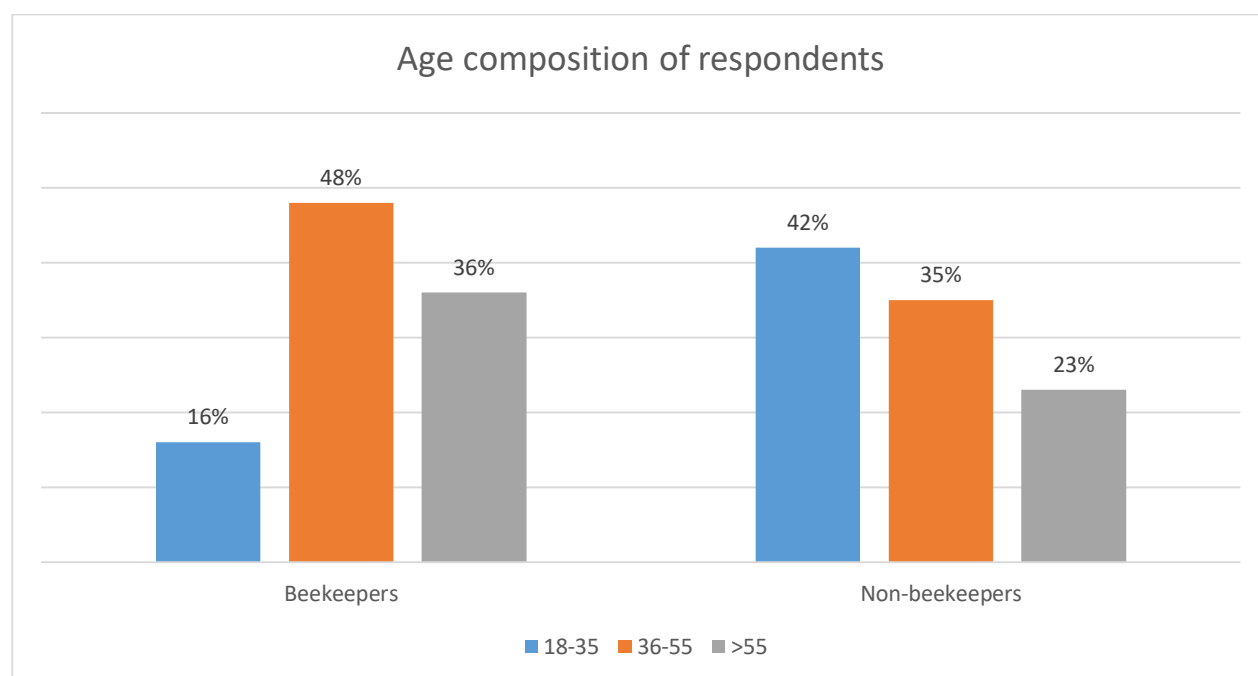


Figure 5 Age composition of respondents for beekeepers and non-beekeepers (Author July 2022)

### 4.1.3 Marital status of respondents

The respondents' marital status is presented in Figure 6. The majority of respondents from the semi-structured interviews—75% (n=30)—were married, which help them in feeding their families adequately since either one of them could take advantage of the fact that they were both nominally working. 5% of the respondents were widows and



20% singles. The results from the survey also shows that 65% of the married men had more than one wife. The multiple partner situation in the chiefdom is due to the religion (Islam) predominantly practiced in the chiefdom and they belief that the more social capital the more income and prestige for the household. The rest of the married men had one wives. This was also attributed to the religious faith and income, and education of the respondents.

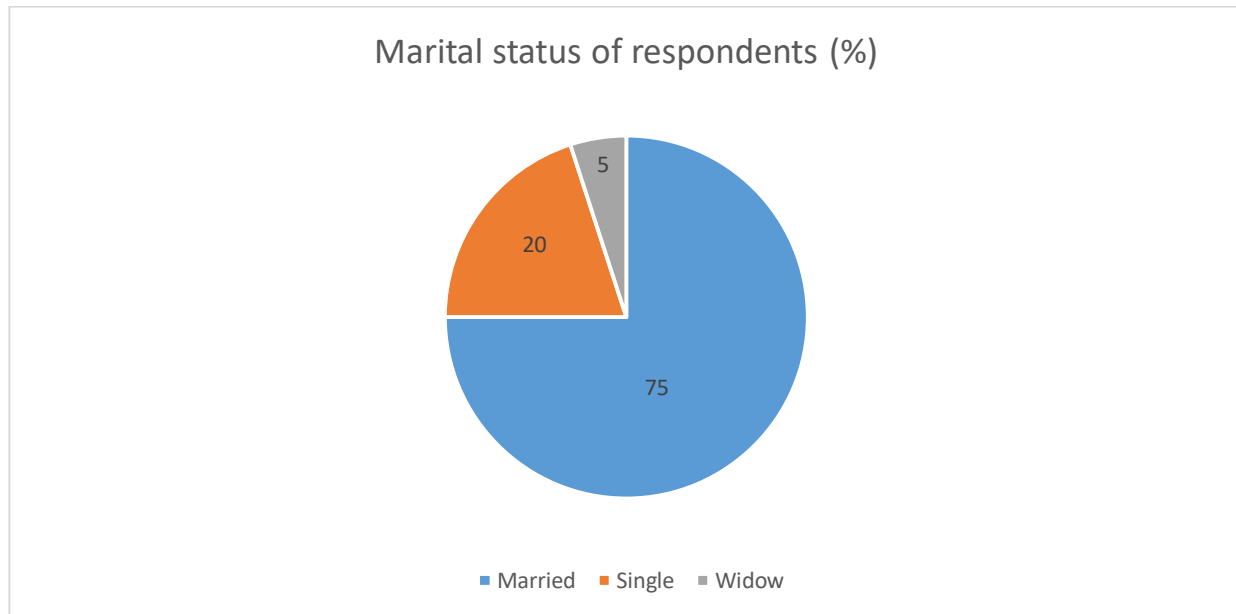


Figure 6 Marital status of respondents (Author July 2022)

#### 4.1.4 Household size of respondents

Family size was a key consideration for the researcher, who recognized that as the household size grows, so do new options/strategies of livelihood, additional income, and the demand for more income and food. The respondents' household size is presented in Figure 7. Out of the 40 smallholder farmers interviewed in Yoni Bana Chiefdom, 55% (n=22) had a household size of 8-12 people, allowing them to have higher human and social capital. 32% (n=13) of the homes had between 2-5 individuals, while 13% (n=5) had more than 12 people. According to farmer interviews, their average family size is 9.6, and they have been able to maintain their families via different livelihood strategies.

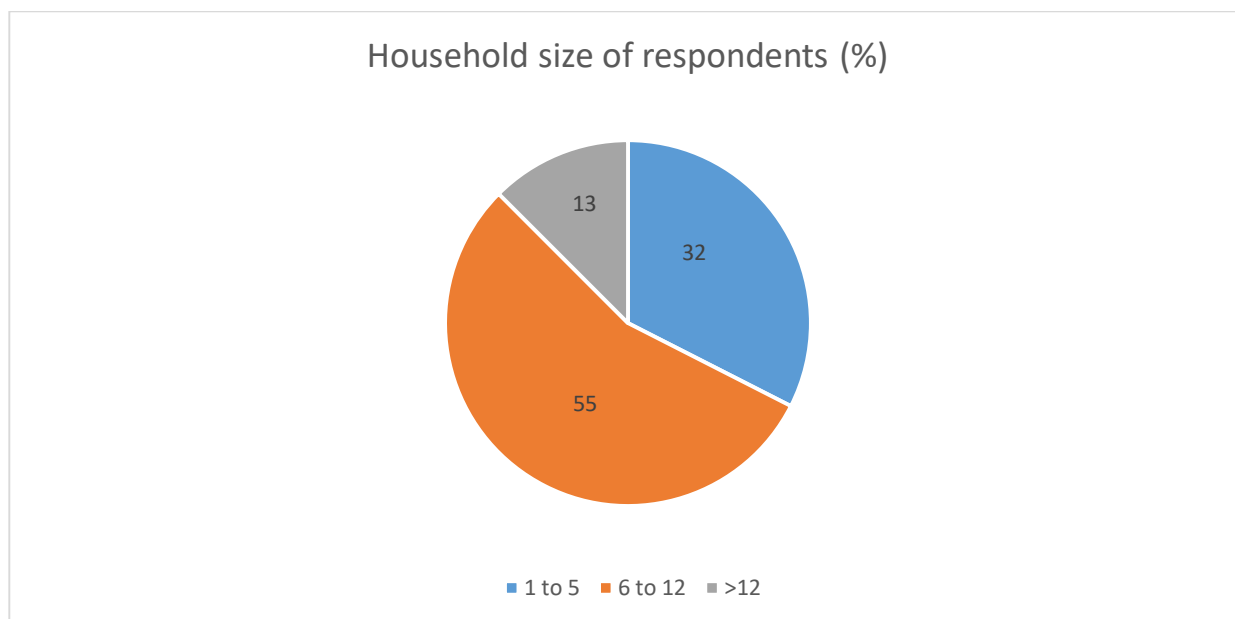


Figure 7 Household size of respondents (Author July 2022)

#### 4.1.5 Educational level of respondents

It is believed that the educational level of the family influences the adoption of livelihood options. The survey results for the education level of sample smallholder farmers are shown in Figure 8. (27%) of respondents attended primary school (class 1- 6), whereas 3 respondents (1%) attended secondary school education (JSS - SSS). The proportion of illiterate (those who never went to school) respondents was (72%). As a result, the majority of the selected household cannot read and write.

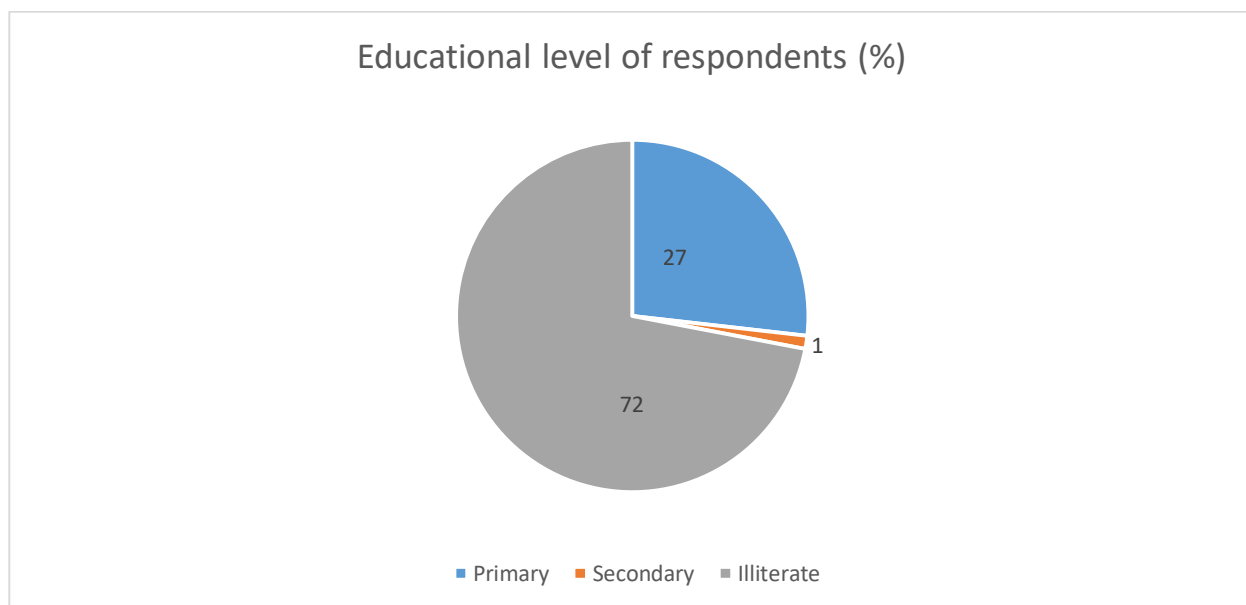


Figure 8 Educational level of respondents (Author July 2022)

#### 4.1.6 Main source of livelihood of respondents

The main source of livelihood of respondents is presented in Figure 9. According to the data gathered during the survey, farming (crop production) accounted for 70% (n=28) of the sample's respondents' primary source of income, while 13% (n=5 of the beekeepers) listed beekeeping as their primary source of income, 2% (n=1) said they worked in offices, 10% (n=4) said they ride commercial bikes, and the remaining 5% (n=2) said their primary source of income was unknown. This makes it clear that crop production—rather than other agricultural practices—is the primary source of subsistence in the Yoni Bana Chiefdom.

*“Most of us that live in this chiefdom are farmers, either in cash crops such as oil palm, cocoa, cashew nuts or food crops like rice, cassava and sorghum. Apart from being a rice and cassava farmer myself, I am also into commercial bike riding from which I pay school fees for my five kids and take care of other expenses in the family.” (R 10)*

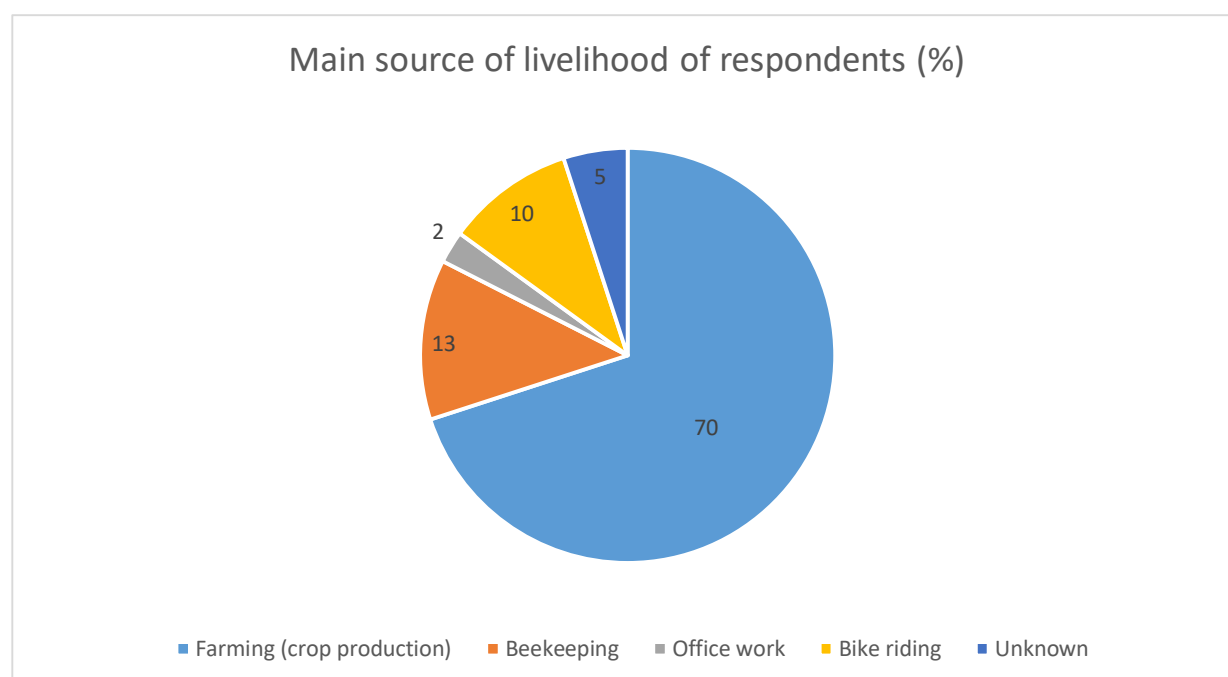


Figure 9 Main source of livelihood of respondents (Author July 2022)

## 4.2 ECONOMIC CONTRIBUTIONS OF BEEKEEPING TO BEEKEEPERS IN YONI BANA CHIEFDOM

### 4.2.1 Income from bee products

About 47% of the honey produced was utilized for both sale and home use, while 37% was produced entirely for sale and just 16% was produced solely for home consumption. This can be seen in Figure 10. The major bee products obtained by beekeepers in the region were honey (95%), beeswax (2%), and propolis (3%). Farmers that gathered beeswax either sold it as pure wax (1% or 0.2% of total) or mixed it with honey to make comb honey (65% or 1.3% of total), while others discarded it (34% or 0.7% of total). The share of bee products obtained is presented in Figure 11.

Despite honey having the modest market price, the majority of beekeepers (95%) focused on producing it as their primary bee product. Honey, the primary hive product, made up 96.7% of the overall income from bee products, while beeswax made up 2% and propolis made up 1.3%. Generally speaking, beekeeping made up just 10% of the annual household income of respondents.

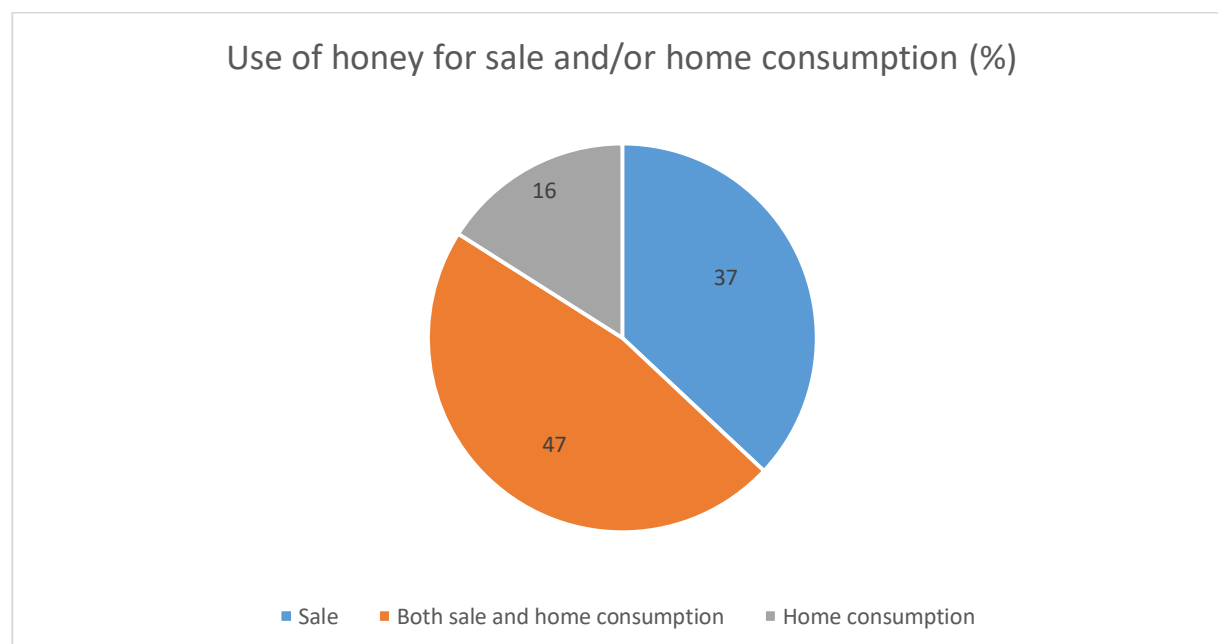


Figure 10 Use of honey for sale and/or home consumption (Author July 2022)

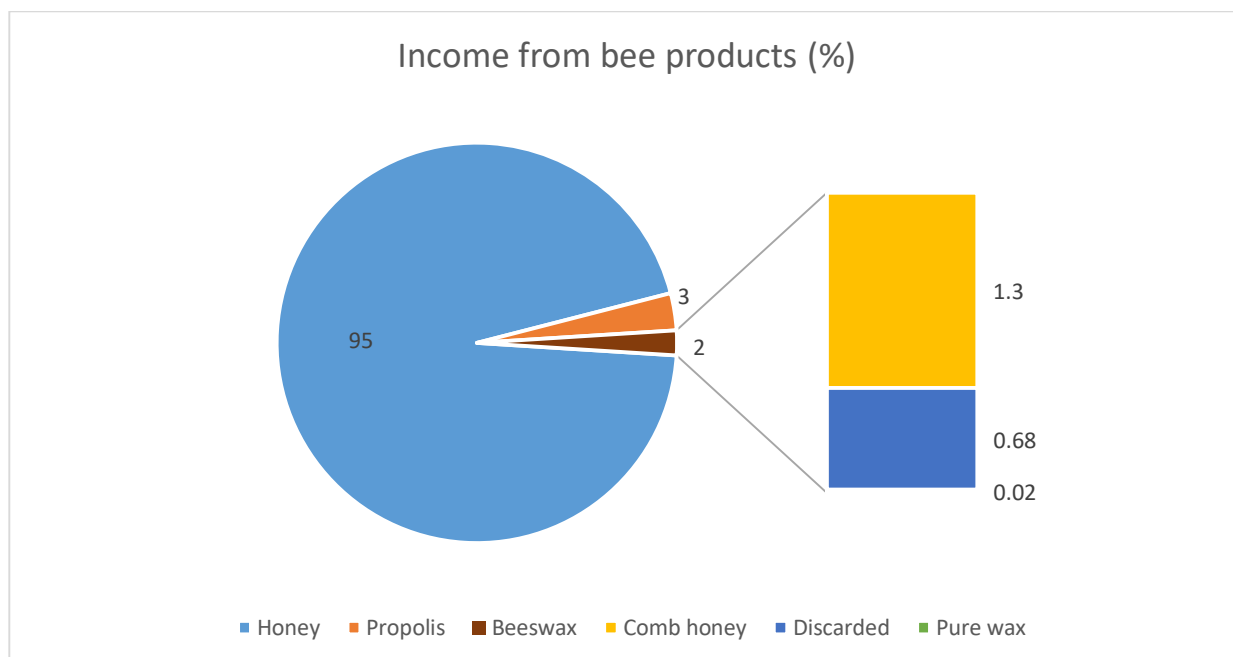


Figure 11 Income from bee products with beeswax specified (Author July 2022)

#### 4.2.2 Equipment used by beekeepers in Yoni Bana chiefdom

As illustrated in Table 2 beekeepers possessed a range of equipment used in the production and processing of honey. Beehives were the major producing equipment. Beekeepers sampled generally owned around 15 hives. The survey's findings show that sampled smallholder beekeeper uses a modern hive (frame hive) and a traditional hive known as 'gbonkan' in Temne (The local language in the area).

The most prevalent type of beehives owned were log hives (36%) and cane basket hives (55%). The other hive type utilized by beekeepers was Langstroth hives (18%). Traditional beehives included cane basket hives, log hives (see Picture 3), and Langstroth beehives (modern beehive, see Picture 4). The majority of beekeepers also had including pot, spoon, bucket, 5-gallon jerry can, and large bowl which were used for production. Processing tools including honey strainers, airtight containers, and extractors were not visible among beekeepers. Beekeepers acquired their beekeeping equipment from a diverse range of sources, including their own purchases, co-funding, local production, and donations from NGOs and businesses that supported beekeeping in the region (Table 3). In this study, it was discovered that no equipment had been purchased on credit. Donations, personal purchases, and self-production were the main sources.

Table 3 Types of hive used in Yoni Bana Chiefdom

Type of hives		No. of respondents	%
Traditional hive	Log	4	36%
	Cane	6	55%
Modern hive	Langstroth	2	18%



Picture 3 Log hive (Field data July 2022)

The findings on beekeeping tools showed that traditional beehives, which were mostly made locally by beekeepers, dominated beekeeping in the research area. Additionally, it was discovered that only a small number of beekeepers had processing equipment and those that did primarily got it through gifts and own purchase.



Picture 4 Langstroth hive

Table 4 Sources of beekeeping equipment (Author July 2022)

Sources	Frequency	Percentage
Donation	9	82%
Purchase	11	100%
Self-production	7	64%



### 4.2.3 Knowledge and skills of beekeepers

This is the number of years that the sampled respondents were involved in beekeeping. It can be seen in Figure 12 below that the majority, 7 out of 11 respondents (beekeepers) had more than ten years of beekeeping experience. According to the information collected from the majority of respondents, their forefathers practiced beekeeping. As a result, beekeeping has been practiced in the region for a long time. Only 2 out of 11 respondents had 6 to 10 years of experience, with the remainder having less than 6 years.

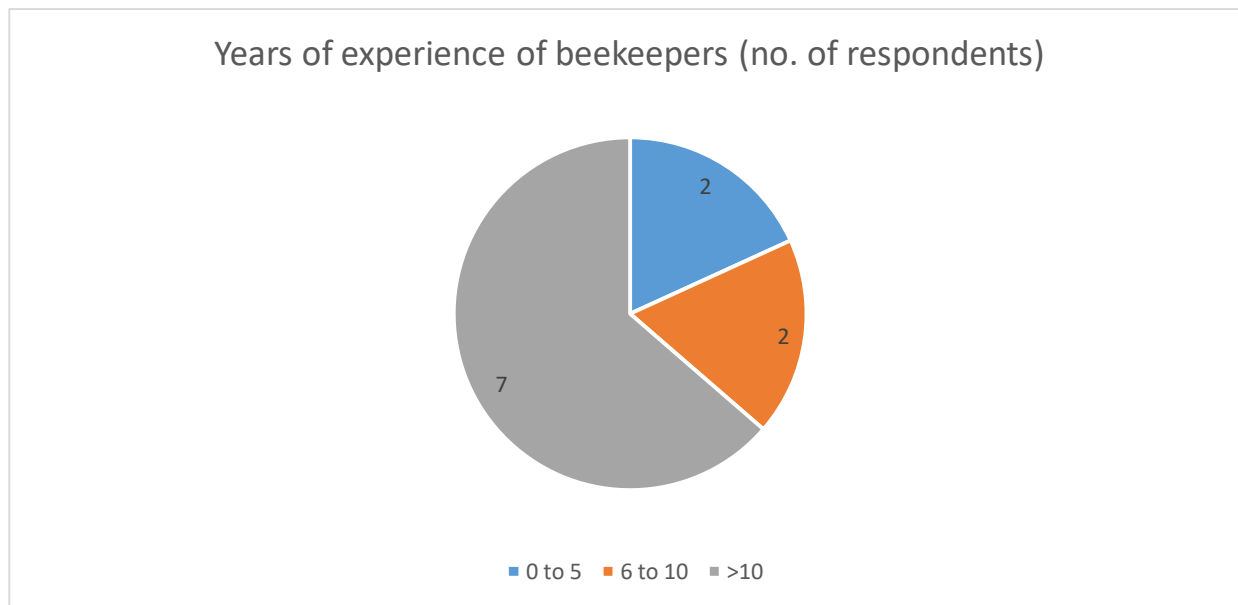


Figure 12 Years of experience of beekeepers (Author July 2022)

The study found that beekeepers were knowledgeable about a variety of beekeeping activities, which is presented in Figure 13. These include hive sitting/hanging (mentioned by 73% of respondents), local beehive construction (61%), honey harvesting (52%), understanding the colony calendar (39%), feeding honey bees (33%), capturing swarms (27%), processing of other hive products (24%), pests and diseases control (20%), and inspection of beehives (12%). and multiplication of colonies and splitting (8%). With further practice and years of knowledge, one may process additional hive products like beeswax and propolis, feed honey bees, understand the colony calendar, catch swarms, gather honey, and build local hives.



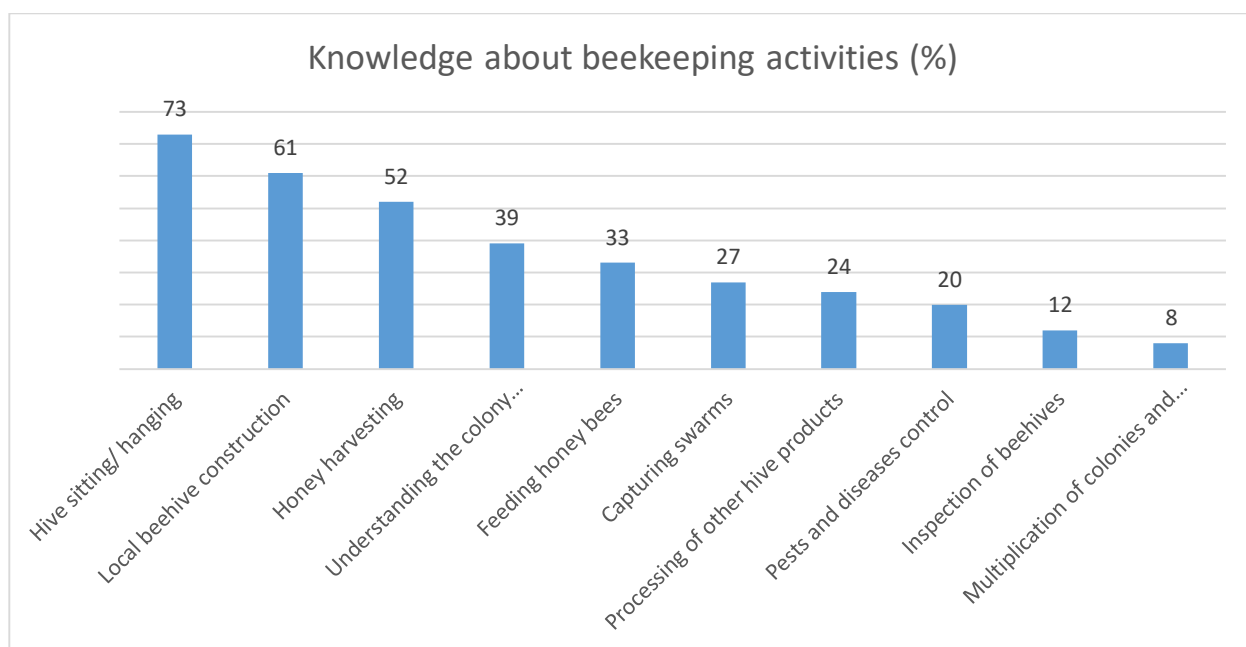


Figure 13 Knowledge about beekeeping activities (Author July 2022)

#### 4.2.4 Beekeepers' access to training opportunities

According to the survey report, both beekeepers and non-beekeepers had less training opportunities in Yoni Bana Chiefdom. NGOs and peer training were the primary sources of training services for beekeepers (Table 4). 5 of the 11 beekeepers learned beekeeping through their parents, 2 from their fellow beekeepers, and 4 from non-governmental organizations (NGOs) outside of the chiefdom. When compared to non-beekeepers, beekeepers used training services much more frequently.

Table 3 Beekeepers' training source

Source of training	No. of respondents
Parents	5
NGOs	4
Peer training	2

#### 4.2.5 Reasons for not keeping bees

The survey data shows that farmers were most motivated to beekeeping by the potential for high revenue from hive products, encouragement from fellow farmers, personal interest, and availability of beekeeping management knowledge. Non-beekeepers were discouraged from beekeeping due to a lack of knowledge about the venture (mentioned by 62% of respondents), fear of bees due to their defensive behavior (59%), a lack of capital to purchase equipment (31%), a lack of space (24%), a lack of interest (23%), a fear that the enterprise would not break even (16%), and a lack

of awareness about the market for hive products (15%). Non-beekeepers cited high projected revenue from hive products, availability to beekeeping management training, and access to finance as important motivators for keeping bees, however 9% expressed no interest in beekeeping at all.

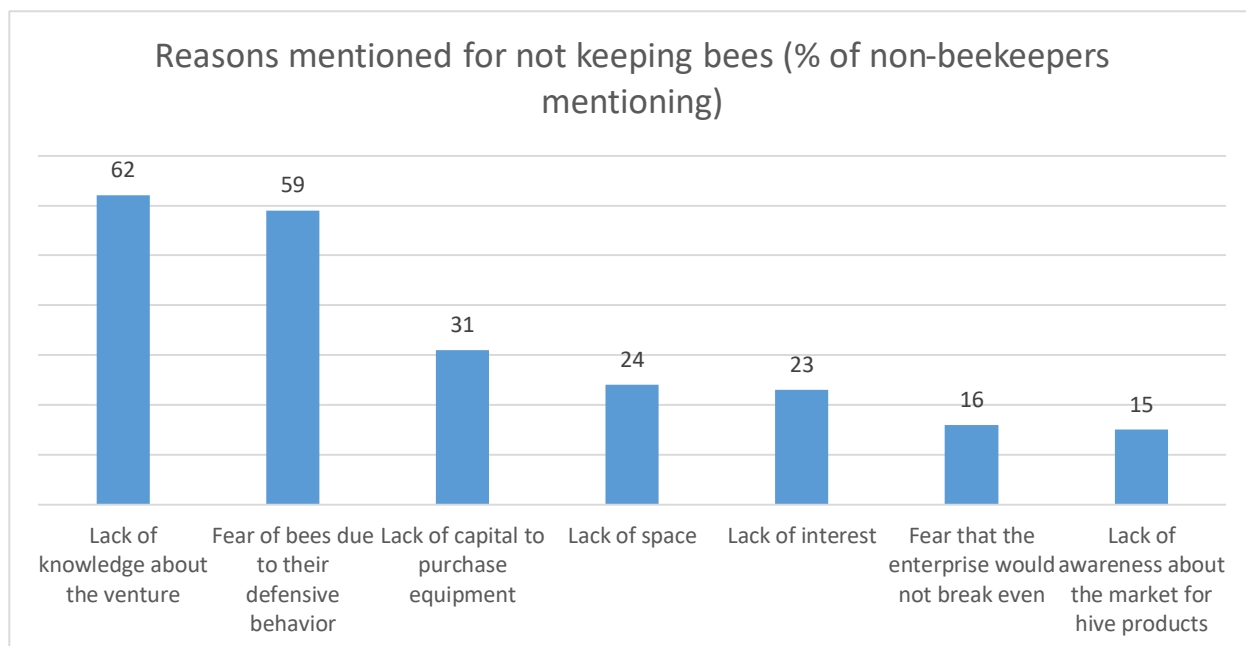


Figure 14 Reasons mentioned for not keeping bees (Author July 2022)

*“...if I have the right equipment and gears for harvesting I will engage in a large beekeeping enterprise but for I don’t have money to buy them” (R 2 Beekeeper).*

*“Maybe if they train me how to do it I will be interested...” (R 6 Non-beekeeper)*

## 4.3 CONSTRAINTS AND OPPORTUNITIES FOR BEEKEEPING IN YONI BANA CHIEFDOM

### 4.3.1 Challenges faced by beekeepers

The study found that production and marketing constraints have an impact on beekeepers. The main productivity obstacles highlighted included a lack of understanding about production techniques, pests and diseases, limited hive colonization, deforestation, seasonality, bush fires and theft. More over half of the beekeepers cited these (Figure 15). A handful of the beekeepers cited the additional marketing constraints.

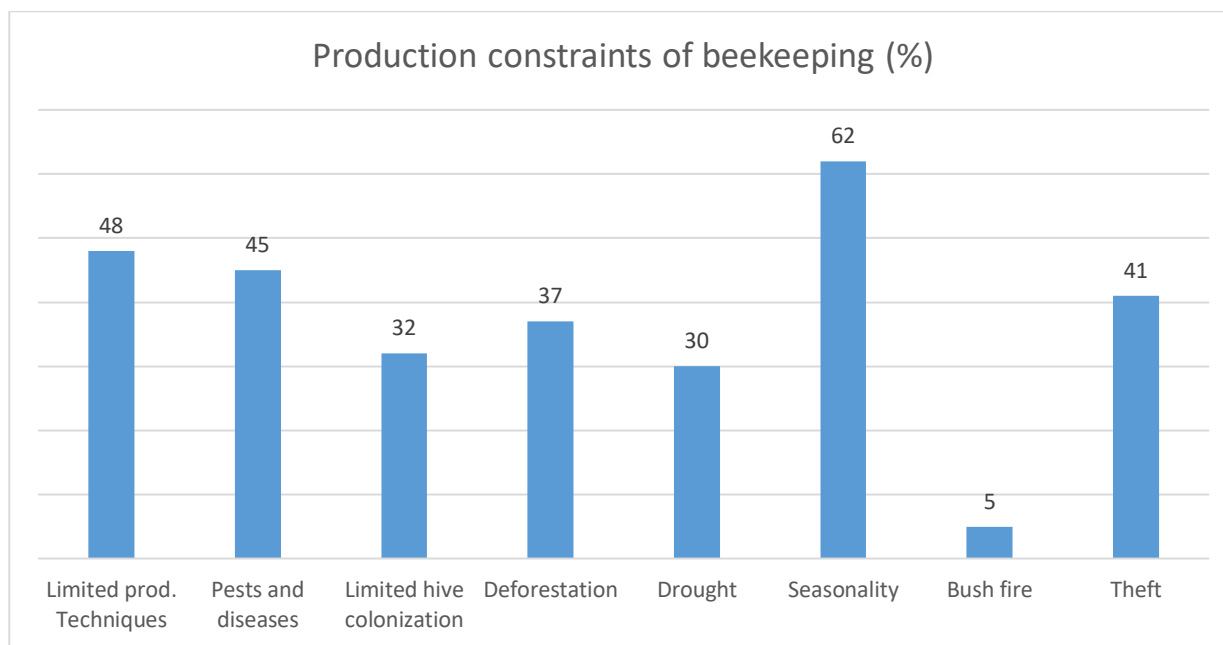


Figure 15 Production constraints of beekeeping (Author July 2022)

Meanwhile, the main marketing constraints were low honey product quality, being cheated by middlemen, long distances to markets, bad roads, and a lack of adequate packaging materials (Figure 16). Other marketing problems were cheap prices, a limited market, little demand for hive products such as beeswax and propolis, and items being destroyed during delivery to the market.

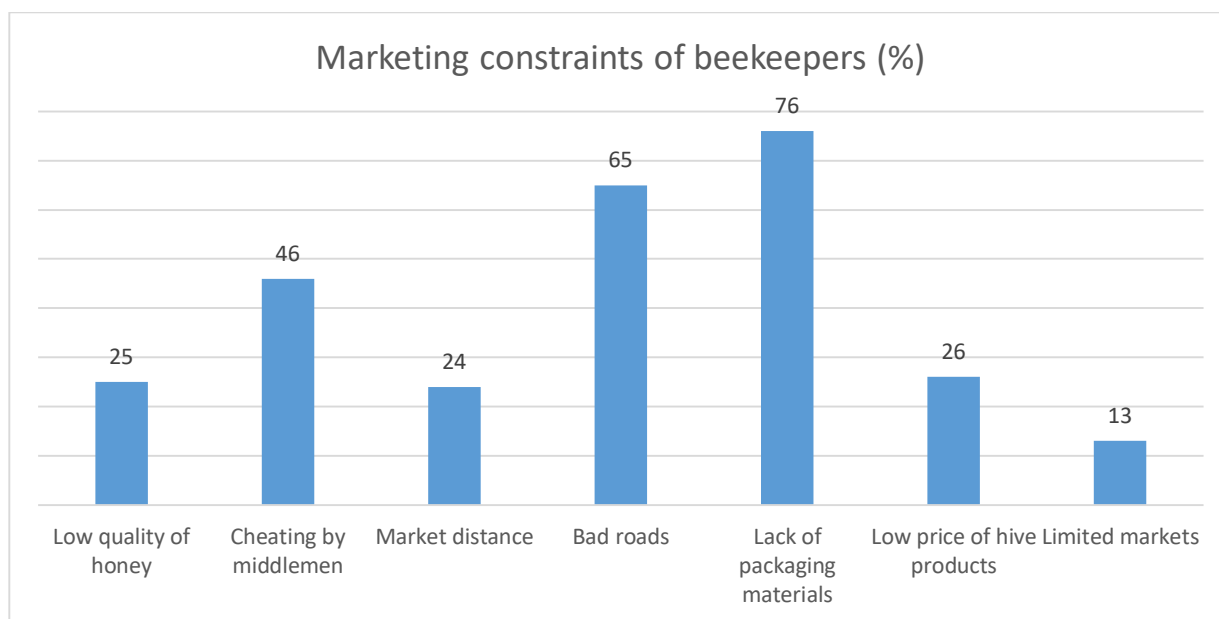


Figure 16 Marketing constraints of beekeepers (Author July 2022)

### **4.3.2 Opportunities for beekeeping in Tonkolili District**

Respondents from the survey highlighted the opportunities for beekeeping in the chiefdom below;

#### **Favorable Climatic Condition**

Tonkolili district has a favorable climate that is beneficial to beekeeping and pleasant environmental conditions. Large natural forests with a variety of tree species and bee floras, as well as flowing rivers that provide food for numerous bee colonies, are tremendous advantages for the local beekeeping industry. Another enabling aspect that improves beekeeping in the region is the simple availability of local resources for building hives and the availability of indigenous expertise and experience.

#### **Market Demand for honey**

Because of the organic character of the honey produced in Yoni Bana Chiefdom in general and Tonkolili area in particular, it is in great demand both inside and outside of the country. As beekeeping is another source of income for smallholder beekeepers in the district, market accessibility is critical in order to sell their products conveniently and meet their demands at any time. The existence of various agro businesses or processing companies operating in the beekeeping sector, the emergence of new beekeeping groups active in the production and sale of bee products, and the availability of a wide range of honey market actors in the district improved the accessibility of a market for honey produced by smallholders.

#### **Support from non-governmental organizations**

The availability of several nonprofit groups that give beekeeping support is another fantastic possibility that has a significant impact on the growth of the district's beekeeping industry. They help the industry in a variety of ways, including providing inputs such as modern production and processing materials, as well as capacity building through training farmers in modern beekeeping practices or techniques. They also play an important role in organizing smallholder beekeepers to maintain bees in groups in order to increase their bargaining power in the market and connect them to high-value markets.

## **4.4 BEEKEEPER'S PERCEPTION OF THE QUALITY OF HONEY IN YONI BANA CHIEFDOM**

According to data gathered during the survey regarding beekeepers' perceptions of the quality of their honey, 81% of sample respondents indicated that they were not intending to improve the quality of their honey, while 19% of the beekeepers in the

sample used various methods to do so, including a locally developed modern hive and using appropriate hygienic materials for honey harvesting and storage. This finding makes it clear that most local smallholder beekeepers in the study area are not knowledgeable on how to control the honey's quality.

#### 4.5 MARKET CHANNELS FOR HONEY

All of the beekeepers in the sample were selling their honey straight from the hive, unprocessed. The market channels used by beekeepers are shown in Figure 17. According to the survey's findings, 75% of the respondents sell their products to local vendors in the local market. Only 7% of them do business with exporters. Depending on the price they provide, the remaining respondents sell either to local vendors or to exporters. Additionally, it was discovered that males sell honey. Women's only function in beekeeping was to help the males process the honey and take care of the honey that was kept at home.

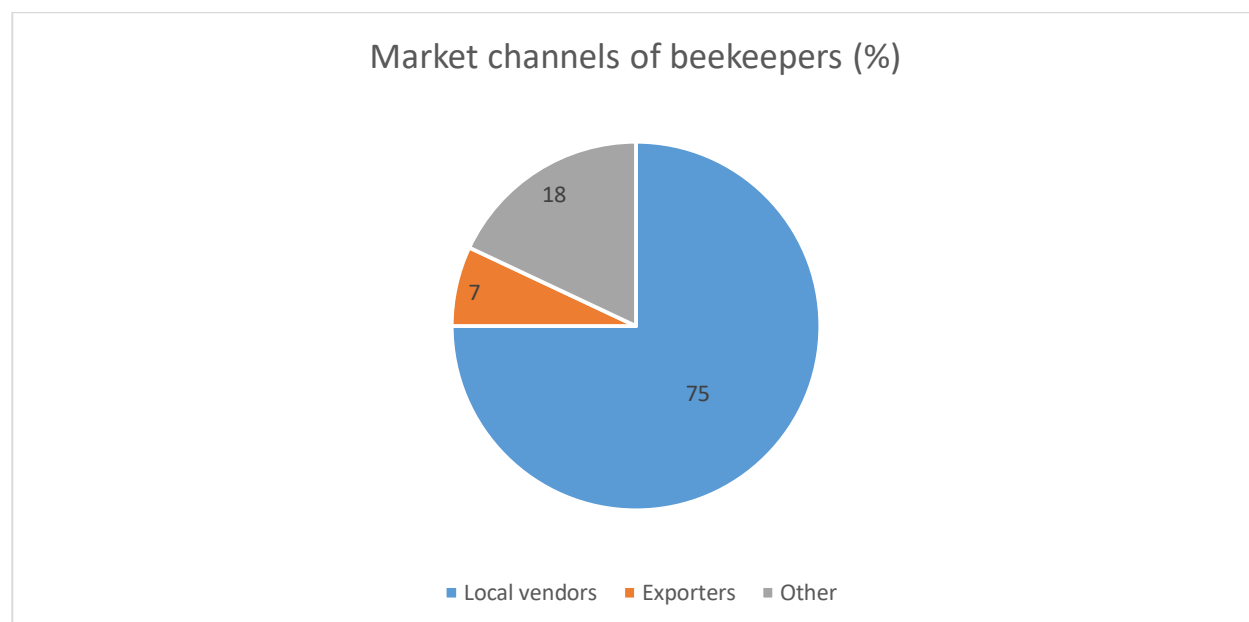


Figure 17 Market channels of beekeepers (Author July 2022)

#### 4.6 VULNERABILITY CONTEXTS AFFECTING SMALLHOLDER FARMERS FOR BEEKEEPING IN YONI BANA CHIEFDOM

Smallholder farmers in Yoni Bana chiefdom are vulnerable to various forms of shocks and stresses, including droughts, pests, and disease outbreaks, with the increase in food prices being the most recent shock in the last two seasons. The arguments mentioned by the respondents are presented in Figure 18. The increase in food prices due to the Covid-19 and Ukraine/Russia war has put a strain on households since most

of them largely depend on imported foodstuff, this has led to an increase in malnutrition in the chiefdom. According to the interviews, 80% of farmers have been affected by an increase in food prices in the last two years. 47% of farmers also reported experiencing post-harvest losses and theft. This adds to their food insecurity. Smallholder farmers in Yoni Bana Chiefdom face challenges due to trends they also face. Land pressure is increasing as a result of youth unemployment, as farmers are obliged to subdivide their land to accommodate their children and their families. This has put some constraints on beekeepers since the forests where they usually practice their trade had been cut down for farming.

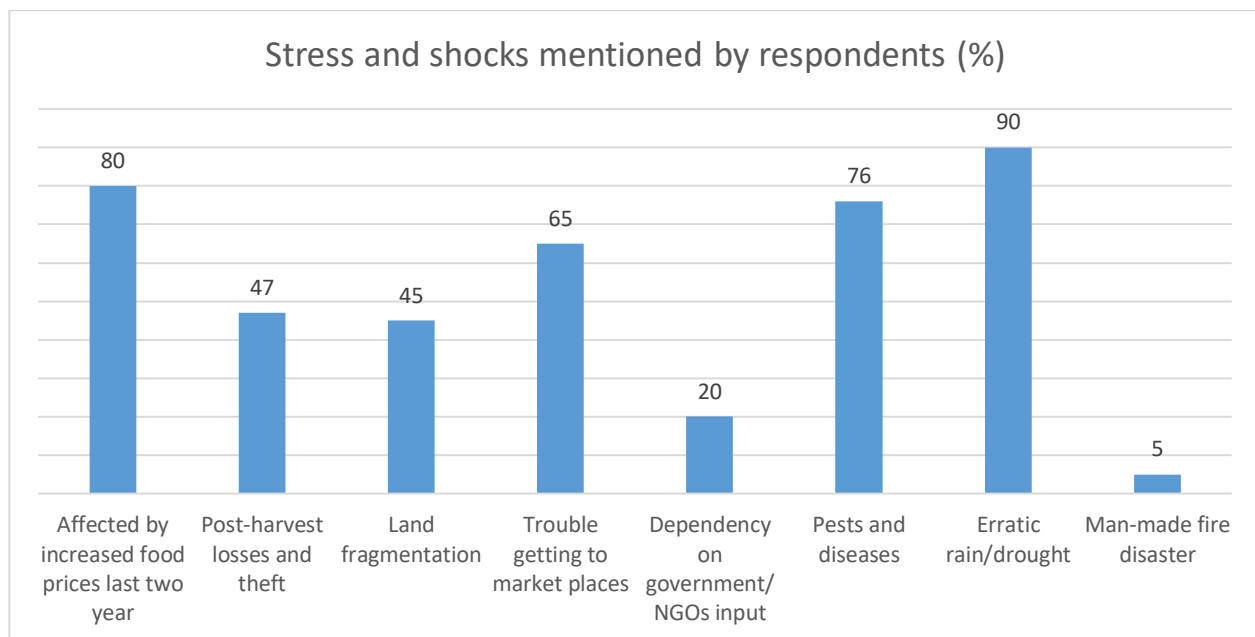


Figure 18 Stress and shocks mentioned by respondents (Author July 2022)

45% of farmers stated that their land had been subdivided, preventing the spread of various projects that might help them become more resilient. This puts further pressure on natural resources' ability to support livelihoods. Smallholder farmers in Yoni Bana Chiefdom claim to have access to land and water as natural assets, which they use to cultivate various crops. Poor road conditions, like in most rural communities around the country, Yoni Bana Chiefdom has limited access to marketplaces. Since 65% of farmers have trouble getting to marketplaces, they have turned to the cooperatives of farmers who have been successful in getting vehicles. 7% of farmers own physical assets like motorbikes, making them more resilient since they can transport their crops in bits whenever they are ready after harvest. Due to a lack of collateral protection, 20% of farmers said they heavily rely on the government and NGOs to supply inputs for every agricultural season. They also said they use group village savings ('Osusu') which aid them to undertake some projects. The country's present economic meltdown has

resulted in high-interest rates and a liquidity crunch. This has an impact on their capacity to hire personnel during harvesting. 90% of farmers stated that they have been witnessing erratic rain patterns during the last four years which limits them to carry out various agricultural activities in their seasonal cycle and 5% acknowledged that they have suffered losses on their farms in the past due to man-made disasters like bush fire.

#### 4.7 COPING STRATEGIES OF SMALLHOLDER FARMERS IN YONI BANA CHIEFDOM

The survey data revealed that apart from crop production, beekeeping, office work and commercial bike riding, respondents also engage in other economic activities as a source of living. The sample respondents' result shows that 82% of farmers utilize family savings from the sale of livestock, crops, honey and other income-generating activities as a coping strategy, which affects the sustainability of most agricultural activities and leads to stress since they will not be able to embark on or start up new projects. Despite the fact selling livestock for meagre sums will make them more vulnerable, 55% of respondents said they are still selling their livestock as a coping mechanism. Reduced agricultural productivity and the sustainability of more agricultural activities are increasingly being challenged by economic difficulties. 40% said they suffer from loans obtained from money lenders after borrowing to cover up difficulties or challenges they encounter.

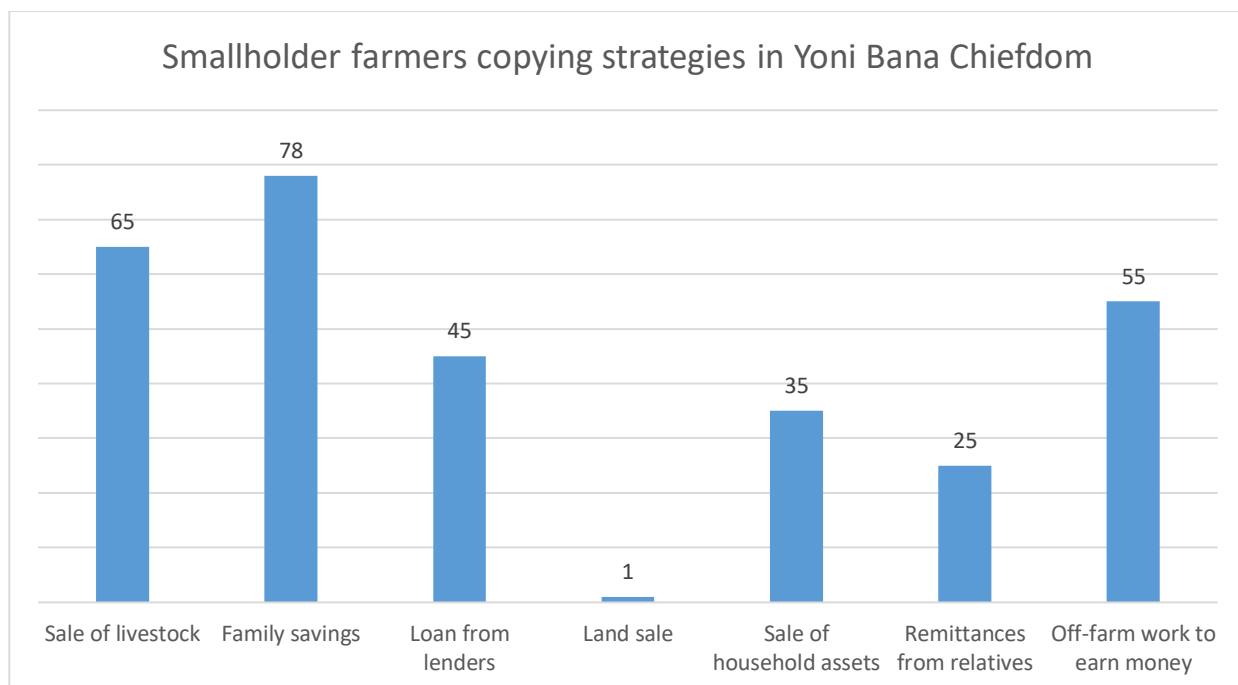


Figure 19 Smallholder farmers' coping strategies (Author July 2022)



Farmers emphasized that while employing coping mechanisms to lessen difficulties they still encountered difficulties. Figure 19 displays the proportion of respondents who are still experiencing stress by the coping mechanisms they use to manage difficulties.

#### 4.8 GENDER ROLES IN BEEKEEPING IN YONI BANA CHIEFDOM

Beekeepers in the Yoni Bana Chiefdom harvest honey from the combs in order to prepare their own honey. Simple instruments like spoons, double cooking pans, or self-drip are used in the procedure to extract honey from honeycombs. Women dominate this process to a considerable extent. In addition to pressing the honey, women are also active in its marketing and sales. The other areas like constructing the hives and hanging them on trees is perceived by women to be labour intensive and cultural reservations while harvesting is dangerous for the fear of being sting by bees, so these parts of the beekeeping process are male dominated. Furthermore, males were responsible for replacement and honey extraction, while females handled supplement feeding and grading/packing.

*Picture 5 Beekeeper standing with Research Assistant (Author July 2022)*





## **CHAPTER FIVE: DISCUSSION AND CONCLUSION**

### **5.1 VULNERABILITY CONTEXT AFFECTING SMALLHOLDER FARMERS FOR BEEKEEPING IN YONI BANA CHIEFDOM?**

The vulnerability setting has serious ramifications for the livelihood opportunities (Chambers 1992). The results of this survey shows that Yoni Bana smallholder farmers have been subjected to unforeseeable occurrences that have undermined and pushed households into poverty. Drought, the prevalence of pests and diseases, land pressure as a result of population growth, and price increases were among the factors. The findings also revealed that there were individual shocks that primarily affected individual households, such as deaths and sickness.

In general, livelihoods are sustainable when they can withstand shocks and stress, are independent of outside assistance, preserve the long-term productivity of natural resources, and do not restrict others' possibilities for livelihood (DFID, 1999). Farmers in the Yoni Bana area encounter a wide range of shocks (drought, erratic rains, theft, diseases and pests, man-made disasters, land fragmentation), which prevents them from expanding or starting a beekeeping business. Many farmers claimed that they wanted to start beekeeping but were unable to because they lacked funds to buy the necessary tools (31%), knowledge (62%), and fear of bees (59%). This is consistent with DFID 1999, which acknowledges that the vulnerability environment has a significant impact on people's livelihoods and asset availability. Smallholder farmers are under stress as a result of price increases triggered by the worldwide pandemic (Covid-19). Climate change can create both trends in the form of altering weather patterns and shocks in the form of an unpredictable rainy season or droughts. According to the farmers in Yoni Bana, the impacts of climate change were already visible, posing a challenge to alternative farming approaches.

### **5.2 CONSTRAINTS AND OPPORTUNITIES FOR BEEKEEPING IN YONI BANA CHIEFDOM**

Beekeepers faced a number of problems while attempting to maximize production. The findings agreed with Mujuni et al (2012), who identified the main production challenges as a lack of knowledge about production skills, as well as pests and diseases. The recent study also found that the main marketing obstacles were being cheated by middlemen, producing low-quality of bee products, and traveling long distances to access market. Middlemen's deception might be attributable to the sale of unprocessed products and a lack of adequate packaging materials. Value addition, which translates into higher pricing and the potential to leverage the export market, has been underutilized by beekeepers.

This was likely due to the fact that these beekeepers lacked processing equipment often. Because middlemen gave beekeepers cheap rates for their products, they were unable to produce high-quality products and were sometimes forced to travel for hours in quest of higher prices which was also in agreement with Ejigu's observation.

Despite the numerous challenges/constraints facing beekeepers in Yoni Bana Chiefdom, there are opportunities that favour the production such as favourable climatic conditions, forest reserves, water, and market for marketing of hive products.

### 5.3 IMPORTANT LIVELIHOOD ASSETS FOR BEEKEEPING PRACTICE IN YONI BANA CHIEFDOM

#### Human Capital

Adoption of beekeeping was impacted by human capital. The current study discovered that, when other factors were held constant, male farmers were more likely to undertake beekeeping than female farmers. Male dominance in beekeeping may be explained by a number of factors, including the need for women to help out around the house, the predominance of traditional hives, and aggressive bee behavior (Ogaba and Akongo 2001).

Furthermore, most Sierra Leonean cultures forbid women from climbing trees, which might be one of the reasons why women are underrepresented in beekeeping, particularly when traditional hives are employed. Additionally, women are less likely to get capacity building and have fewer access to skills and equipment. As a result, they lack the technical expertise and resources to adapt new technology, which may limit their ability to engage in activities like beekeeping, however, it was also discovered during this research that men who are engaged in beekeeping in Yoni Bana Chiefdom largely acquired the skill from their parents, co-beekeepers and other organisations.

#### Social Capital

Social capital is one of the key driver of beekeeping practices, this was to a great extent missing among beekeepers in the chiefdom as there were no association or group of beekeepers. However, the existing beekeepers had some support from NGOs, family members such as wives and children who help in the production and processing of honey.

#### Physical Capital

Adoption of beekeeping has a bad association with infrastructure, as indicated by the distance to the closest markets. Although it could be expected that farmers who lived close to markets would adopt more readily, this study discovered that, *ceteris paribus*,

the chance of adopting beekeeping rose with the increase in distance to the closest markets. This may be related to the protective behavior of bees, which limits the viability of beekeeping to secluded and isolated locations like as forests. The results of the survey also show that traditional equipment were mostly used as compared to modern beekeeping equipment which had constraints on the production capacity.

### Financial Capital

Financial capital is one of the strongest factors that enhance beekeeping, the expansion of the enterprise, and availability of equipment such as modern hives and processing tools are all tied to this. This was a challenge for most beekeepers in Yoni Bana Chiefdom as in many parts of developing countries. As a result of its lack thereof, many beekeepers in the chiefdom used traditional equipment for keeping bees leading to low production, also discourage a lot of non-beekeepers from venturing into the trade.

### Natural Capital

Yoni Bana Chiefdom is endowed with a lot of natural capital. It has a favorable climate that is beneficial to beekeeping and pleasant environmental conditions. Large natural forests and afforested areas (see Picture 7 in Appendix 2) with a variety of tree species and bee floras, as well as flowing rivers that provide food for numerous bee colonies, are tremendous advantages for the local beekeeping industry. Another enabling aspect that improves beekeeping in the region is the simple availability of local resources for building hives and the availability of indigenous expertise and experience.

## 5.4 CONCLUSIONS

The primary goal of this study was to understand the factors important to beekeeping as one of the smallholder farmers' livelihood strategies in Yoni Bana Chiefdom, Tonkolili District. In Yoni Bana chiefdom, information was gathered at random from 40 smallholder farmers (11 beekeepers and 29 non-beekeepers) and three key informants using a semi-structured interview guide. The sustainable livelihood framework was used to analyze the factors important to beekeeping.

According to study results, human, social, physical, natural, and financial capitals are the factors that support beekeeping as a livelihood in this setting, while social, financial, and human are the important assets needed for beekeeping in Yoni Bana Chiefdom according to the report. Other significant findings include the fact that beekeeping is mostly a male occupation practiced by the impoverished who live distant from marketplaces. They rely heavily on agricultural production for survival. Furthermore, the study result shows that beekeeping still contributes a relatively modest amount to beekeepers' typical family income. This is significantly less than its anticipated potential, which might be attributed to the underutilized potential of beeswax

and propolis production, marketing and production constraints, and the low amount of honey being produced by most producers. Even though the contribution looked little, it may still be helpful to beekeeping households because the practice was common in lower-income homes where every penny matters. This increased money can be utilized to purchase home goods, farming equipment, and children's school expenses.

Lack of processing equipment, cheating from middlemen, modest price of hive products, and poor market access are some of the constraints of beekeepers in the chiefdom, while favourable climate, water, forest, and market for bee products are some of the opportunities for beekeeping identified by respondents.

The survey also showed that the majority of beekeepers now sell their honey mostly to neighbors who pay them low prices. Although co-operatives and exporters offer higher prices, very few beekeepers trade with them, which prevents them from exploring collective marketing and broader market access.

This study has shown that the drawbacks of Yoni Bana smallholder farmers have stemmed from shocks and stresses they encountered such as droughts, erratic rainfall, pests and disease infestations, predation, and theft. However, smallholder farmers reacted differently to shocks and stresses to their livelihoods. Yoni Bana smallholder farmers tend to cope with shocks more successfully even though some would suffer from stress. Some of the coping strategies identified were, borrowing loans from relatives, selling household assets, livestock, and off-farm activities even though this substantially increases their workload. Yoni Bana smallholder farmers were found to be involved in various activities mainly as individuals.

## 5.5 RECOMMENDATIONS

Basically, these recommendations are determined by the result of the findings and the conclusion set out in the study. More importantly, the recommendation items will be used to design an intervention in beekeeping for Yoni Bana Chiefdom smallholder farmers, which is expected to better impact, both socially and economically. It is therefore recommended that SEP undertake the following based on the research results;

1. A study to understand why the majority of beekeepers have not capitalized on the production of beeswax and propolis.
2. Design an intervention that will encourage farmers to invest in the production of propolis and beeswax, which will provide extra income.
3. Organize farmers into cooperatives which might result in higher pricing for bee products. This will further encourage beekeepers to package properly bee products and increase their market access, particularly in the export market.

These measures will cause a shift from informal marketing channels for bee products, which are now quite popular to formal marketing channels.

4. Linking beekeepers to financial institutions to obtain financing would help them enhance their financial capability and enable them to transition from traditional hives to modern hives and acquire additional equipment.
5. Training, and sensitization initiatives to increase beekeepers' human capital for improved production. This should also target non-beekeepers to motivate them to undertake beekeeping as a livelihood option.
6. Design an intervention that will encourage crop farmers to integrate crop production with beekeeping.
7. Advocate on behalf of beekeepers for beekeeping to be captured into the Tonkolili District Development plan. Because, I found out that, apart from rice production, palm oil, groundnut, corn, honey production has not got the district attention, whereby players in the honey business can benefit from technical support like training, and provision of kits, which is seriously lacking.

## 5.6 REFLECTION AS A RESEARCHER

Research is an iterative process, and one may feel he has reached a conclusion. But it is back and forth process. Conducting this research was time-consuming and often exhausting. I would go for days without having a good night sleep while drafting my proposal, getting worked up most of the time. When I completed my proposal draft for submission to my supervisor, I thought I had given it all, but after receiving comments, I realized how many things I had ignored and how major they were for the success of my research. As a researcher, I learned to be patient and take my time with the feedback process, which may be rather exhausting and stressful at times. We discover our blind spots and problems through feedback. Not just during the research phase, but also during the whole Masters program, I learned a lot.

Data collection was quite a bit challenging because it was done through a research assistant remotely. There were times we would go days without communication because where the data was collected lacked mobile network coverage. This situation led to the omission of vital data which caused me additional financial resources to go back to the field to collect those vital data.

While conducting my thesis research remotely, I developed social and organizational skills such as teamwork and efficient communication, time management, managing sensitive material with confidentiality, and being impartial when presenting the opinions of study respondents. My knowledge of information and communication technologies has increased as a result of the thesis. Nevertheless, I did the bulk of my work online. The acquired skills are the most appropriate for the actual work. to collaborate with others through consultations while maintaining independence as per the Dublin descriptors.

I found it difficult during data analysis because I had never conducted qualitative research before. There was a lot of data I had that needed to be triangulated. It was difficult to leave certain facts you found intriguing but didn't meet the research questions, which made me recognize areas of additional investigation. I gained a better understanding of what beekeeping is, its difficulties, and its potential from the information I gathered. Since they knew the general response to all of the questions, it proved to be rather difficult to discard the answers.

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## **APPENDIX 1: SEMI-STRUCTURED INTERVIEW GUIDES**

The purpose of this survey is to document the socioeconomic characteristics of beekeeping and non-beekeeping households, as well as their perspectives, knowledge, and attitudes, toward beekeeping; investigate the present livelihood assets accessible; the limits and potential for beekeeping; the vulnerability setting, and their primary sources of income.

### **Consent**

My name is..... I am a research assistant and I am doing this interview for a Masters student studying Food Nutrition and Security at Van Hall Larenstein University in the Netherlands. I am requesting your participation in this research project on Beekeeping as a livelihood option for smallholder farmers in Yoni Bana Chieftdom, Tonkolili District by completing the semi-structured questions below which will take about 30 – 35 minutes. Please note that this interview will be electronically recorded. The data collected will be used solely for academic reasons and will be kept totally confidential. During the course of the interview, if you feel like not continuing the interview or responding to a certain question you are free to do so. Your assistance is much appreciated.

### **Interview Guides**

#### **Semi-structured Interview (guide) Checklist**

Name:

Sex:

Age:

Educational level:

Marital status:

#### **A. Farmers**

##### **Non-beekeepers**

How long have you been farming in this chieftdom?

What type of farming (oil palm, cassava, rice, fish, livestock) are you engaged in?

What other things do you do for a living?

Did you observe any changes in your crops and livestock over the past three years? What are those changes you observed? 3b. How do these changes affect your livelihood?

How do you get a living when you have a poor harvest or when your source(s) of living are affected?

Have you ever thought of keeping bees? If not, what are the reasons for not keeping bees? If yes, what would make you start beekeeping?

### **Beekeepers**

How long have you been practicing beekeeping?

How did you learn beekeeping and from whom?

What are the major constraints and opportunities for honey production in your area?

What are the equipment or tools you have for beekeeping? How do you get them?

How do you collect and store your honey?

Which products do you harvest and what do you do with them?

Who buys your bee products?

Which aspect of beekeeping do you know?

Do you face any challenges marketing your bee products? What are those challenges?

Have you ever received comments from buyers about the quality of honey that you produce? What do they say and what are you doing to address those comments, if any?

Do you have access to opportunities such as training, loan?

### **B. District Agricultural officer**

What are the other livelihoods strategies of the people of Yoni apart from farming?

Have there been any occurrences or vulnerability contexts such as drought in the last three years that have affected smallholder farmers in the district? 3b. How long have these occurrences been occurring and what are their impacts on smallholder farmers in the district? 3c. What are the coping mechanisms of smallholder farmers during vulnerable situations such as drought, famine, conflict, etc.?

What is the history of beekeeping in the district?

What livelihood assets (land, forest, flowers, etc.) are available for beekeeping in Yoni Bana Chiefdom?

What are the constraints for beekeeping (production, processing, management, and marketing) in the district?

What are the gender roles in beekeeping in Tonkolili District?

What do you think can be done to improve beekeeping in Tonkolili District?

Is there anything that you want to add?

### **C. Forestry Officer**

What are the livelihood assets (natural, financial, equipment, skills, knowledge, networks) that support beekeeping are lacking in Yoni Bana Chiefdom?

Are there policies, or regulations that support or forbid beekeeping practices in the district/Yoni Bana Chiefdom? Explain more.

What are the challenges beekeepers face in Yoni Bana Chiefdom?

What are the opportunities for beekeeping in Yoni Bana Chiefdom?

Do you have anything to add or ask me?

### **D. Marketing Officer**

Among the agricultural and non-agricultural produce, your organization is responsible for marketing do you have honey among?

What is the quality of honey produced in Yoni chiefdom?

What are the constraints for beekeeping (production, processing, management and marketing) in Yoni Bana Chiefdom?

What are the opportunities for beekeeping in Yoni Bana Chiefdom?

Do you want to add anything?



## Observation Checklist

What to observe	Comments/Remark
<b>Assets:</b>  <b>Natural</b> Forest/trees Bees Flowering plants Land owned by farmers <b>Physical</b> Hives Bee harvesting equipment e.g. bee brush Accessible roads Physical market <b>Social</b> Family members Relations Group/Organization belonging to <b>Financial</b> Livestock-owned by farmers Credit facilities	
<b>Vulnerability Context (Shock and Stress)</b> Affected crops and other vegetation Affected roads Affected livestock	
<b>Livelihood Strategies</b> Activities engaged in to make a living e.g. carpentry, tailoring etc.	

**Note:** Beekeeping is different from bee hunting

## APPENDIX 2: ADDITIONAL PICTURES



*Picture 6 Guest house research assistant was lodged (Author July 2022)*



*Picture 7 Trees planted by Miro Forestry SL LTD in Yoni Bana Chieftdom (Author July 2022)*



*Picture 8 Research assistant obtaining permission from the village chief of Mathoir village to carry out research*