



**ST. MARY'S UNIVERSITY,
SCHOOL OF GRADUATE STUDIES
INSTITUTE OF AGRICULTURE AND DEVELOPMENT STUDIES**

**CONTRIBUTION OF SOCIO-ECONOMIC FACTORS ON INCOME
GENERATION AMONG URBAN APICULTURE HOUSEHOLDS' IN GULLELE
SUB CITY, ADDIS ABABA, ETHIOPIA**

BY

TIGIST ADAMTE GETAHUN

ADVISOR:

DR. WONDIMAGEGNE CHEKOL

June, 2023

ADDIS ABABA, ETHIOPIA

**ST. MARY'S UNIVERSITY,
SCHOOL OF GRADUATE STUDIES
INSTITUTE OF AGRICULTURE AND DEVELOPMENT STUDIES**

**CONTRIBUTION OF SOCIO-ECONOMIC FACTORS ON INCOME
GENERATION AMONG URBAN APICULTURE HOUSEHOLDS' IN GULLELE
SUB CITY, ADDIS ABABA, ETHIOPIA**

**A THESIS SUBMITTED TO THE GRADUATE STUDIES OF ST. MARYS
UNIVERSITY IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR
DEGREE OF MASTERS OF SCIENCE IN DEVELOPMENT ECONOMICS**

BY

TIGIST ADAMTE GETAHUN

ADVISOR:

DR. WONDIMAGEGNE CHEKOL

June, 2023


ADDIS ABABA, ETHIOPIA

DECLARATION

I hereby declare that the thesis entitled 'a contribution of socio-economic factors on income generation among urban apiculture households' in Gullele sub city, Addis Ababa, Ethiopia submitted by me for the partial fulfillment the masters of science in development economics to St.Mary's university is my own original work and has not been submitted earlier, either to St.Mary's university or to any other institution for the fulfillment of the requirement for any other programmer of study. I also declare that no chapter of this manuscript in whole or in part is lifted and incorporated in this report from any earlier work done by me or others.

TIGIST ADAMTE

Name



Signature

10/07/23

Date

ENDORCEMENT

This is to certify that the thesis entitles "contribution of socio-economic factors on income generation among urban apiculture households' in Gullele sub city, Addis Ababa, Ethiopia". work by **Ms. TIGIST ADAMTE GETAHUN** submitted to St. Mary's university for the award of the Degree of Master in development economics, a research work carried out under my guidance and supervision by. Therefore, I approve that no part of this thesis has been submitted to any other university or institutions for the award of any degree or diploma.

Wondimagegne Chabot (PhD) [Signature] 09/07/2023

Adviser

Signature

Date

ST. MARY'S UNIVERSITY,
SCHOOL OF GRADUATE STUDIES
INSTITUTE OF AGRICULTURE AND DEVELOPMENT STUDIES

CONTRIBUTION OF SOCIO-ECONOMIC FACTORS ON INCOME GENERATION
AMONG URBAN APICULTURE HOUSEHOLDS' IN GULLELE SUB CITY, ADDIS
ABABA, ETHIOPIA

BY
TIGIST ADAMTE GETAHUN

APPROVED BOARD EXAMINERS

Dean, Graduate Studies

signature & Date

Wondimagedem Chekol (PhD)

SMU 05/07/23

Advisor

signature & Date

Dr. Daniel Mesresha

[Signature] 08/07/23

External Examiner

signature & Date

Dr. Paulos Asrat

[Signature] 10/07/23

Internal Examiner

signature & Date

Acknowledgement

First, I would like to thank God for His presence with me in all day to day performances and giving me strength and protection to complete my study.

Second, I would like to express my gratitude to my advisor, Dr. Wondimagegne Chekol, for his continuous support, unreserved supervision, guidance and encouragement from the proposal to end of the thesis.

Finally, I would like to thank respondents who participated in this study Gullele sub-city urban agriculture development office employee. I could not have done this without you. I am very grateful for the time and effort you put into this study.

Much appreciation and thanks to all my family members and friends those not mentioned.

List of tables

Table 2. 1 Summary of number of beehives, production potential and average frequency of harvesting honey per year in Ethiopia (CSA 2016/17).....	13
Table 3. 1 Sample Distribution.....	35
Table 3. 2 Cronbach’s alpha value.....	44
Table 4. 1 demographic characteristics of the respondents.....	46
Table 4. 2 household perceptions on apiculture factors.....	47
Table 4. 3 source of income in the study area.....	49
Table 4. 4 Annual honey yield and obtained income.....	50
Table 4. 5 Reliability Statistics.....	51
Table 4. 6 Correlation matrix of household’s income and urban apiculture factors.....	52
Table 4. 7 Heteroscedasticity test.....	53
Table 4. 8 Test of Multicollinearity.....	53
Table 4. 9 Regression results	55

List of Figures

Figure 2. 1 Conceptual framework.....	31
Figure 3.1: Map of Ethiopia, Addis Ababa and Gullele sub city.....	33

List of Acronyms and Abbreviation

BKC	.....	Beekeeping Cooperatives
CSA	.....	Central Statistics Authority
EBA	.....	Ethiopian Beekeeper Association
EIAR	.....	Ethiopian Institute of Agricultural Research
ETB	.....	Ethiopian Birr
FAO	.....	Food and Agriculture Organization
FDRE	.....	Federal Democratic Republic of Ethiopia
GTP	.....	Growth and Transformation Plan
HH	.....	Household
IBAR	.....	Inter Africa Bureau for Animal Resource
IPMS	.....	Improving Productivity and Market Success
KTBH	.....	Kenya Top Bar Hive
MEFCC	.....	Ministry of Environment, Forest and Climate Change
MOA	.....	Ministry of Agriculture
NGO	.....	Non-Governmental Organizations
SPSS	.....	Statistical Package for Social Sciences
TTBH	.....	Tanzania Top Bar Hive
UK	.....	United Kingdom
UNEP	.....	United Nation Environmental Program
USA	.....	United State of America
USAID	.....	United States Agency for International Development

Abstract

The main objective of this study is to analyze contribution of socio-economic factors on income generation among urban apiculture households, the case of Gullele sub-city, Addis Ababa, Ethiopia. The sampling design employed in this study purposive sampling for the study area (sub-city and woredas under sub-city). The sampling design for the urban beekeeper household survey; used a simple random sampling technique in order to have a reasonable sample size, as a result the study selected 91 sample respondents from 118 beekeepers from three selected woredas in the sub city. The study data were collected through urban beekeeper household survey, key informant interviews to do this, primary and secondary data have been used. The primary data was obtained from survey data. Both Descriptive and explanatory research design, with a mixed quantitative and qualitative research approach was used to establish the causal effect relationship between the urban beekeeper household income and the socio economic factors to contribute generation of household income (institutional factor, social factor and access of input). Multi linear regression model was employed to examine the contribution of socio-economic factors on income generation of apiculture among urban beekeeper household. The investigation result using regression model estimator and descriptive statistics reveals that This result implies that, as urban beekeeper household 's year of experiences, availability of apiculture professionals, swarms catching experience and production potentials and honey forage availability increases the income generation of apiculture households by 64%, access and sources beekeepers source of their swarm / honey bee colony and accessibility in general access of input increase household income by 36% and the appropriate extension agents frequent contacts and follow up of urban beekeeper is the most significant to increase income at households' level by 51.1%. generally the model result indicate that socio-economic factors of apiculture (institutional factor, access of input factor and social factor) significantly and positively contributions to generation of income among urban apiculture households and the descriptive statistics result shows that urban apiculture households earn 16670.32 ETB annually on average this leads that urban apiculture has positive significance impact on income among apiculture households. The research concludes that socio-economic factor has positively significant contribution on income generation of apiculture and apiculture has positive significance impacts on household income. The study recommended that; capitalizing on the existing beekeeping policy, targeted beekeeping extension to farmers, incorporate financial aid, marketing access, and establishing cooperative association could contribute to closing gaps in skills and resource endowments and, hence, maximize household incomes.

Keywords: socio-economic, contribution to urban apiculture, household income,

Table of Contents

Acknowledgement	v
List of tables.....	vii
List of Figures.....	viii
List of Acronyms and Abbreviation	ix
Abstract	x
CHAPTER ONE.....	1
INTRODUCTION	1
1.1 Background of the Study.....	1
1.2 Statement of the Problem	4
1.3 Objective of the study	5
1.3.1 General Objective	5
1.3.2 Specific Objectives	5
1.4 Research hypothesis	5
1.5 Significance of the Study	5
1.6 Scope and limitation of the Study	6
1.7 Ethical Consideration	6
1.8 Organization of the thesis.....	7
CHAPTER TWO	8
LITERATURE REVIEW	8
2.1 Theoretical review.....	8
2.1.1 Theoretical Concept and Foundation of Apiculture.....	8
2.1.2. Beekeeping Practices in Ethiopia.....	11
2.1.3. Input supply, Extension and Marketing Services.....	14
2.1.4. Beekeeping as a livelihood strategy and its contribution at household level.....	16
2.1.4 Economic Importance of Beekeeping in Ethiopia.....	18
2.1.5 Constraints and Opportunity of Beekeeping in Ethiopia	21
2.1.5.1 Constraints of Beekeeping.....	21
2.1.5.2 Opportunities of Beekeeping in Ethiopia	24
2.2 Empirical Review	26
2.2.1 Socio-economic factors affecting urban apiculture.....	26
2.2.1.1 Social Factors	26

2.2.1.2 Institutional Factors	27
2.2.1.3 Input Related Factors.....	28
2.2.2 Urban Apiculture Contributions.....	29
2.2.2.1. Social Contribution.....	29
2.2.2.2. Economic Contributions	30
2.2.2.3. Contributions to Environment	30
2.2.2.4 Urban Apiculture Contributions for income	30
2.3 Literature Gap	31
2.4 Conceptual Framework	31
CHAPTER THREE	33
RESEARCH METHODOLOGY.....	33
3.1 Introduction	33
3.2 Description of the study area.....	33
3.3 Research Design.....	34
3.4 Target Population	35
3.5 Sample size determination	35
3.6 Source of data and data types	37
3.7 Method of Data Analysis and Model specification.....	37
3.8 Definition of Variables and Working Hypothesis.....	38
3.8.1 Dependent Variable	39
3.8.2 Socio-economic independent/explanatory variables.....	39
3.8.2.1 Social factors.....	39
3.8.2.2 Institutional factor variables	41
3.8.2.3 Input Variables.....	42
3.8.3 Description of variables and expected sign with the output variable	44
3.9 Reliability test	44
CHAPTER FOUR.....	46
RESULT AND DISSCUTION.....	46
4.1 Introduction	46
4.2 Demographic characteristics of the respondent	46
4.3 Household perceptions on apiculture factors	47
4.4 Source and level of income	49
4.5 Annual Income from apiculture	50

4.6	Reliability test	52
4.7	Correlation analysis.....	52
4.8	Model diagnostics	53
4.8.1.	Heteroscedasticity test	53
4.8.2.	Test of Multicollinearity	54
4.9	Regression results and Discussion	55
4.10	Hypothesis testing	56
4.11	Summary of Interview Response	58
CHAPTER FIVE		59
SUMMARY CONCLUSION AND RECOMMENDATION		59
5.1.	Summary	59
5.2.	Conclusion.....	59
5.3.	Recommendations	60
References		62
Appendix 1.....		68

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Apiculture is the scientific method of rearing honeybees and an apiary (bee yard or bee farm) is a place where bee honeys are kept, (FAO, 2011). The term “urban beekeeping” has come to connote a bunch meaning sociopolitical, commercial, environmental and personal beyond the mere description of where bees and beekeepers occur to coincide. Yet these meanings are seldom articulated openly and barely brought into serious engagement with the relevant fields of urban ecology and political ecology, (Sponsler, and Bratman, 2020).

Bees and beekeeping contribute to peoples’ livelihoods in almost every country on earth. Honey, and also the other products obtained from bees have long been known by every society within the world. The bees being exploited vary between regions, and beekeepers operate under varying conditions and with widely differing resources available to them (Brad bear, N. 2009). It also promotes economic self-reliance and has become a life sustaining source of income and livelihoods particularly for the poor. Beekeeping is an ecologically and traditionally appropriate form of income generation for communities in some of the poorest areas in African countries such as Mozambique, Malawi, Kenya and Zimbabwe just to mention a few (Bernard, 2012).

It is, therefore, necessary to plan means to reinforce production and returns from beekeeping. The yield from a beekeeping enterprise within the continent depends entirely on the way bees are managed (Weidmann, G., and Kilcher, L. 2011). Ethiopian, beekeeping has been experienced for hundreds of years and its potential is well recognized. Of all the countries within the world, no country has such an in depth tradition of beekeeping than Ethiopia, Serda et al, (2015).

In Ethiopia there are above 10 million bee colonies which are fairly distributed throughout the country. Out of those bee colonies about seven million are to be found in local hives, while about 500 thousand bee colonies are projected to live in transitional and frame hives. The remaining 2.5 million bee colonies are wild bees living everywhere the place within the country, like under

branches of trees, in craves of rocks, cliffs, and in earth holes. Honeybees produce numerous valuable yields. But the Ethiopian beekeepers and also the people within the country at big believe that honey and beeswax are the sole produce obtained from beekeeping. They still depend on that these two products are the top outcomes of bee culture. In particular agricultural products, Ethiopia was first known by its bee wax export item. Huge amount of honey and beeswax is gotten from traditional hives. The recent production and introduction of transitional and frame hives have largely contributed to reinforce the production of honey and beeswax, (EBA, 2011).

Despite the long tradition of beekeeping in Ethiopia, having huge bee density and being the leading honey producer likewise as one of the most important beeswax exporting countries in Africa, the products obtained from the subsector were still low as compared to the potential of the country, (Haftu Kebede and Yoseph Baraki, 2018). Hence, Ethiopian annual honey production was projected about 43,373 metric tons which is shared with about 23.5% and 2.35% of African and world's honey production, respectively. This makes the country rank 1st in Africa and 10th within the world. Because, of over 7000 species of flowering vegetation which most of them are honeybee vegetation and type of landscape differences has given the country better honey production within a consequent seasons.

Additionally, long tradition of beekeeping is formed Ethiopia having the very best bee density and being the highest honey producer still the biggest beeswax exporting countries in Africa, (Haftey Sahle et al, 2018).Information power about the present honey marketing enables the traders to come to a decision when and which market to sell their honey. Adequate information is with relevance the competitors within the market, and data on the selling and buying prices are significant Sileshi Yeserah, et al (2019). Bee Urban started off as a social initiative and non-profit organization as a response to guided tour within the Royal National City Park in Stockholm in 2010.

There founders aimed that, plant species within the park are disappearing thanks to lack of pollination. Bee urban aims to boost awareness of this decline and therefore the overall importance of pollination, there for also attach sustainability talks to their urban apiculture. because of lack of initial support, however, the once social initiative has since the

developed in to a business, resulting in an improved recognition in over-all and entering into touch with other Companies, Municipalities and also the Swedish government,(Marco Claussnizer M., 2014). On the opposite way Ontario Urban beekeeping policy indicated that urban agriculture and food production within the cities has newly experienced an enormous growth in interest. In response to concerns about the care and sustainability of their existing food system, many of us within the cities are searching for ways to supply more of the food they eat with within the city itself. A part of this development was a growing interest in urban beekeeping. Supporters of urban beekeeping argue that it is often a secure and healthy practice with variety of environmental, economic and social benefits, for practitioners and cities alike. Whereas many municipalities in north America have taken a step to legalize and regulate urban beekeeping, existing legislation in Ontario largely prohibits keeping hives in cities (University of Toronto, 2012).

On the other hand, Honey production is undertaken because it provides both social and economic benefits to urban communities and has received primary attention from the farmers. Economic benefits are usually measured in monetary terms as income from employment in the sector while social benefits are reflected in the many local uses they offer to the communities ranging from honey being used as food and medicine for the treatment of various ailments.

In Addis Ababa and others regions of the country, beekeeping **is** taken into account together of the incomes generating activities for poor farmers including women, youth and also the unemployed sectors of the community (The former Addis Ababa Urban Agriculture reports, 2018).Beekeeping remains operating within the old traditional ways implying the requirement for modernization .Low productivity and poor quality of bee products are the most important economic and marketing barriers for the urban and rural beekeepers. Hence, this study is aimed to assess urban apiculture business contributions to house-hold income generation with its challenging determinants boldly and contribution of socio-economic factors on income generation among urban apiculture households in Gullele sub city, Addis Ababa city administration Ethiopia.

1.2 Statement of the Problem

Urban apiculture is one of the common practices in urban agriculture which has many opportunities not only produce honey but it plays a vital role in the balance of nature, especially the pollination of agriculture crops, horticulture crops, and the house garden. A bee cross pollination service is important for the viability of market gardens, orchards and seed industries. Varied of people our favorite foods such as apples, avocados, peach, citrus fruits, raspberries, pumpkin are either highly dependent on, greatly benefit from honey bee pollination.

On the same way, urban beekeeping is becoming increasingly popular in towns and cities throughout for consumption, enjoyment in watching these highly social creatures and the opportunity to join an amateur beekeeping group. But due to long term traditional bee keeping practice, the absence of proper management individual not earn like what they expect and exposed to urban poverty (Douglas & Sponsler, 2020).

In Ethiopia, traditional farmed beekeeping is the oldest and the richest practice, which has been carried out by the people for thousands of years. Several million bee colonies are managed with the same old traditional beekeeping methods in almost all parts of the country (Oxfam, 2008). It is an environmentally friendly and non-farm business activity that has immense contribution to the economy of segments of the society and to a national economy (Bersmp, 2008).

Ethiopia could be a leading honey producer in Africa and one in every of the ten largest honey producing countries within the world. Despite the favorable agro-ecology for honey production and also the number of bee colonies the country is endowed with, the amount of honey production and productivity within the country remains low. One among the prominent factors for this low honey productivity is that the traditional hive and therefore the lack of improved beekeeping management techniques, (FAO, 2011). Similarly, Ethiopia has a huge resource base country for honey production and other hive products, and beekeeping is traditionally a well-established household activity in most parts of the country.

On the other hand, approximately 62 tons of honey is harvested in Addis Ababa annually, with an average of 40 kg of honey gained annually per improved beehive. This output is nearly double that of rural parts of the country where only 15–20 kg per beehive per annum is

harvested, (UNEP, 2014). But with this urban ecology potential and efficiency, the city itself and also the sub-city administration, not yet fully used it properly, especially to boost household income, as a result of problems relating with market, beekeepers' knowledge gap and extension support (Dafar, 2018)..

The available literature thus identifies the advantages of socio-economic factor on apiculture as a method of source of income for households in Ethiopia. However, as far as the researchers' knowledge, there is no study so far conducted to investigate socio-economic factor on apiculture income among household in Gullele sub city.

1.3 Objective of the study

1.3.1 General Objective

The general objective of this study is to analyze contribution of socio-economic factors on income generation of apiculture among urban apiculture households' in Gullele sub city, Addis Ababa city administration, Ethiopia.

1.3.2 Specific Objectives

- To examine contribution of socio-economic factors on income generation of urban apiculture in study area
- To analyze the impact of urban apiculture on income of households in the study area

1.4 Research hypothesis

This research hypothesizes the factor of apicultures contribution on income generating at household level based on specific objectives:

H1. Socio-economic factors has significant contribution on income generation of urban apiculture

H2. Urban apiculture has significant impact on income among apiculture households

1.5 Significance of the Study

In several theoretical and empirical literature, most of the apiculture enterprise /business development and the linkage of production input marketing studies are focused on rural part of Ethiopia but not yet well researched in the town and cities of the country. Thus this study has

focused on urban apiculture and tries to fill the information gap by examining challenging factors, such as the linkage of production input; marketing and other factors that affect the urban apiculture production and its contributions to household income generation.

Additionally it has great significances to further practitioners, policy makers, urban development and municipality's planers as secondary materials and will have abundant significant for the apiculturist enterprise / business development, linkage of production input marketing who are currently involved in the subsector and future participants. Therefore, the output of this research will improve the knowledge about the sector plays in urban households' livelihoods, and will also add information to the limited research done so far on the role of urban apiculture production development and its effect in the sub city house hold income generation.

1.6 Scope and limitation of the Study

The study conducted in Gullele sub-city administration which is purposively selected in the city, wherever the urban apiculture potentially practiced. Also activities have been carrying out apiculture cooperatives and individual small scale apiculturist. Even more the time and budget resource limitation is the other factor to include more similar potential sub- cities in the study. The limitation of this study is only focused on the urban apiary subsector and also may have its own limitation with availability of prior research in the study area to making compare data and challenges to interviewing.

1.7 Ethical Consideration

The research ethical consideration is the main assignment for the researcher to conduct the study in a way that he/she wants to meet. Therefore, from the beginning the researcher gather full information to follow considerable steps to collect the necessary data from the respondents and the respondent not harmed being the participant or the respondent in doing this study.

The researcher politely asks their voluntariness and the objectives of the study briefed through the introductory letters of the questionnaires. The respondents also believe that the overall objective of conducting this study will be only for the academic use not for any other doubtful purpose. Any respondents were not being forced to do so rather encouraged to voluntarily respond. The researchers also make sure that personal or demographic information of all respondents kept confidential.

1.8 Organization of the thesis

This research report was organized in five chapters. Chapter one provides the general Introduction about the whole report. Chapter two describes the review of related literatures and Chapter three provide detail description of the methodology employed by the research. Chapter four contains data presentation, analysis and interpretation. Finally, the last chapter concludes the total work of the research and gives relevant recommendations based on the findings.

CHAPTER TWO

LITERATURE REVIEW

2.1. Theoretical review

2.1.1 Theoretical Concept and Foundation of Apiculture

Human being concerns in bees started with hunting and robbing from wild colonies in hollow holes, in trees or rocks cavern. Up until the refining of sugar cane within the 19th century, honey was the solitary sweetening agent commonly available. It had been valued not only as food, but also for its uses in traditional medicine. People have perceived and studied apiculture /bees with the target of accelerating the production of hive products and making it easier harvest them. Bees have also attracted many of us due to their highly social nature. Similarities have often compared the sociality of bees of humans. The accrued knowledge on bees allows the trendy beekeeper to manage them.

The beekeeper can collect hive products with an ease and efficiency far greater than the honey predator or gatherer. While humans have educated much about bees and the way to keep them, the bee itself has not altered. Unlike most of the animals and plants utilized in husbandry, the honeybee of today is that the similar as it was thousands of years before. In short, humans haven't tamed the honeybee. The bee remains in essence a wild animal. People can keep bees and manage them for better production, but control over bee genetics and behavior has not been accomplished to the identical degree like tamed animals and vegetation, (Feed the future,2014). Apismellifera defensive behavior may be a complex trait that involves individual worker behavior and a coordinated colony response with a swarm effect. Genetic control of defensive behavior in honeybees and this parameter are included in many genetic breeding programs.

The African honeybees are highly defensive and far more aggressive towards humans and animals. They respond faster and intensely than European bees and typically sting in larger numbers. They also tend to own more aggressive behavior than their European or American counterparts, a trait which also makes them more productive and resilient at their native range.

This aggression trait is manipulated and utilized for the continent's advantage, through selective breeding. Although the African honeybee is incredibly aggressive, some tend to sting but others are more docile. The aggression trait is manipulated and utilized for the continent's advantage through selective breeding. Generally, the aggressive behavior of honeybees is related to environmental factors, genetics, strength of colonies, large stores, and amount of alarm produced. It's possible to pick out less defensive honeybees based on their reaction, (Tessema Aynalem and Zeleke Mekuriaw, 2017).

Bees offer a huge potential with insignificant savings. As an agricultural enterprise beekeeping does not require land possession or hire charge, it can be started with equipment and tools that can be obtained nearby and in many instances abilities and awareness required for such an enterprise are found within local traditions. As a business enterprise it offers not only diverse yields, for example honey and wax among others, which can be sold in local markets and become an important source of consistent income for farm families, but can also offer balancing services, such as crop pollination. Furthermore, bee products improve farm family nourishment and can provide for traditional health care medications (FAO, 2011).

On the other hand, Apiculture (beekeeping) is the keeping and management of honeybees for various products: honey, beeswax, royal jelly, propolis, bee pollen and brood, as well as for pollinating flowering agronomic or tree crops (Ayers, 1992).

Kaiser et.al, (2013) defined beekeeping or apiculture is an applied science of rearing honey bees man's economic benefits and it's the maintenance of honey bee colonies, commonly in hives, by humans. A beekeeper keeps bees in order to collect honey and bee wax to pollinate crops, or to produce bees for sale to other beekeepers. A location where bees are kept is called an apiary or 'bee yard'

Apiculture (Beekeeping) is a promising non-farm activity for the rural and urban households. It directly and indirectly contributes to the incomes of households and the economy of the nation. The direct contribution of beekeeping includes the value of the outputs produced such as honey, beeswax, queen and bee colonies, and other products such as pollen, royal jelly, bee venom, and Propolis in cosmetics and medicine (ARSD, 2000; Gezahegn, 2001). It also provides an employment opportunity in the sector. The indirect, but very important contribution of

beekeeping is through plant pollination and conservation of natural environment. According to Gemechiset al, (2012) Apiculture is one of the agricultural subsectors that most suits the rural poor and also contributes significantly to income diversification for those who are better off. It is simple and relatively cheap to start, as it requires a very low level of inputs (land, labor, capital and knowledge in its simplest form). The bee products and byproducts supply income that contributes to the improvement of the livelihood of the rural people

On the same way, apiculture is a positive program that not only contributes to the uplifting of the rural communities but also protecting the trees thereby enhancing the protection of our planet earth through conservation of the natural resources. It has a long tradition in Africa dating back several centuries when beehives were first used for producing honey in ancient Egypt.

Beekeeping is an aerial agricultural activity that does not occupy cultivated land, requires less investment and benefits can be obtained quickly, besides it being a nonpolluting intensive agriculture (Conrad, 2007). This means that there is sustainability and availability of beekeeping requirements as it is based on locally available resources which utilize both the traditional and modern hives. Apiculture or beekeeping has to do with the preservation of honey bees' colonies in hives by humans. The collection of honey products and those of the hive such as bees wax, propolis, pollen and royal jelly is central to beekeeping. This type of farming is also crucial for the pollination of crops as well as producing bees for sell to other beekeepers, (Kerealem, Ejigu, & Preston, 2009).

Beekeeping is a long-standing practice in the rural communities of Ethiopia and appears as ancient history of the country (Ayalew and Gezahegn, 1991). It is environmentally sustainable activity that can be integrated with agricultural practices like crop production, animal husbandry, horticultural crops and conservation of natural resources. Thus, it would be one of the most important intervention areas for sustainable development of poor countries like Ethiopia (Gibbon, 2001).

Beekeeping is a useful means of strengthening livelihoods because it uses and creates a range of assets. According to Meaza (2010), these assets include natural (bees, a place to keep them, water, sunshine, biodiversity and environmental resources); human (skills, knowledge, good

health and strength, and marketing expertise); physical (tools, equipment, transport, roads, clean water, energy and buildings); Social (help from families, friends and networks, membership of groups and access to a wider society, market information and research findings; and financial (cash, savings and access to credit or grants).

Beekeeping Practices in Ethiopia

Honey is produced in practically every region of Ethiopia, with different types of honey produced in different areas. The majority of honey produced in the country (92.80% of total honey produced) is produced by traditional beehives, which provide low yields and poor-quality honey. According to the result of the survey of (CSA 2019) revealed, from a total of 7.08 million hives estimated to be found in the country, the greater part (96.03%) is reported to be traditional. Ethiopia has a vast natural resource base that allows for the production of honey and other hive products, and beekeeping is still practiced in most parts of the country by beekeeper households (Dekebo A, Bisrat D, et al 2019). According to Kassa and Megerssa (2020), bees are currently handled using three unique beekeeping practices: traditional, transitional, and modern hive systems.

Traditional (Forest and Backyard) System

Traditional beekeeping in Ethiopia is the oldest and richest practice, having been practiced by the Ethiopian people for thousands of years. In every parts of the country, several million bee colonies are handled using the same old traditional beekeeping practices (Ababor S, Tekle Y. 2018). Hive is made of locally available materials such as tree logs, bamboo, woven grasses, and other natural elements. Beekeepers that are knowledgeable and skilled in using these hives could perform many operations with less equipment (Guy S, Legesse S. 2015). Forest beekeeping and backyard beekeeping are the two forms of traditional beekeeping practices. Forest beekeeping, in which some traditional beehives are hung from trees, is popular in different parts of the country, especially in the west and south.

In most other parts of the country, backyard beekeeping is popular, with relatively better management. The productivity of these hives is exceedingly poor, with an average yield of only 5-8 kg per colony per year, compared to 18-30 kg per year for improved hives (including transitional hives) (Ababor S, Tekle Y. 2018). Traditional beehives are relatively difficult to

manage than transitional and modern hives because of colony inspection for brood status (e.g., for infectious diseases), opening hives at night, not suitable for managed queen rearing, higher risk for a variety of bees, and a queen being killed during operations, and honey harvesting is more difficult. Furthermore, colony feeding during times of food scarcity is challenging, and determining the maturity of honey before harvesting is pretty difficult.

Transitional Beekeeping

Transitional beekeeping practice was first introduced into Ethiopia in 1976. It's a form of beekeeping activity that falls somewhere between traditional and modern beekeeping, and it's one of the better methods of beekeeping when compared to traditional methods (Dekebo A, Bisrat et al 2019). Kenya Top Bar Hive (KTBH), Tanzania Top Bar Hive (TTBH), and mud-block hives are the three types of hives used in this method (Sebsib A. and Yibrah Tekle. 2018). Because of its low cost and ease of construction, the KTBH has shown to be the most ideal. KTBH is well-known and widely used in different parts of the country among these hives. An ideal condition, a top- bar hive can produce approximately 50 kg of honey per year, but in Ethiopia, the average amount of crude honey produced per hive per year is 9-13 kg (Hailemichael Tsehaye Bahta. 2018).

Transitional (intermediate) beekeeping has several advantages, including the fact that it can be opened quickly and easily, that bees are guided into building parallel combs by following the line of the top bars, that the top bars are easily removable, allowing beekeepers to work quickly, that it is easier to construct than frames, and that honeycombs can be removed from the hive for harvesting without separating themselves from the hive (Dekebo A, Bisrat D, et al 2019). This practice has its own set of drawbacks, such as the fact that top bar hives are more expensive than traditional hives, and that combs suspended from top bars are more likely to break off than combs built within frames (Ababor S, Tekle Y. 2018).

Improved Beekeeping Practices

To provide optimal honey yield for a long time without damaging bees, modern beekeeping procedures are essential. The modern movable-frame hive is made up of properly built rectangular box hives placed one on top of the other in a tier, with the number of boxes varying depending on the size of the bee population and the season. Since 1970, around five different

types of mobile frame hives have been introduced in Ethiopia (Dekebo A, Bisrat D, et al 2019). The improved box hive has an advantage over the others in that it produces a high quality and quantity of honey and it is east to manage the swarm by supervising the bees as they look for honeybee flowers and pollination services (KenesaTeferi. 2018).The downsides, on the other hand, are that the equipment is somewhat expensive, it requires experienced labor, and that it requires very specific precautions.

Table 2.1 Summary of number of beehives, production potential and average frequency of harvesting honey per year in Ethiopia (CSA 2016/17).

All types of Beehives	In number	Production (Kilograms)	Average Frequency (Harvests/Year)
Traditional Beehives (Forest and backyard)	5,902,624	42,927,921	1.64
Intermediate/transitional Beehives	80,832	2,036,969	1.94
Modern Beehives	205,873	2,741,211	1.58
Total	6,189,329	47,706,101	1.64

Input supply, Extension and Marketing Services

The beekeeping /honey value chain map and actors and functions are often broadly clustered into three main tiers; the bottom, middle and top tiers. This can be according to their role/s within the production of honey or roles which range from production, handling, processing, and distribution throughout to the top markets. Input suppliers constitute the initial node of the value chain and that they comprise organizations and or

individual entrepreneurs involved within the construction of beekeeping gear purchasa ble to nterested producers. Production is principally through three ownership and tenure systems; individually owned apiaries at the farm level; cooperative society advanced hives and located within the member's farms and collectively owned apiaries mainly found within the adjacent forests. The top markets mostly comprise the eventual consumers of honey. These include but aren't limited to domestic consumers, who use honey as a table food, industries that use honey as a food processing or preservation agent, (SNV, 2009).

Supply of inputs: /accessories especially bee forage, colony bee wax, protective clothing, and beekeeping accessories are at a rudimentary stage. Well-built hives, frames, foundation combs, centrifuges and other hive management equipment are generally expensive and not widely available. For beekeepers within the central and northern parts of the country, it's becoming tougher to obtain bee colonies because of credit constraints. Lack of credit availability prevents farmers from buying high yielding beekeeping equipment and undertaking modern colony management.

Apiculture extension: services aren't well organized and that they lack a strategic approach and coordination. The slow uptake of recent beekeeping methods moreover, indicates that thus far research has contributed less to real innovation in beekeeping; innovation within the sense of turning knowledge into improved productivity and incomes. Beekeepers, honey and beeswax collectors, retailers, Tej brewers, processors and exporters are identified to be the key actors within the value chain of the honey subsector. Three principal channels were identified within the value chain of the subsector. These are Tej brewery channel, honey

processing and exporting channel and beeswax channel. These channels are complex and interconnected that means absence of organized marketing channel and lack of formal linkages among the actors, (MOA, 2013)

The studies done in Sude Woreda, Arsi Zone Oromia, the price of honey varies from 50 to 70 Ethiopian birr/kg supported the kind of hive from which the honey was harvested. Within the same manner, the value of honey fluctuates with highest price within the season especially during time of wedding ceremonies (January to April), and also during wet season (June to August) within the period when there was no honey production and lowest price during honey harvesting time (September to November and May). The overall marketing of honey within the area was promising. They use honey as food, as local drinks (such as mead), medicine and for cultural ceremony purposes Alemayehu and Abera (2017).

According to Mikhail Miklyaev, (2017) in Ethiopian Honey Value Chain Players are classified into four levels as follows: Producers (beekeepers). At this level of the value chain, many beekeepers are engaged in honey production, actively taking advantage of the Ethiopian honey market's high domestic demand and comparatively low supply (when compared with demand). Direct Buyers: Honey collectors/traders, cooperatives, tej houses, and agribusinesses/processors that buy directly from beekeepers.

Agribusiness companies that market honey in domestic and export markets and honey wholesalers in in the city (Mercato). This level of the honey value chain also includes multiple participants. Wholesalers in national capital (Mercato) and agribusiness companies that cater to domestic markets compete with agribusinesses that are engaged in sales for export markets in terms of quantity (reliable and timely supply), quality, and price of honey and Domestic retail honey sellers (supermarkets, retail stores) and honey exporters (agribusiness companies /processors). Many participants at this level compete with one another in terms of quantity, quality, and price of honey. Additionally, some agribusinesses/processors that offer honey for export markets also are engaged in sales within the domestic market, in order that they compete with the wholesalers.

Beekeeping as a livelihood strategy and its contribution at household level According to Chambers and Conway (1992), a livelihood is a set of capabilities, activities and assets; both material and social that are required for a means of living. A livelihood is said to be sustainable, only if it can cope, recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base (Carney, 1998). Peasant farmers are prone to shocks, trends, policy changes and various interventions that claim to enhance their farming hence require sustainable livelihoods.

Beekeeping contributes to livelihood outcomes through increasing food security more so increasing food accessibility, availability and utilization. Beekeeping enhances food accessibility through direct income generation which can be used for purchasing other nutritious foods that reduce the prevalence of protein, iodine, vitamin and iron deficiencies (Wilson, 2006).

Beekeeping has additional nutritional benefits as an extensive source of food hence its contribution to food availability. This is mainly in form of honey which is used for several other purposes in a home including being used as a sweetener. Honey contains antioxidants, minerals, vitamins, proteins and a high calorific value which present attractive ingredients that do not occur in artificial sweeteners (Gemed Tolera, 2014).

Honey is also used for brewing traditional beer in Ethiopia primarily for cultural and religious purposes. In addition it possesses antibacterial properties that make it a well-known remedy for colds, mouth and throat irritations. Consumption of honey improves food assimilation, reduces infective intestinal problems such as constipation, duodenal ulcers and liver disturbances which increase peoples' food utilization (Krell, 1996). Not only is honey used to treat infections but also promotes tissue regeneration and reduces scarring even in its pure unprocessed form.

Apart from enhancing food security, beekeeping provides employment especially in areas where there is population pressure on the land (Illgner et al., 1998). This helps households manage economic shocks hence reducing vulnerability among these households (Gebreyohannes Meaza, 2010). In marginal areas with infertile land for agricultural production, beekeeping will be the major livelihood diversification strategy to support their pastoral farming systems (Kipainoi, 2013).

Apiculture also accelerates the accumulation of savings as a result of increased income. Beekeeping increases cash flows because it supplements the household income especially during the dry seasons when on-farm income is low. Hive products may be harvested two to three times a year especially at consumption peak times, for instance, when a school fee has to be paid (Kidd *et al.*, 2001). Some bee products such as beeswax and propolis have long shelf lives which enable them to be stored for a long period as a form of saving and sold when need arises. Additionally, the ease of asset recovery and accumulation among beekeepers in case of insecurity was reported by (Enzama, 2008). This makes beekeeping a very important safety and cargo net.

Beekeeping is said to improve well-being of the beekeepers through increasing the number of tools, equipment and access to basic infrastructure for instance access to roads and markets (Gebreyohannes Meaza, 2010). Some of the tools and equipment owned to enhance beekeeping production include bee suits, smokers, beehives and other tools used in apiary management. During beekeeping production, farmers acquire new knowledge and skills particularly those related to beekeeping (Carroll and Kinsella, 2013). This may be acquired from organized trainings or as a result of cumulative experience in beekeeping. These skills enhance beekeepers capabilities. In addition, beekeeping gives an opportunity to farmers to network with other members in the communities. This is mainly through group formation that eases access to extension services (Benin *et al.*, 2007).

Indirectly, beekeeping improves peoples' quality of life through facilitation of sustainable natural resource management. For instance, it enhances pollination which is very important for production of most seed, cash and food crops and promoting biodiversity (Klatt *et al.*, 2014). Pollination of agricultural crops is an important agro-technical measure that increases productivity of seeds, fruits and vegetables. Some crops such as rapeseed even require supplementary pollination that is achieved by placing one to two beehives per hectare. It is also known that the closer the hives are to the bloomed field, the greater the pollination effect which expedites production. Although the exact contribution of pollination to yield is hard to measure precisely, it is likely to be much higher than the value of honey, wax and royal jelly (Chuma *et al.*, 2012).

2.1.4 Economic Importance of Beekeeping in Ethiopia

Beekeeping has long been a part of Ethiopia's farming systems (Kenesa Teferi. (2018). It is a tradition long before other farming systems. It's been a tradition for a long time before other farming systems existed. Around one million farmers are expected to maintain bees, which is a long- standing and widely held activity in rural areas across the country. Beekeeping has played and continues to play, an important part in both the country's national economy and the subsistence smallholder farmers' livelihoods (Fikru S. 2015).

Honey production: Honey, a natural product of the honeybee, is a good source of energy because it includes simple sugars that are ready for digestion as soon as they enter the intestine. Honey is in high demand on the local market since it is used to make the traditional beverage 'Tej' (honey mead). Much honey has traditionally been fermented in Ethiopia to make 'Tej.' According to Sahle et al. (2018) 85% of the total honey estimated to be brought for the market is used for 'Tej' manufacture, with 15% of the total honey consumed at home. Furthermore, beekeepers are estimated to earn around 360-480 million Birr per year from the total honey produced in the country (Amsalu et al. 2020). According to the report of FAO (2017), from the 187 tons of honey exported about a 133 million ET Birr Per year was earned at a national level.

Beeswax production: Wax is largely used in the production of comb foundations, cosmetics, candles, ointment and cream, varnishes and polishes, unique forms and surfaces for creative sculptures, and the fabrication of queen cups for the development and reproduction of bee colonies. In Ethiopia, traditional hives are used to collect wax rather than moving frame hives. Traditional hives' wax yield is estimated to be 8- 10% of the honey yield, compared to 0.5- 2 percent for frame hives (Guy S, Legesse S. 2015). Nonetheless, it is estimated that a significant amount of beeswax is lost at various stages due to a lack of awareness of its marketability. The annual beeswax production of the country is estimated at 5790 tones and this makes the country is the second- largest beeswax producing country in the world after India (FAO.2017). According to this data, the yearly average value of beeswax exported is estimated to be over 325 tones, with a profit of around 560 million ETB.

Crop pollination: In the agricultural system, bees play a critical function. Although the importance of honeybees in agricultural pollination is underestimated, they play an important role in enhancing the national food supply and plant species regeneration. Honeybees are also thought to play an important part in Ethiopia's economy by providing pollination services. An experiment was done in Ethiopia to investigate the effect of pollination on Niger (*Guizotia abyssinica*), and the results revealed that honeybees increased Niger seed yield by about 43% (Hailemichael T. 2018).

In addition to its economic relevance, beekeeping makes a major contribution to annual income supplementation. Farmers make money by selling hives or colonies, as well as honeybee products. Honey production and value addition to honey products are essential to poor people's long-term survival. It also plays a role in providing employment opportunities for landless men and women, as it requires little cash to get started. It's also important to note that a large number of people (intermediaries and traders) are involved in honey harvesting and distribution (at the village, district, and zonal levels).

Domestic Market: In Ethiopia high portion of honey is sold for income generation. The domestic honey market starts at the smallholder bee keeper's level, who majorly sells crude honey to collectors in the nearest town/village markets (Assefa A.2009). Beekeepers of the country sell the largest proportion of their honey during harvest at low price mainly to meet their demand for cash to pay taxes, debts and other social obligation. Similar authors notified that, the price of honey is also governed by different factors such as distance from market (28%), quality of honey (25%), consumers 'preference (20%), color of honey (15%), and test of honey (12%). About 10% of the honey produced in the country is consumed by the beekeeping households. The remaining 90% is sold for income generation and of this, it is estimated that 70% is used for 'tej' brewing. Honey price is differing by region and type of honey. The most expensive is Eastern Tigray's white honey, where the current retail price is ETB 170.00/kg. Lower retail prices (of around ETB 60–90.00/kg) are observed for other varieties of white honey, depending on the area and the honey's characteristics. The retail prices for yellow honey are around ETB 50– 60.00/kg, while the least expensive red honey is sold at a price of around ETB 45–50/kg (USAID 2012). Domestic honey consumption is increasing due to highly increasing demand for tej, increased consumption of processed table honey in most urban areas and increased demand

for honey in the local industries (Assefa M 2011). The total volume of domestic consumption in 2007-2011 was 163,257.42 tons, out of which 146,931.67 tons was domestic consumption [40]. Recently, country's domestic honey market is estimated to be 42935 tons out of total 47,706,101 tons (EIAR 2017).

Export Market: Beekeeping products play significant role in the development of national economy. Honey and other apiculture products such as beeswax, propolis, pollen, royal jelly and bee venom are among the growing export commodities with good potential in many African countries (Paulos D 2012). The developing countries get a chance of money exchange with honey and other apiculture products.

Ethiopia exports honey to the countries such as Sudan, Norway, Saudi Arabia, UK, Yemen, Japan, USA and. For the first time Ethiopia exported honey to European country, U.K. was 30 tons in 2008 others (Demisew, FDRE 2016). Between the years of 2008-2011, Ethiopia exported 7,068 tons kg of honey and 6,752 tons of beeswax. As it was increasing from time to time, it reached 4252.8 tons of honey in the year 2011-2016. Currently, the export had reached up to 900 tons per annum (Demisew, 2016). The beeswax price at the domestic market is mostly higher than the international beeswax price which makes beeswax export less profitable in Ethiopia.

Source of Immediate Cash Income: Beekeeping plays significant role in supplementing the annual income. Honey production and value addition to its products are vital factors in sustainability of livelihood of poor people (EIAR 2017). In Southwest Ethiopia, production from honey can reach 100-200 kg per year and fetches price per kg of 8-10 Birr. Thus, the potential annual income from honey can reach 800-2000 Birr (Adilo et al. 2005). An average of 420 million ETB was obtained annually from the sale of honey. In Ethiopia, the total annual gross value of 2.20 billion ETB and 0.15 billion of ETB was earned from honey and bees wax respectively (MEFCC 2015).

Job Opportunities: Beekeeping practices create job opportunities for landless men and women for their livelihood as it needs low capital to start (Abadi B, et al. 2016). It could also be observed that many people (intermediaries and traders) participate in honey collection and retailing (at village, district and zonal levels). Hundreds of honey processors are engaged in Tej

brewing and exporters are also flourishing. It can also serve as job opportunities to local carpenters and organized youths in construction of beehive.

Environmental Protection: Beekeeping is a non-destructive activity that could be employed in the conservation of biodiversity (Gemechis L, et.al. 2012). Bees provide numerous benefits in maintaining sustainable natural environment. These are needed for the pollination of many cultivated crops and maintaining biodiversity. More plantations for supplying pollen and nectar need to be encouraged. Thus, many plants are conserved and protected from destruction in this way (FAO 2009).

2.1.5 Constraints and Opportunity of Beekeeping in Ethiopia

2.1.5.1 Constraints of Beekeeping

In Ethiopia, the beekeeping sub-sector has some key challenges and constraints that must be solved if the full potential of apiculture is to be realized.

Honeybee pests, predators and disease: With the life of bees, the number of pests and predators is remarkable. According to a study conducted by Malede et al. (2015) ants, insects, spiders, snakes, and lizards, wax moth (*Galleria mellonella*), bee-eater birds, bee lice (*Braulacoecal*), honey badger (*Mellivoracapensis*), monkey, and small hive beetles (*Aethinatumida*) cause devastating damage to honey bee colonies and products in a short time. Honey bees, on the other hand, can become affected by the disease, posing a major threat to honey bee production and productivity.

Different authors investigated and reported on the existence of two adult honeybee illnesses, *Melphigamoebamellificae* and *Nosematosis*, as well as their distribution (Fikru S. 2015).]. The most famous bee diseases in Ethiopia are *nosemosis*, *amoeba* and *chalk* (Ababor S, Tekle Y. 2018).

Improper application of agrochemical inputs: The major three challenges affecting the beekeeping industry have been identified as pesticide poisoning, a lack of equipment, pests, and

predators, with roughly three-quarters of beekeepers losing their colonies owing to sprayed agrochemicals (Fikadu Z. 2020).

Improper pesticide use in crop production is a source of socio-economic conflict among farmers, and poisoning of honeybees by these chemicals has increased over time, with some beekeepers losing all of their colonies as a result of agrochemical use. According to a study conducted by Bizuayehu in the east and west Gojjam Zones of the Amhara Region, on average, 1,736, 4036, and 1,890 honeybee colonies die, abscond, and dwindle each year (Ayele et al.2020). This suggests that the application of various insecticides on crops has a significant impact on beekeepers' bottom lines.

High cost and limited availability of improved technologies: The key issues influencing the promotion and development of honey production and marketing are reliance on traditional and low-technology input, poor pre- and postharvest management, insufficient extension services, and a lack of marketing infrastructure. According to Seid and Solomon (Guy S, Legesse S. 2015), Introducing upgraded hives and working tools to the rural population is out of reach for most farmers and even for those who can afford it, it is not readily available. Some beekeepers, for example, have modern beehives (only boxes) but lack the instruments needed to properly manage them (such as a smoker, queen excluder, or honey extractor) (Tekle G, Weldeyohannis S. 2016). In some parts of the country, modern beehives built by some private companies and co-operatives were built with the wrong dimensions and poor quality wood. As a result, honeybee migration in modern hives is extremely high (Sahleet al. 2018).

Limited technical capacity: Limited technical capacity, such as a shortage of materials and the ability to construct improved beehives, inadequate hive management skills, limited know-how in regards to hive colonization, insufficient capacity for monitoring beehives for pests and illnesses, and limited capacity for developing solutions to problems such as additional feed and disease management, are all important challenges to the sector's development. One of the biggest concerns has been the occurrence of infections such as parasites, bacterial, and viral diseases. Furthermore, predators and the unrestricted use of pesticides and herbicides are two important difficulties that have an impact on the quality and wholesomeness of honey bee products.

Moreover, understanding is scarce about how to mitigate and reduce the primary risks associated with apiculture, as well as how to manage them when they arise. Beekeepers that do have modern beehives lack the necessary skills and knowledge to effectively manage them, and training is not widely available. As a result, they frequently use poor extractive harvesting methods and tools that are inappropriate for this kind of hive. Moreover, during droughts, they rarely offer supplementary feed (water, sugar syrup, or flour) and have little awareness of existing honey-quality requirements in export markets (Tekle G, Weldeyohanis S. 2016).

Lack of financial resources (access to financial service): Access to financial services is one of the primary obstacles to increasing honey production. Poor financial access has been a major barrier to the development of industrial-scale production and the establishment of honey processing and packaging operations (Mamo YS. 2016). Beekeepers have limited access to financial services that would allow them to upgrade from traditional beehives to better versions, making it difficult for them to buy modern beehives and other tools necessary to increase honey production. Most beekeepers do not have the financial means to upgrade to transitional and modern beehives; therefore they continue to produce honey using traditional methods (Tekle G, Weldeyohanis S. 2016).

Lack of standardization and quality management system: On the farm, there is a lack of standardization and quality management systems, which contributes to poor production, processing, packaging, and labeling. This is due to a lack of adequate laboratories and facilities for quality assessment. This has an impact on access to international markets, as well as the production and sale of honey on the domestic market and along the value chain (IBAR 2016). In absence of support to address proper handling, packaging, and labeling, locally produced honey fails to command good market prices even though it is organic and free from human interferences, making it inherently a premium product attract to niche markets. Locally produced honey fails to attract excellent market pricing in the absence of support to meet proper handling, packaging, and labeling, although it is organic and lacks human interferences, making it naturally a premium commodity attracting to niche markets.

Limitation in business management: Most beekeepers consider beekeeping as a part-time business with low work requirements. One of the biggest issues that beekeepers face is managing

and growing their businesses. The majority of profits are not re-invested in the business to increase production and improve quality standards. Processors, particularly large marketing agencies, demand an assured supply of a specific quantity and quality. As a result, beekeepers are unable to compete in competitive markets where their products could command a higher price.

Beekeepers lack established commercial procedures, and there are few connections between smallholder, medium scale, and large-scale producers and processors. Low production, poor yield, limited market access, low incomes, and under-utilization of beekeeping for wealth generation are the overall effects of the above issues (A. Tadesse. 2019).

2.1.5.2 Opportunities of Beekeeping in Ethiopia

There are tremendous opportunities in the honey industry for the improvement of the livelihoods of people in the country.

Diverse Agro-ecological conditions and flowering plants: The country's current various agro-ecological conditions are ideal for honey production. The favorable environmental conditions encourage the establishment of dense forests such as rainforests, dry deciduous forests, spiny woods, and other forms of flora that are conducive to beekeeping and honey production. There are also a lot of marginal lands, such as dry and semi-arid places, that can't support permanent or intense agriculture without a lot of money invested inland.

Beehives could be placed in this area because the bees will not be relying on the land directly, but rather on the nectar flowers found in the marginal regions (KenesaTeferi. 2018). Ethiopia has beekeeping potential due to the abundance of diverse plants and crops that provide nectar and pollen for honey bees.

There are around 7000 varieties of flowering plants in the country that the bees feed on and collect crucial raw materials for making honey and other hive products (Ababor S, Tekle Y. 2018).

Existence of strong bee colonies: Ethiopia's favorable climatic conditions and diversified floral resources support approximately 10 million honeybee colonies, of which 7 million are kept in local beehives by farmers and the rest remain in the wild in the forests (Sahle et al. 2018). Similarly, data on beehives acquired during the CSA (2019) livestock survey revealed that there

are an estimated 7.08 million hives in the country's rural areas. As a result, the country has the largest number of bee colonies in Africa.

Demand for the bee products and honeybee: The demand for apiculture products is expanding at an alarming rate both in the domestic and international markets. According to the healthy state of bees and the production of organic honey are in great demand (KenesaTeferi. 2018).Beekeeping is a low-impact activity that can be combined with other agricultural practices like crop production, animal husbandry, horticultural crops, and natural resource conservation (A. Tadesse. 2019). As a result, it would be one of the most critical intervention areas for long-term growth.

Bee products are in high demand, and this trend is expected to continue. Honey has a lot of health benefits, so it's in great demand. Honey and its derivatives are commonly used inputs for cosmetics and medicine production and formation; widely used inputs for cosmetics and drug manufacturing and formulation. Currently, approximately all of these industries' supplies come from imports because local suppliers do not meet the industry's quality standards. Import substitution presents a significant potential.

Presence of Indigenous knowledge and skills: The main areas of indigenous beekeeping knowledge are hive construction from locally available materials, swarm catching, hive fumigation, honey and swarming season identification, different medicinal values of honey, identification of important honeybee floras, and identification of adulterated honey (Ababor S, Tekle Y. 2018). This experience and pride in beekeeping may help to speed up adoption among new beneficiaries.

According to research conducted by Dinku and Bereket in Hawassa city and Tsegayet in Wolaita and Dawro Zone beekeepers in Southeastern Ethiopia have good indigenous knowledge of traditional beekeeping (IBAR. 2016, Negash D, Mengeste B. 2019).

The presence of supporting organization: Various governmental and non-governmental organizations (NGOs) were active in beekeeping practice, for example, they provided financial credit, beehives, and bee equipment, and they gave short-term beekeeping training. Training has resulted in significant improvements in apiculture production. For the past ten years, new

technologies, equipment production, and distribution, and institutional capacity building have been deployed. Training of extension workers and farmers in apiculture has also been prioritized for them to get better beekeeping knowledge and develop skills, allowing them to improve traditional beekeeping practices and increase honey and beeswax production (Lijalem T. et al. 2017).By connecting them with local carpenters who make modern honeycombs, the government has intensified its focus on expanding the beekeeping sub-sector as one of its measures to alleviate poverty and diversify export products and establish commercial ties with end users, including international markets (K. Aregawi, et al. 2018). The government is currently promoting a self-governing basin development initiative that includes beekeeping. Modern, low-cost beehives are built using locally accessible materials, while an effort is made to organize farmers into groups and connect them with local carpenters who build modern hive. Recent public and private sector initiatives, as well as non-governmental organizations (NGOs), are pointing in the correct direction for developing the beekeeping sub-sector in order to maximize its potential and competitiveness. Introduction and promotion of innovative honeycomb methods for obtaining high quality honey for industrial processing (Mitikie A. 2017).

2.2 Empirical Review

2.2.1 Socio-economic factors affecting urban apiculture

2.2.1.1 Social Factors

The challenges in market-oriented beekeeping development specifically related to knowledge and skills needs and development. Shortage of skilled manpower with ability to understand the existing beekeeping-human relationship and provide context-specific services to make a difference in the productivity and quality of marketable hive products, also there is a substantial difference in beekeeping management skills and knowledge among beekeepers. In this regard, how to improve and address the various knowledge and skills needs of beekeepers will continue as a challenge to the research and development service providers, (IPMS, 2012).It is very important to identify perceived relative merit of improved beekeeping technology and its relative detriment to determine the perception of beekeepers about improved technology and for appropriate interventions. Improved beekeeping technology requires knowledge of their practical activities, (Dereje Tulu et al, 2020). Continuous follow up and rapid detection of honeybee pests

at their respective areas has paramount importance to prevent the loss of honey product and the swarm itself due to pest attack. The productivity of frame hive and transitional hives more than triple than that of traditional hives, which is perhaps because of better management practices such as providing wax foundation sheets, recycling drawn-out combs after honey extraction, and a higher frequency of harvesting, (Wolay K. and Teklebirhan T, 2017)

Beekeeping is being suffering from the lack of skilled man power, extension service, appropriately skilled trainers, training materials and training institutions (Fenet and Alemayehu, 2016).

Inspection of hives is one in every of the mechanisms through which difficulties faced in honey production are observed and identified. This might help to require necessary corrective or precautionary measures and/or to determine on early harvesting before the issues worsen. There are two kinds of hive inspection. These are external (without opening from the hive) and internal (with opening of the hive), (Temesgen Terefe, 2018).

2.2.1.2 Institutional Factors

Apiculture extension services don't seem to be well organized and that they lack a strategic approach and coordination. Moreover, with limited staff, even more limited budget and poor facilities; it's difficult to create an effect, (Hadera Gebru, 2019). Inspection of hives is one in every of the mechanisms through which difficulties faced in honey production are observed and identified. This might help to require necessary corrective or precautionary measures and/or to determine on early harvesting before the issues worsen. There are two kinds of hive inspection. These are external (without opening from the hive) and internal (with opening of the hive), (Temesgen Terefe, 2018)

According to Teklu Gebretsadik and Dinku Negash (2016) studies on the inspection of bee colonies by the beekeepers, about 72% of the respondents don't seasonally undertake inspection of their bee colonies. This shows that almost all of beekeepers visit monthly and inspect their beehives outwardly but, they are doing not inspect internally at seasonally unless to test either the hive was stuffed with honey or not. A number of things have prevented the interest of improved methods beekeeping. Lack of inputs and credit services, poor extension services, unsustainable and fragmented supports, lack of data, least research support in generating reasonable and adaptable apiculture technology packages for diverse agro-ecological zones are a

number of the explanations for slow uptakes. The estimations are indicating that around 64% of honey production is employed to form tej (Ethiopian mead) while the export amount is extremely small proportion, just less than 1% of the whole honey and beeswax produced. Within the country, formal and full-fledged service providing to test standards for beehives, beeswax, honey and other beekeeping equipment; decrees on quality assurance; and food safety regulations are lacking, (Holeta Bee Research Center, 2015).

Lack of government intervention is the most affecting factor for beekeeping practice. Most of the beekeepers lack the knowledge of appropriate management of beekeeping. In the country there is no concerned university and college which responsible to provide beekeeping diploma or certificate level course in apiculture science. Holeta bee research center is the only institute which provides basic trainings for beekeeping skill improvement but not meet even for the region level of Oromia. Beekeeping is one of the disciplines which suffered and is being suffering from lack of skilled man power (Haftey and Gashaw, 2018).

2.2.1.3 Input Related Factors

Effective bee colony management requires use of appropriate technologies and accessories. Relatively improved box hive demands further input and accessories than traditional beehive. These consist of smoker, bee veil, high boots, glove, overalls, bee brush, water sprayer, queen catcher, decamping knife, honey presser, honey extractor, casting mold and uncapping fork, (Basuma Rasa, 2019). An improved beehive technology influences the efficiency level of honey producers positively. Honey producers who used of improved beekeeping technologies are more efficient than their counterparts, (Kassa Tarekegn and Assefa Ayele, 2020). Supply of inputs/accessories especially bee forage, colony bee wax, protective clothing, and beekeeping accessories are at a rudimentary stage. Well-built hives, frames, foundation combs, centrifuges and other hive management equipment are generally expensive and not widely available. For beekeepers in the central and northern parts of the country, it is becoming more difficult to procure bee colonies due to credit constraints, (MOA, 2013)

Access to finance is a significant for the development of apiculture for purchasing of beekeeping inputs, processing and packaging of hive products. Modern hives and its equipment are too expensive and thus it is not easy to affordable to buy and uses this equipment. Most of urban

apiculturist were resource poor and needs start up finance for their urban beekeeping activity, sub-city farmers and agriculture bureau 2020).

Most of improved bee hives equipment's such as, honey extractor, wax and wax printer, smoker, modern hives and so on are too expensive to buy and use it. Cost of honey extractor costs ranges from 4,000-5000 ETB and cost of wax printer ranges 5,000-6,000 ETB (Haftey Sahle and Gashaw Embiyale, 2018).

Successful apiculture enterprise requires production equipment and infrastructure such as transport, energy, water, communication systems and apiary buildings (shade, hive stand, hanging fixed comb/removable comb. Sustainable apiculture equipment can be made locally which, in turn contribute to the livelihoods of other local people (FAO, 2009).

2.2.2 Urban Apiculture Contributions

Beekeeping is considered as live stocks, with the increasing commercial value of honey and bees are becoming a growing generator of income, livelihood strategy and means of ensuring food security for so many small-scale beekeepers (FAO, 2018). Apiculture plays an important role in food security and poverty alleviation in Ethiopia. Food security is not only a matter of producing grains and cereals but it is also the financial power to pay the purchase of cereals and grains, since the product obtain from bee hives are high value products. The income generated through selling of hive products (honey and beeswax) is very significant to purchase cereals and grains for family consumption (Samuel, 2017).

2.2.2.1. Social Contribution

According to Young and Zilky (2012), from a social perspective, urban beekeeping fits within an emerging model of land-use regulation that moves away from rigid separation of uses and instead looks at ways to create an urban pattern based on fine grained, multi-use communities, in which the practice urban agriculture is a growing area of interest for citizens and policy makers. Urban beekeeping is also part of the concept of 'ecological citizenship,' which seeks to reconnect people living in cities with natural systems and processes through a reintegration of ecology into the urban fabric. One key issue here, from a regulatory perspective, is how we determine personal landowner and user rights.

2.2.2.2. Economic Contributions

Making the economic case for urban beekeeping is not without its challenges. Opponents of urban beekeeping point to its small profit margins, the inconsistency of urban honey, and the difficulty of staying in business in a market saturated by large, commercial beekeepers. However, it is unfair to evaluate urban beekeeping under the same lense as traditional, commercial beekeeping. Due to higher survival rates and honey yields of urban bees; beehives being extremely land-efficient; and an increasing demand for small-scale, traceable, local food, urban beekeeping has the potential to serve as an important component of a commercialized urban agriculture sector, (Young and Zilky, 2012).

2.2.2.3. Contributions to Environment

The effect of honey bees on urban environment seems to be far less than the effect of the urban environment on the honey bees. Much of this has to do with the fact that urban areas are for the most part artificially shaped. That means that many of its plants and gardens cultivated by humans to have amenity value more than anything else. Even in cases of plant is held for its seeds and a fruit, if it does not carry a desired amount another plant is most likely being added. The dependency on honey bee is therefore no longer given, (Claussnitzer, M., 2014). Though the city may be an important habitat for honey bees, it is not correct to assume honey bees are an important pollinator for cities. Population density within each hive must also be carefully monitored; crowded hives cause swarms of bees to leave the colony and seek a new home. A new colony of bees is likely to be perceived as an unwelcome addition to public space. These concerns highlight the need for proactive policy and regulation to ensure bee health and public safety are protected and enhanced through responsible practice, (Young and Zilky, 2012).

2.2.2.4 Urban Apiculture Contributions for income

Honey is produced mainly as a cash crop, which is serving as a source of additional cash income for hundreds of thousands of farmer beekeepers. Honey is mainly produced for market in Ethiopia. More than 95% of the total produce is marketed, while the remaining is used for home consumption. In addition, a significant number of people are engaged in production and trading of honey at different levels and selling of honey wines (local beverage tej) which create job and self-employment opportunities for large number of citizens. Export of honey and beeswax is

estimated to contribute an average of 1.6 million USD to the annual national export earnings (Ethiopian Customs Authority and Export Promotion Agency, 2006).

Honey production and beekeeping are environmentally friendly practices and relatively easy to engage in. These non-farming business activities have the potential to provide a wide range of economic contributions. Two main economic values could be derived from engaging in beekeeping: income generation from marketing honey and its by-products (beeswax, royal jelly, pollen, propolis, bee colonies, and bee venom) and the creation of non-gender-based employment opportunities.

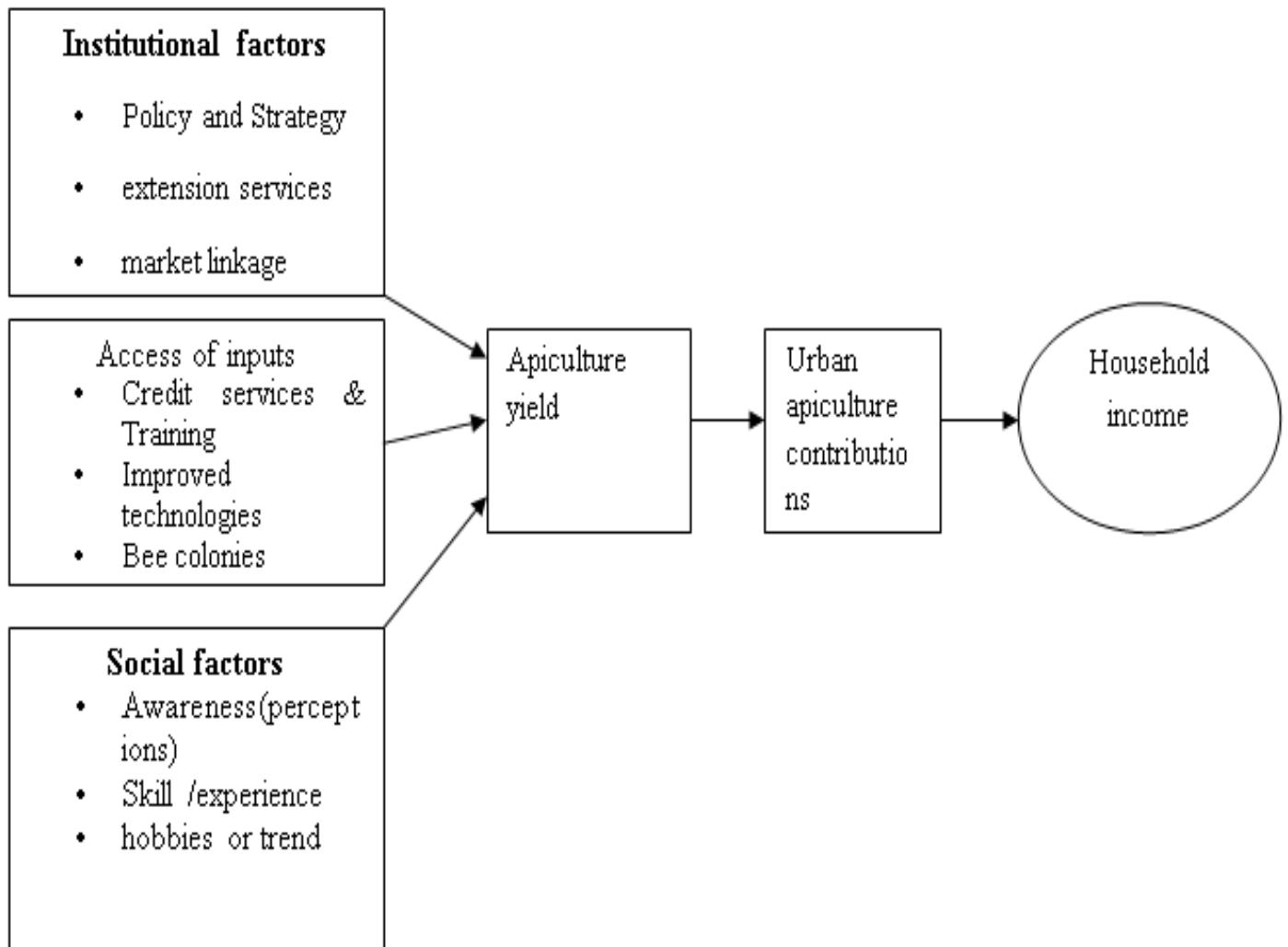
2.3 Literature Gap

Based on all the above theoretical and empirical literature reviewed, there are no enough similar previous literatures, which are done on the topics of urban apiculture production sub-sector in the in Addis Ababa city. It is the major challenging to compare and contrast my findings. So this study will bridge this literature gap in the country to the future studies and intended to contribute the awareness gap regarding to urban apiculture productions contributions to the house-hold income generating capacity.

2.4 Conceptual Framework

The conceptual framework of this study is talk over and as shown (see figure 2.1) below based on the assumption that to bridge urban apiculture production business by small scale apiculture producer's development/enterprise are having a great role in improving production and bee yard income for household expenditure. The linkage between urban apiculture development, input supply, institutions and psychological factors (perception, knowledge and attitude) such variables assumed to affect apiculture yield and house-hold income. Conceptual framework model of the study is presented as follows:-

Figure 2. 1 Conceptual framework



Source: Own construction based on the Sustainable livelihood framework.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides the reader with an overview of the methodological considerations and assumptions underlying the research process. It describes the methods and procedures that the researcher used to achieve the research objectives. The chapter covers the research approach used in the study, research design, target population, sample size, source of data and data collection, and finally how the data is analyzed.

3.2 Description of the study area

Gullele sub city is located in the Northern part of the city at 9° 3' 46.8" N and 38° 44' 36.96"E Latitude of Addis Ababa which is topographically mountains in nature. Most part of these mountains are covered by forests mostly eucalyptus trees. These forests are part of the green areas reserved in the city and have both economic and environmental benefit. The sub city is surrounded by Kolfe Keraniyo sub city in the west, Yeka sub city in the East, Arada and Addis Ketema Sub city in the south and Oromia regional state in the North, the total area of the sub-city about 30.18 km² and it is about 11.65 km away from the center of the city (Minwuyelet M. 2004 ESS web.).

The sub city is one of third populated sub city in Addis Ababa. Currently, in Addis Ababa city farmers and urban agriculture development commission report shows that there are about 1027 urban apiculture development participants in the city. From those about 168 are presented in Gullele sub-city. Currently for administrative purpose the sub city is divided in to 10 Woreda's and providing basic public services at local level. Most of the populations of the sub city fall in medium and lower living standards; they are mainly imaged in low standard informal activities (Gullele sub city strategic plan, 2008). The study explains the contribution of social and economic factors on income generation among urban apiculture households' in Gullele sub city.

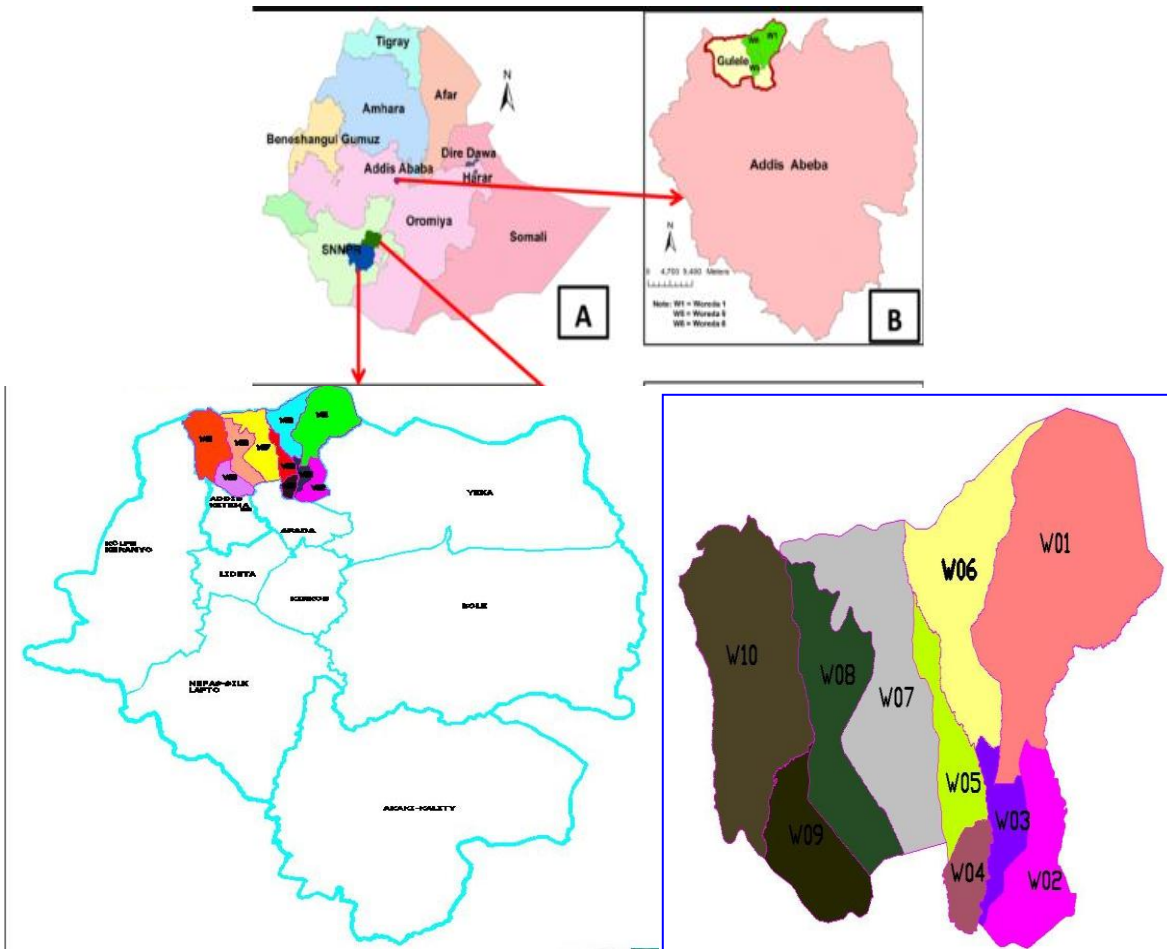


Figure 3.1: Map of Ethiopia, Addis Ababa and Gullele sub city

3.3 Research Design

This study used an explanatory and descriptive research design to identify a contribution of urban apiculture for income generation at household level. Explanatory research seeks to explain the phenomena being studied (Kothari, 2004).

According to Creswell (2003), there are three types of research approach which are familiar to social science studies, namely qualitative, quantitative, and mixed approach. Qualitative approach used mostly when the researcher needs to develop a complex, holistic picture, analyzes words, reports, detailed view of informants, and conducts the study in a natural setting and involves studies that do not attempt to quantify their results through statistical summary or analysis (Creswell, 2009). The rational reason for the adoption of a quantitative approach includes: to develop knowledge of cause and effect thinking, reduction to specific variables and

hypotheses and questions, use of measurement and observation, and the test of theories, employee strategies of inquiry such as experiments and surveys (Creswell, 2009).

The quantitative approach uses surveys of cross-sectional or longitudinal using self-administered semi-structured questionnaires with the intent of generalizing from a sample to a population. So well designed and implemented quantitative research approach has the advantage of generalizing to a wider population from the sample. The mixed research approach is a means to collect both qualitative and quantitative data and analyses together to answer the research questions. In other words, it involves the collecting and “mixing” or integration of both quantitative and qualitative data in a study.

Therefore, in this study, mixed research approach employed; which includes both qualitative and quantitative research approaches. The use of this method is helpful to ensure that the data collected effectively, interpreted and analyzed using the descriptive statements.

3.4 Target Population

According to Kombo and Tromp (2009) population is a group of individuals, objects, or items from which samples were taken for measurement or it is an entire group of persons or elements that have at least one thing in common. The target population of the study consists of Gullele sub-city beekeepers. Furthermore, from the total 168 population in the sub-city for the entire number of beekeepers’ house about 118 households taken as the sample population of the study from purposively selected three woredas.

3.5 Sample size determination

Sampling refers to the statistical process of selecting and studying the characteristics of relatively small number of items from a relatively large population of such items, to draw statistically valid inferences about the characteristics of the entire population. Prior to the actual data collection, emphasis was made on the determination of sample size that is mainly dependent on the purpose of the study, available resource and precision (variance) required Sangeeth, (2007).

According to Gullele sub-city farmers and urban agriculture development office 2021/2022 semiannual reports total population for the entire number of beekeepers’ house about 168 households in the sub city and 118 beekeeper households in purposively selected three woredas.

In order to select sample from the population the study used simplified formula provided by Yamane (1967) in order to determine the required sample size at 95% confidence level, and with the level of precision of= 5% for proportions. To select sample size the following mathematical formula used.

$$N = 118$$

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

Where,

N= designates total number of beekeepers households in the selected weredas from the sub-city,

n= represents the sample size,

e= assumed to be represents maximum variability or margin of error 5% (0.05),

1= designates the probability of the event occurring.

$$n = \frac{N}{1 + N(e)^2} = \frac{118}{1 + 118(0.05)^2}$$

$$n = 91$$

Table 3.1 Sample Distribution.

S/NO	SELECTED AREA	POPULATION SIZE (HH)	PROPORTION	SAMPLE SIZE (HH)
1.	GULLELE SUB-CITY	168		n
1	SELECTED WOREDAS IN THE SUB-CITY			
2	01	57	0.48	44
3	04	38	0.32	29
	06	23	0.19	18
TOTAL	3	118		91

Source: (Gullele sub-city farmers and urban agriculture development office, 2022)

3.6 Source of data and data types

To make an analysis the study was used both primary and secondary data. The primary data was collected through questionnaires and direct observation. The questionnaires had several questions with close-ended types of questions that are relevant to the subject of the study in such ways that the respondent fills easily. Finally, the researcher used a secondary source of data which was obtained through review and selected materials such as organization records, and related literature reviews.

3.7 Method of Data Analysis and Model specification

The study was used both qualitative and quantitative method of data analysis. The qualitative type of data were collected through continuous field observation and analyzed textually. The collected quantitative data were coded and entered in to the analysis software which is called statistical package for social science (SPSS 20). The data collected from urban beekeeper households' survey through questionnaire presented and analyzed through inferential descriptive statistics.

The first objective (to examine the contribution of socio-economic factors on income generation among urban apiculture household) was analyzed with the aid of inferential statistics including correlation coefficient for continuous explanatory variables, chi square test categorical variables and finally confirmed by **econometric model** (multiple linear regression models which are used to analyzed, the socio-economic factors affecting urban apiculture for income generation among households. The reason is multiple linear regression models is recommended for analyzing continuous dependent variables.

The second objective of the study (impact of urban apiculture on households' income) was analyzed also qualitatively by generating descriptive statistics. The descriptive statistics with the aid of tables used maximum and minimum values, mean, standard deviations, frequencies and percentage analyzed the data.

Multiple linear regression models: The study was employed by applying multiple linear regression models as above explained, to examine the contribution of socio-economic factors on income generation among urban apiculture household level in Gullele sub city multiple linear

regressions model applied. Multiple regressions, is a statistical technique that uses several explanatory variables to predict the outcome of a response variable. The dependent variable was that of household income from urban apiculture which is continuous variable for this study is being. The explanatory variables are composed of institutional factors, access of inputs, infrastructure/physical capital and social factors.

Models specification: Multiple regressions, is a statistical technique that uses several explanatory variables to predict the outcome of a response variable. As a predictive analysis, the multiple linear regressions are used to explain the relationship between one continuous dependent variable and two and more independent variables. The multiple linear regression model equation is shown as below.

$$y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \dots + \beta_p x_{ip} + \epsilon$$

Where it becomes:-

$$HI = \beta_0 + \beta_1 IF + \beta_2 SF + \beta_3 AI + \epsilon$$

HI = household Income/dependent variable

IF = Institutional factor

SF= Social factor

AF= Access of input factor

β_0 = y-intercept (constant term)

B_1, B_2, B_3 = slope coefficients for each explanatory variable

ϵ = the model's error term (also known as the residuals)

3.8 Definition of Variables and Working Hypothesis

The data were covered information necessary to make apiary level indicative of input; institutional and social factors those challenging urban apiculture productions and its contributions to income generation at household level in the study area. Both continuous and discrete variables will be used on economic theories and findings to answer the research questions of this study, the following variables are constructed.

3.8.1 Dependent Variable

The main objective of this study is to analyze contribution of socio-economic factors on income generation of apiculture among urban apiculture households. In the sub-city honey is produced for both consumption and sell to earn household income. For this study, household annual income generating from apiculture is used as dependent variable and it is a continuous variable and measured in two ways first by using likert scale based on perception of the respondents secondly measured in ETB.

3.8.2 Socio-economic independent/explanatory variables

Independent variables are variables that stand alone and are not changed by the other variables but cause change in dependent variable(s). The independent variables for this study are identified based on review of different literatures and carefully identified only those affects households decision to engage in urban apiculture business and the outcome considered by the study. Based on this, those include social factors; institutional factors; and access of input factors identified as independent variables for this study. As above (Figure 2.1) shown independent variables (as shown in conceptual framework) will be explained that most probably to influence urban apiculture in the study area have effect on apiculture yields and income generation at household level. Those independent variables (Social factors; institutional factors and input service and supply factors) each is triangulated with the conceptual framework ideas.

3.8.2.1 Social factors

Sex of household head (SEX)

Is a dummy variable, Amina Said (2019) found that the majorities of beekeeper were males and were likely to be the dominant users' modern technology in beekeeping. But, it was hypothesized that sex being male or female of household heads both have a positive influence on urban beekeeping practice and management.

Age of households

Age is continuous variable that represents the age of household heads in years. The older and retired household heads have more experiences and more risk averters to urban apiculture

productions. Therefore the age of the household heads increase, their experience and hobbies to involve in such easily income generating activity expected to involve and support their household food security. Therefore age is hypothesized that, a positive relationship between age of beekeeper and participating in urban beekeeping sector. Age and experience has a valid implication on beekeeping practice to identify the technique and characteristics of apiary management to increase production by using it accordingly Addisu and Desalegn (2021).

Education level of urban beekeepers

As we know education is enhancing urban beekeepers ability to perceive, easily understand to apply, widely use and get more quantity and quality of hive products from urban apiculture sub-sector. It also enables urban beekeepers to search more production way and easily manageable technique or acceptable (adaptable) by densely populated urban environment friendly urban apiculture practices. This research expected as there is a positive relationship between educational status of urban beekeeper and participation in beekeeping activities and household income from hive products.

Education level of beekeeper households is vital to accept and perceive the characteristics of improved beekeeping. More educated beekeeper has a tendency of access and use information relevant to the beekeeping management and practice Amsalu (2020).

Awareness (Perceptions): Nuisance impacts on adjacent property, potential neighbor non-support and public opinion, no hobbies at all for beekeeping, small in scale, limited interest in practice, unlikely to achieve reasonable scale of economies to become effective on income Tulu et al, 2020.

Urban apiculture production Experience

Actually apiary farm experience is a continuous variable which is measured in years. Which is used to simply know household heads has own skill to manage their apiary by their own self or not. The apiary farm experience is a continuous variable which is measuring urban apiculture factors is used in years. Their own self apiary management skill used to minimize their professional expense, maximize production yield, controlling pest and bee pray and timely running the production activities appropriately. So this study supposed that, there is a positive

relationship between self-experience and urban apiculture better production. The hypothesis also supported by Guide to Urban Beekeeping, (2019) that stated as principal role of urban apiarist in the city is to insure, that the well-being of urban colonies management, which is too different from country side beekeeping management.

3.8.2.2 Institutional factor variables

Apiculture extension services are not well organized and they lack a strategic approach and coordination. Moreover, with limited staff, even more limited budget and poor facilities; it is difficult to make an impact. Also least research support in generating reasonable and adaptable apiculture technology packages for diverse agro-ecological zones are some of the reasons for slow uptake of urban apiculture production business Gebru, 2019.

Access of appropriate extension Service

Extension service is the activity that could be given to the urban beekeeper households and cooperatives who involved in urban beekeeper or not. This service includes technical advice, regular follow up, training service, trial and demonstration for new urban beekeeper participant households and member of urban beekeeper cooperatives. This study hypothesized that there is a positive relationship between extension service and urban beekeeping activities.

Beekeepers access to extension service and knowledge transfer from extension expert and nongovernmental organization is very critical for apiculture development practices and sustainability of beekeeping. Government side involvement and attention paid

Based on Fente and Alemayehu (2016) study inadequate government support and promotion of apiculture industry development cease its potential contributions as a country level. Absence of adequate bee research and research center, training institutions, strong policy and strategy are lagging its contributions.

Government side involvement and attention paid

Based on Fente and Alemayehu (2016) study inadequate government support and promotion of apiculture industry development cease its potential contributions as a country level. Absence of

adequate bee research and research center, training institutions, strong policy and strategy are lagging its contributions.

Price of honey

This explanatory variable is a continuous that explained by price/kg. According to Nasir et. al (2020) in rural side most beekeeper households were price taker and not decision maker when and with how much price they want to sell their hive products. This implies no ready market access which attracts beekeeper households at rural side. Their study percentage shows that 72% price decision share determine by buyers, 24% by both negotiation and the only share of 4% selling price determined by beekeeper own.

3.8.2.3 Input Variables

Input availability and potential to use is among the factors influencing apiculture business. Availability of input for apiary technologies is very important in apiculture production. The inputs such modern hives and its accessory materials are very crucial for who engaged in the activities. However, required inputs may not be available in accessible local markets. Effective bee colony management requires use of appropriate technologies and accessories. Relatively improved box hive demands further input and accessories than traditional beehive. Credit service, farming place (land), bee colony (swarm), training supports are the major input to promote urban apiculture business Rasa, (2019).

Types of hives used (traditional, transitional and modern hives)

This variable affect positively the production amounts of hive products of the urban beekeeper households. This variable also assumed positively affected the annual income of urban beekeepers households. This indicate that apiculture producers with improved hive type and with more number of improved bee hives can harvest more volume of honey and it is also used to maximize and having of marketable surplus as well as able to sell more to earn better income for households Kassa et. al, (2018)

Access of Credit Service

It is used to measure whether the urban beekeeper household heads have to credit access or not. Credit is a major input in startup capital like as urban agricultural activities (dairy production, fattening, poultry and horticulture) production activities. Therefore this study hypothesized that there is a positive relationship between credit access and urban beekeeper household's income from urban bee hive products.

Bee swarm is a liquid asset easily to change in to cash that support beekeeping sectors and beekeepers to lend credit for confidently for their honey production Belets and Birhanu (2014).

Access to swarm

It is used to measure whether urban beekeeper households has access of swarm for their increasing of hives and its products or not. Apiarists getting market access to buy the swarms in a way easy with a reasonable and fair market price for their product maximizing, consumption and generating more income for their household food security. This study supposed that there is a positive relationship between accesses of swarm for urban beekeeper households to produce more for their consumption and income from sales of it. According to Soresa and Nigusa (2020) to sustain and start beekeeping availability of swarm resource by any means is very critical. The common establishing apiary mechanism is by catching the swarm from the locality, by gift and transfer from parents and families and buying it.

Use of printed wax foundation

The expectant result hypothesized that have positive relationship between the improved (modern hives) and use of wax foundation.

Printed wax foundation sheet is used for the recent type of hive (modern hive) and it believing, has the potential to be an excellent in higher yield and better quality of honey production capacity than traditional and transitional types of hives. The problem is it needs centrifugal extractor to extract pure honey from its crude Carroll (2006).

Apiary land size in (meter square)

Apiary land size of the urban beekeeper households play a significant role to placing a hives and properly manage it. It is a continuous variable which measured in hectares (h). Based on Berquist, et. al. (2012) for urban environment apiary land can be integrated as mixed use land part policy is an important issue for the urban apiary. This urban land use opportunities for beekeeping include from back yard to commercial areas with a supportive component of urban agriculture movement to incorporate as a part of urban food sovereignty and bee ecological citizenship in the urban ecology.

3.8.3 Description of variables and expected sign with the output variable

All the above explanatory variables are summarized in three major groups (institutional factors, social factors and access of input factors) and those are continuous and discrete variables for this study they measure by likert scale for the purpose of find out their effect/contribution on income generation of apiculture. They are expected have positive significant on income from apiculture.

3.9 Reliability test

Reliability refers to the consistency of the measurements of variables (Hair, et al., 2010). Moreover, Rovai, et. al., (2014) recommended that Cronbach's alpha is a very important tool for measuring internal consistency and assess the reliability of the variables. Hence, George and Mallery (2003) mentioned that Cronbach's alpha coefficients have ranged from 0.5 to 0.90. A test is considered reliable if the same results are gotten repeatedly.

The closer the Cronbach's alpha is to 1, the higher the internal consistency reliability of the research instrument. Furthermore, Hinton et al. (2004) have suggested four cut-off points for reliability as follow:

Table 3. 2 Cronbach's alpha value

Cronbach's Alpha	Results
Above 0.9	Excellent reliability
0.70-0.90	High reliability
0.50-0.70	Moderate reliability
Below 0.50	Low reliability

Therefore, as per the discussion above the researcher used Cronbach's alpha to evaluate the internal consistency of variables designed to collect the respondents' views concerning the research topics. The reliability of the data was tested by taking 10 percent of the total respondents. The items (variables) are both dependent and independent variables. From the result of reliability data, it possible to conclude that the questions included in the questionnaire have internal consistency.

CHAPTER FOUR

RESULT AND DISSCUSSION

4.1 Introduction

This chapter presents the descriptive statistics, correlation analysis and multiple panel linear regression analysis of the study variables under three sections. The first section deals with the descriptive statistics and summarizes the main features of the study variables in terms of mean, standard deviation, minimum and maximum. The second section deals with the correlation analysis and shows the degree of association between the study variables, various tests (specification tests) also presented. Finally, the result of the given regression model was interpreted accordingly.

4.2 Demographic characteristics of the respondent

From table 4.1, the sex distribution of urban beekeeper households were 62.8% (57) were male headed and the remaining 37.2% (34) were females' urban beekeeper households. The finding shows that, the urban beekeeping activity in the sub-city was dominated by male respondents.

As shown in Table 4.1 the highest percentage of age of the bee farmers was above 46-55 (59 %) years and ranging from 31 to 45 years with has 28 % the remaining age which is 18-30 and above 56 accounts 8% and 5% respectively. This suggests that aged urban dweller spend their spare time on urban apiculture practice to support their household food security and income earning. Further the aged people have more social networks tendency than younger peoples to lead their apiary patiently and appropriately using this industry.

Respondents also enquired to address their educational profile so as to know the educational level of respondents. As per the statistical analysis result through frequency and percentage; 5 (6%) of sub city respondents are illiterate. 28 (30%) of the respondents are that their educational level is general secondary school, 38 respondents are having TVET certificate and 26 percent are having diploma. Based the analyzed information the educational level of respondents, most of the respondents are TVET certified and above below certificate and some of them are illiterate and secondary school or less (see Table 4.1)

Table 4. 1 demographic characteristics of the respondents

Respondents		Frequency	Percentage
Sex	Male	57	62.8
	Female	34	37.2
	Total	91	100
Age	18-30	7	8
	31-45	25	28
	46-55	54	59
	Above 56	5	5
	Total	91	100
Education Background	Illiterate	5	6
	Secondary School Or Less	28	30
	TVET Certificate	34	38
	Diploma	24	26
	Total	91	100

Source: studies Survey results, 2023

4.3 Household perceptions on apiculture factors

According to table 4.2, all the respondents (91) were answered —yes about urban apiculture supportive contribution for their household food security (consumption) and income generation. On the other hand, 9.9% (9) respondents were involved in urban beekeeping production as a hobby; similarly, about 61.6% (56) of the respondent households were saying they learned from their families and parents. The only 23% (21) respondents were started keeping by aid of training. The left 5.5% (5) learned from other sources.

About 46% (42) respondents were set their honey selling price and 46% (42) were set their honey price by negotiations. The remaining 8% (7) urban beekeepers were not selling their honey; instead they consume it in the house (table 4.2).

A human capital is very critical issue for urban beekeeping, as the urban environment is densely populated and is associated with noise of bees ‘movement to the surroundings of the apiaries to search of forage and water for their honey production. From the questioner, traditionally some societies of the study area have less awareness to bees’ management. From urban beekeeping skill check responses, 73.9% (67) said yes as having skills to manage their apiary by themselves. The remaining 26.1% (24) beekeeper households gave no response as they do not have skill to manage and inspect their colonies by themselves.

Concerning the source and access of training for urban beekeeper households, 89 % (81) said no appropriate training access given from government institutions or from non-governmental organizations to urban beekeeper households. Only 11% (10) beekeeper got access of appropriate beekeeping management training. On the other hand, almost all 94.6% (86) beekeeper households were keeping their bees in small plot of backyard land, on their top of buildings, on fence wall or their house wall. Finally, the descriptive analysis results show in table 4.2 that 91.6% (83) of urban beekeepers were having no access to credit service from governmental or any other financial sources. The only 8.4% (8) were having access of finance for their apiculture business in the sub city. Almost all apiarists were leading their production activities with the limited land space around and on the top of their buildings.

Table 4. 2 household perceptions on apiculture factors

Respondents		Frequency	Percentage
Urban Apiculture Supportive Contribution For Income Generation	Yes	91	100
	No		
	Total	91	100
How Did You Start Beekeeping	From Other Source	5	5.5

	Learned From Their Families And Parents.	56	61.6
	Hobbies	9	9.9
	Aid Of Training	21	23
	Total	91	100
Selling price	Set Their Honey Selling Price By Their Own	42	46
	By Negotiation	42	46
	Not Selling Honey	7	8
	Total	91	100
Urban Beekeeping Skill	Having Skills	67	73.9
	Do Not Have Skill	24	26.1
	Total	91	100
Training For Urban Beekeeper Households	No Training Access	81	89
	Access Of Training	10	11
	Total	91	100

Source: studies Survey results, 2023

4.4 Source and level of income

In the study area, urban households practice different livelihood activities. Among them apiculture production system was the most important activity practiced by most of the households. From the respondents, 100 % and 45 % of them practice honey production and poultry on agricultural activity system respectively, as their major income sources (Table 4.3). incorporates Public work, Daily laborer on non-agricultural activity, Trading livestock, house rent and Selling fire wood or charcoal are also sources of income.

Agriculture and non-agricultural activities were the main sources of income in the study area. Farmed beekeeping is expected to increase farm income. The survey result revealed that the mean honey income of the beekeepers was ETB 16670.32 which means sample respondents in the sub city earns additional ETB 16670.32 by engaging in apiculture. The other source of incomes is public work on non-agricultural activity which is the third source of income for the sample respondent; on the other hand, trading live stock is one of income generation for household in Gullele sub city, daily laborer is the other source of income generation following

trading livestock. House rent and crop production are the other source of income generation for beekeepers respectively, finally Selling fire wood or charcoal is the least source of income in for beekeepers in the sub city.

Table 4. 3 source of income in the study area

Source of income		Lively Hood Activity During The Last 12 Months		Order Of Importance For House Hold Income Contribution	Total Annual Income Earned While Doing This Work (mean Birr Per Annual)
		Yes (%)	No (%)		
Urban agricultural activity	Poultry	45	55	2	16670.32
	Dairy	20	80	6	
	Honey production/apiculture	100	0	1	
	Garden vegetation	18	82	7	
Non- agricultural activity	Public Work	34	66	3	
	Daily Laborer	18	82	7	
	Trading Livestock	32	68	4	
	House Rent	23	77	5	
	Selling Fire Wood Or Charcoal	5	95	9	
Others		11	89	8	

Source: studies Survey results, 2023

4.5 Annual Income from apiculture

The total honey production of (2022) in the study area was 7.708 tons, of which 1,248kg was consumed in the household and 6460 kg was sold at household level with a total value of 1,517000 ETB (Table 4.4).

From the sample taken households 7.708 tons of honey was produced and almost no production of wax in the sub-city. Most of the sub-city apiarists did not have awareness and skill to produce hive products other than honey and also they did not have completed hive production materials (accessories).

Domestic honey price mainly in the study area and Addis Ababa city differ substantially by honey marketing shop, super market and domestically produced honey

Table 4. 4 Annual honey yield and obtained income

	N	Minimum	Maximum	Sum	Mean	Std.
Annual hone honey supply for sale in kg	86	0	531	6460	75.11	86.31
Annual consumed honey in the household in kg.	91	0	163	1,248	13.71	16.71
Annual income obtained from sales of honey in Eth. Birr	91	1050	47000	1,517000	16670.32	10723.6

Source: studies Survey results, 2023

In addition, the descriptive statistics shows that the average annual income from having a skill on beekeeping management and bee keepers with no skill households during the budgeted year, 2022 and 2023, is Birr 11,374.77 and Birr: 5,286.45 respectively. And also the average annual income for those who have access of training is found to be Birr: 0,210.10 and for no access to training is Birr: 6,558.14. Therefore, this suggests that the average household income from having skill and access to training on beekeeping is higher than compared to the average income of households those who have no skill and no access on training on beekeeping.

4.6 Reliability test

The reliability of instruments measures the consistency of instruments. Creswell (2009) considers the reliability of the instruments as the degree of consistency that the instruments or procedure demonstrates. Based on a questioner's response an internal consistency of reliability test was conducted with a sample of 91 households and the Cronbach's alpha coefficient for the instrument was found greater than 0.7 which is above high reliable (see table 4.5).

Table 4. 5 Reliability Statistics

	Cronbach's Alpha	N of Items
Household income	.860	1
Institutional factor	.781.	6
Access of input	.811	6
Social factor	.762	3

Source: studies Survey results, 2023

4.7 Correlation analysis

This section of the study presents the results and discussions of the correlation analysis. To identify the relationship among the selected variables of urban apiculture and its contribution for house hold income. As indicated below in table 4.6, the correlation matrix which shows the relationship of the income generation at household level with urban apiculture (institutional factor, access of input and social factor) the table below also shows that the linear relationships between each independent variables, and dependent variables used in this study. Based on the correlation matrix independent variables; institutional factor (IF), social factors (SF) and access of input (AI) are positively correlated with Income generation at household level, positive coefficients indicate that when the value of social and economic factors increases, the value of the household income also tends to increase.

Table 4. 6 Correlation matrix of household’s income and urban apiculture factors

Correlate	House hold income	Institutional factors	Access of input	Social factor
House hold income	1.000			
Institutional factors	0.130	1.000		
Access of input	0.114	0.018	1.000	
Social factor	0.095	-0.132	0.166	1.000

Source: studies Survey results, 2023

4.8 Model diagnostics

This section of the study presents the regression results of the effects of urban apiculture elements on income generation at household level. To enhance the quality of the econometric estimates, model diagnosis tests are made followed by presentation of regression results on the effects of urban apiculture on income generation at household level. The regression analysis enables the study to empirically test the proposed hypothesis and to achieve the research objective. Due to the attractive statistical properties that made it one of the most powerful and popular methods of regression analysis (Gujarati 2004), the method of least squares, OLS estimation method was used in the model by conducting the appropriate diagnosis tests.

4.8.1. Heteroscedasticity test

Heteroscedasticity is a systematic pattern in the errors where the variances of the errors are not constant (Gujarati 2003). If the residuals have the same variance from one observation to another observation, it is called homoscedasticity. Whereas, when the variance of the error term or residuals differs at different value of the independent variables, it is referred as heteroscedasticity.

Therefore, the White’s test for heteroscedasticity is used. As indicated in both tables of table 4.5 and table 4.6, to test the existence of heteroscedasticity problem in the regression model, the null hypothesis explained as there is homoscedasticity (the error terms have constant variances) and the alternative hypothesis is if not. The result of the test does not permit the researcher to reject the null hypothesis at 0.05, significance level or (Prob> chi2=0.3117 for income generation at household level (HI). Therefore, hetero sedate city problem does not exist on a given research data.

White's test for Ho: homoscedasticity

Against Ha: unrestricted Heteroscedasticity

chi2 (56) = 60.66 Prob> chi2 = 0.3117

Table 4. 7 Heteroscedasticity test

Source	chi2	df	P
Heteroscedasticity	60.66	56	0.3117
Skewness	8.73	10	0.5574
Kurtosis	3.71	1	0.0540

Source: studies Survey results, 2023

4.8.2. Test of Multicollinearity

Multicollinearity exists if the correlation between two independent variables is more than 0.9 ($r=0.9$ or above) (Gujarati 2003). In order to examine the possible degree of multicollinearity among the explanatory variables, Variance Inflation Factor (VIF) technique is employed. It measures the increasing in the variance of a coefficient as result of collinearity. The advantage of VIF is that, it helps to identify the variable causing the problem. As we can see from table, 4.8 below the overall VIF result is 5.2 which is less than 10. Therefore, this test is acceptable and prove that there is no multicollinearity problem from the given research data or it suggests that there is no perfect or strong collinearity between the explanatory (Independent) variables.

Table 4. 8 Test of Multicollinearity

Variables	VIF	1/VIF
Institutional factore (IF)	6.62	0.150987
Access of input (AI)	5.76	0.173694
Social factor (SF)	3.24	0.308400
Mean VIF	5.2	

Source: studies Survey results, 2023

All the above tests of basic classical linear regression model assumptions for OLS estimation discussed so far prove that the results obtained from the regression models in this study are consistent, free from bias and efficient since all the assumptions hold and the next section presents the analysis and discussion of the outputs of the regressions.

4.9 Regression results and Discussion

From the regression analysis Constants = 0.048 for income generation at household level, shows that if all the independent variables are all rated as zero, the income generation at household level of sample urban beekeeping in Gullele sub city Addis Ababa would rate at 0.048. The level of confidence for the analysis was set at 95%. Therefore, the P- value less than 0.05 imply that the independent variables are significant otherwise not.

The regression results of (Table 4.9) below indicated that there was a strong relationship between the dependent and the independent variables. The value of R-Square for dependent variables income generation at household level was 0.54, indicating that 54 % of the changes in income generation at household level, could be explained by the independent variables (institutional factor, access of input and social factor) for the study. The remaining 46% the change in income generation at household level, of the regression model is explained by other factors which are not included in the regression line.

The dependent variables explained here for this study is income generation from apiculture among apiculture household level using the perception of the respondents. The study is perception based study it shows the relation of socio-economic factors for the capacity of apiculture as a means of income generation among households by using likert scale. As indicated in table 4.10 below, institution of factor, access of input and social factor are found to be significant regressors of income generation at household level of sample respondent in Gullele sub city. The overall reliability and validity of the model was also further improved by the fact that the Prob (F-statistic) values being ($P > F = 0.0000$ for the two models), which indicates strong statistical significance. Thus, the null hypothesis of the overall test of significance that all coefficients are equal to zero was rejected as the p-value was sufficiently low (less than 0.05).

Table 4.9 Regression results

Source	SS	df	MS	Number of obs = 91
				F(10, 99) = 11.70
Model	0.438846543	10	.043884654	Prob> F = 0.0000
Residual	0.371258297	99	.003750084	R-squared = 0.5417
Total	0.81010484	109	.007432154	Adj R-squared = 0.4954
				Root MSE = 0.06124

HI	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
(IF)	0.5188	0.0067971	-0.76	0.044**	-0.0186748 0.0082989
(AI)	0.3616533	0.0533739	6.78	0.000***	0.4675587 0.2557479
(SF)	0.6469548	0.049931	4.35	0.000***	0.1178808 0.3160288
_cons	0.0482905	0.0590995	-0.82	0.416	-0.1655568 0.0689758

Note: significance at * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ respectively.

Source: Own survey data computed (2023)

4.10 Hypothesis testing

H1. Socio-economic factors have significant contribution on income generation of urban apiculture among beekeeper households

Institutional factor (IF)

From the Regression result in the (table 4.10) frequent extension contact and follow up for urban beekeeper, applying training/advice, work with policy and strategy, support by government on market linkage was contribute the production amount of hives at positive significance at (b 0.5118 and $p=0.044$) value with the level of 5% significant level. Based on the result it is possible to conclude the appropriate extension agents frequent contacts and follow up of urban beekeeper is the most significant to increase income at households' level by 51.1%. This finding in lined with the study findings by Biruk (2014) continuous

development agent contact and technical support to beekeeper make the beekeepers to have better exposure and more quantity of honey producer.

Access of input (AI)

The beta value for access of input factor for contribution of urban apiculture practice in households' income is (b=0.36 and p=0.0000) on, which implies that urban apiculture household who had chance credit service for beekeeper households, supplies beekeeping equipment for the beekeepers and participating in beekeeping extension packages have a probability of more hive product yield gain and increase households' income. Moreover, as the model result indicates access and sources beekeepers source of their swarm / honey bee colony and accessibility in general access of input increase household income by 36%. This finding in line with Adino and Tessema (2021) has a significant positive effect. Credit access has an ability to minimize the financial limitation of beekeeper households that enable them to buy and use improved technology and inputs for their apiary Dereje et al (2020).

Social factor (SF)

Beekeeping experience played a great role and a positive relationship between apiculture business and income generation. To expand the apiary and produce more the beekeepers experience to manage properly their swarm / honey bee colony an important factor. The statistical results showed apiculture professionals, swarms catching experience and production potentials and honey forage availability significantly contribute for income generation in household level at (coefficient value of 0.64 and p value 0.00) significant level. This result implies that, as urban beekeeper household 's year of experiences, availability of apiculture professionals, swarms catching experience and production potentials and honey forage availability increases the income generation of apiculture households by 64%. This result is confirmed by Kassa et al. (2017) that beekeepers who have more experience in beekeeping have higher ability to produce more quantity of hive products than who have no experiences of beekeeping.

H2. Urban apiculture has significant impact on income among apiculture households

The descriptive statistics result shows that urban apiculture households earn 16670.32 ETB annually on average this leads to accept the hypothesis testing that stands from urban apiculture has positive significance on income among apiculture households. The result indicates that households that engage in urban beekeeping practice are economically benefited and it will be better if there is a good socio-economic factors trend to improve apiculture practice one means of income for urban society with less human resource capital. The result of this study agree with (Teklu Gebretsadik and Dinku Negash, 2016), they stated that on their previous study beekeepers practiced as sideways with other agricultural activities as a means of income in Gedeo zones of southern Nation nationality and people's regional state.

The overall hypothesis testing on the three socio-economic factors on income generation among beekeeper households has highly positive significant on income generation apiculture at house hold level and urban apiculture has positive significant impact on household income.

4.11 Summary of Interview Response

The city and research region lacked a developed market for honey. The interview participants agreed that honey is the food item that has been tampered with the most in their neighborhood. The majority of illegal honey sellers demand a premium price (more than the market), presuming that they will utilize the pure honey for adulteration. They never purchase extracted honey. This suggests that the crude honey wax float was employed to give their contaminated products a likeness with the organic honey. In addition to this, too many urban beekeepers lack complete skills and employ improper or out-of-date management practices. In particular, they were examining themselves for internal hive management (inspection and production), and the majority of them were not currently backed by experts with high professional labor.

CHAPTER FIVE

SUMMARY CONCLUSION AND RECOMMENDATION

5.1. Summary

The primary objective of the study was to contribution of socio-economic factors on income generation among urban apiculture households' in Gullele sub city in Addis Ababa Ethiopia. The study used primary and secondary source and the data gathered from the bee keepers in Gullele. A purposive sampling technique was used to select 91 bee farmers for the study. Primary data were obtained with the aid of structured questionnaire and interview schedule. Multiple linear regression model was employed in the data analysis to help in addressing the objectives.

The study examined the contribution of institutional factor, access of input and social factor on income generation at household level. The perception of households in relation to urban beekeeping practices and their contribution for income generation status were analyzed by regression model. Three independent variables were selected based on empirical reviews conducted by different scholars and the city administration level urban apiculture unpublished documents and reports, which can influence urban apiculture production and urban beekeeper households 'income generation status. From identified explanatory variables, three of them were found to be significant influence and contribute in determining income generation in household level.

5.2. Conclusion

The study looked at home level revenue generating in Gullele Sub-City, a bee farming region in Addis Ababa. The outcome demonstrated that the State's honey production from bees is profitable. Specific knowledge and skill requirements as well as skill development problems were present in market-oriented beekeeping development. There is a shortage of skilled workers who can improve the productivity and caliber of marketable hive products while also understanding the current beekeeping-human relationship and offering context-specific services. Beekeepers also differ greatly in their management abilities and knowledge of beekeeping. Therefore, improving and addressing the varied knowledge and skill requirements of beekeepers helps to rise household income generation from apiculture production.

Other factors that affect income generation at the household level include institutional factors. These include things like a lack of inputs and credit services, subpar extension services, unsustainable and fragmented support systems, and a lack of adaptable apiculture technology. Similar to how enhanced beehive technology increases household income, input related factors have a favorable impact on the productivity of honey producers. The efficiency of honey producers using new beekeeping technologies has increased. Finally, the study finds out that apiculture/honey production has a contribution on house hold income and that was better on the area those apiculture factors are implemented.

5.3. Recommendations

The recommendations listed below were made based on the study's findings in order to boost urban apiculture growth and increase its contribution for income generation. These recommendations should be taken into consideration when formulating future policies and strategies for particular accountable institutions with reference to urban apiculture development and its effects on household income creation. Based on the findings of this study, it is recommended, therefore,

- The apiculture industry may offer opportunities for people to create jobs or sell products that will bring in a steady income. Beekeeping decreases poverty and generates work in urban areas. Apiculture doesn't affect the environment, consumes less land, and helps pollinate plants. Apiculture may be one of the main pillars in reducing poverty and economic vulnerability, particularly in developing countries and low-income areas. Therefore, after looking at its advantages, there should be strong support for it being embraced as one of the strategies by stakeholders and government at all levels to boost the country's economy.
- Through informal, community-based teaching, bee producers in the research region should receive adequate training in the principles of traditional bee management. In order to maximize the profitability of the bee operation and the efficient use of resources used in bee farming, this will ensure that modern equipment is properly understood and that technology is embraced.

- To incorporate financial aid, marketing access, and contributions from governmental and non-governmental organizations through organizations that fight poverty, a bee farmer's cooperative association must be established.

- To provide extension support to urban apiculture home producers who lack resources, urban apiculture institutions should be established. To assist urban apiculture activities, there is also a policy and strategy in place. By utilizing open space and a private land parcel, it contributes to the urban poverty reduction and food security initiatives movements while enhancing urban apiculture in Addis Ababa Gullele sub-city.

References

- Ababor S, Tekle Y. (2018). Beekeeping practice, opportunities, marketing and challenges in Ethiopia: Review. *Dairy and Vet Sci J.* 5 (3).
- Abadi B, Abebe A, Delenasaw Y (2016) Community Perception on Beekeeping Practices, Management, and Constraints in Termaber and BasonaWerena districts, Central Ethiopia.
- Adilo M, Woldemariam T, Yadessa A (2005) Counting on Forests: Non- Timber Forest Products and their Role in the Households and National economy in Ethiopia. Proceedings of the 8th Annual Conference of Agricultural Economics Society of Ethiopia, Addis Ababa, Ethiopia, pp.179-196.
- Ajabush Dafar (2018). Review of economic and ecological importance of bee and bee products in Ethiopia. *J AnimHusb Dairy Sci*, 2(2), 18-26.
- Amsalu Arega, HailuMazengia, Muse Haile melekot. (2020). Apiculture constraints and opportunities in Diga and WayuTuka Districts, East Wollega Zone, Oromia National Regional.International Journal of Advanced Research in Biological Sciences. 7: 21–33.
- Assefa A (2009) Market chain analysis of honey production: in AtsbiWemberta District, Eastern Zone of Tigray National Regional State. A Thesis Submitted to College of Agriculture Department of Agricultural Economics, School of Graduate Studies. Haramaya University, Ethiopia.
- Assefa M (2011) Pro-Poor Value Chains to Make Market More Inclusive for the Rural Poor: Lessons from the Ethiopian honey value chain. Danish Institute for International Studies, Copenhagen, Denmark. p. 35-50.
- ATA, (2018) Minister of Agriculture Commends ATA for Supporting the Apiculture Sector *Unleash Its Potential*.
- Ayele B, Jenberie A, Haylemelekot M, Ayalew W. (2020). Side effects of agro-chemicals on beekeeping in East and West Gojjam Zones of Amhara Region *Side Effects of agrochemicals on beekeeping in East and West Gojjam Zones of Amhara Region, Ethiopia.Adva in Biosci and Bioeng.* 8 (3):47.
- A. Tadesse. (2019). *Opportunities and Challenges of Honey and Bees Wax Production in Ethiopia: A Systematic Review*, vol. 72, pp. 2224–2226.

- Basuma Rasa (2019). Profitability Analysis and Adoption of Improved Box Hive Technology by Small holder Beekeepers: The Case of BuleHoraWoreda, West Guji Zone of Oromia Regional State, Ethiopia.
- Betela Beyene (2019). Honey production and marketing in Ethiopia: *A review paper*, Department of Agribusiness and value chain management, College of Agriculture WolaitaSodo University, Ethiopia.
- Biressaw Serda, Tessema Zewudu, Moges Dereje and Mohammed Aman, (2015). Beekeeping practices, production potential and challenges of bee keeping among beekeepers in Haramaya District, Eastern Ethiopia. *Journal of Veterinary Science and Technology*, 6(5), 255
- Birhan M, Sahlu S, Getiye Z. (2015). Assessment of challenges and opportunities of bee keeping in and around gondar. *Aca J of Entomol.* 8 (3): 127-131.
- Biruk Deribe (2014). *The constraints of honey production in beekeeping cooperatives: A case study of KilliteAwlaloWoreda* (Doctoral dissertation, Mekelle University).
- Bradbear, N. (2009). Bees and their role in forest livelihoods: a guide to the services provided by bees and the sustainable harvesting, processing and marketing of their products, *Non-wood Forest Products*, (19).
- Claussnitzer, M. (2014), Urban Apiculture—A Way to Reconnect Society and Nature?,
- CSA (2016/17) Central Statistical Agency: Agricultural Sample Survey 2016/17. Report on livestock and livestock characteristics. Addis Ababa, FDRE, Ethiopia.
- CSA Central Statistical Agency.(2019). Agricultural Sample Survey, Volume Ii Report on Livestock and Livestock Characteristics.
- Dekebo A, Bisrat D, Jung C. (2019). Opportunities and constraints of beekeeping practices in Ethiopia. *J of Api.* 34 (2): 169- 180.
- Demisew (2016) Beekeeping in Ethiopia. 5th ApiExpo Africa, Kigali, Rwanda.
- Dereje Tulu, MelkamAleme, GezahegnMengstu, ArarsaBogale, AmsaluBezabih and EsayasMendesil, (2020), Improved beekeeping technology in Southwestern Ethiopia: Focus on beekeepers' perception, adoption rate, and adoption determinants. *Cogent Food & Agriculture*, 6(1), 1814070

- Douglas B. Sponsler, (2020), beekeeping in, of, or for the city? A socioecological perspective on urban apiculture, A PREPRINT, Department of Botany Academy of Natural Sciences of Drexel University
- Ethiopian Customs Authority and Export Promotion Agency (2006).
- EIAR (2017) Ethiopian Institute of Agricultural Research: Livestock and Fisheries Research Strategies. Poultry, Fisheries, Apiculture and Sericulture. Addis Ababa, Ethiopia, pp. 153-224.
- Eve Z. Bratman, (2020) Beekeeping in, of, or for the City, a sociological perspective on urban apiculture, Department of Earth & Environment Franklin & Marshall College, United States.
- FAO (2009) Food and Agricultural Organization: Bees and their role in forest Livelihoods. A Guide to the Services Provided by Bees and the Sustainable Harvesting, Processing and Marketing of their Products. Rome, Italy.
- FAO; (2011), *Diversification booklet number 1 second edition. Beekeeping and sustainable livelihoods*
- FAO. *Food and Agriculture Organization.* (2017). *Livestock Primary.*
- FDRE (2016) *Federal Democratic Republic of Ethiopia: The 9th National Monitoring Plan for Residues in Honey from Ethiopia. Ministry of Livestock and Fisheries (MoLF), the Livestock Health and Feed Regulatory Sector, Addis Ababa, Ethiopia.*
- Feed the Future, (2014), Small-Scale Beekeeping replaces an earlier publication of the same name that will produced by the Peace Corps in 1983, Willhington, DC 20526
- Fikadu Z. (2020). Pesticides use, practice and its effect on honeybee in Ethiopia: A Review. *Int J of Tropi Insect Sci.* 40 (3): 473- 481
- Fikru S. (2015). Review of honey bee and honey production in Ethiopia. *J of AniSci Advances.* 5 (10): 1413-1421.
- Gemechis L, Kibebew W, Amsalu B, Desalegn B, Admassu A (2012) Apiculture Research Achievements in Ethiopia, Oromia Agricultural Research Institute, HBRC, Ethiopia.
- Guy S, Legesse S. (2015). Review on beekeeping activities, opportunities, and challenges. *JHarmoniz Res Appl Sci.* 3 (4):2004-010214.

- Hadera Gebru, (2019), Challenges of Ethiopian Honey Export across the Honey Value Chain and Trends of Ethiopian Honey Production and Export, *MSc. Thesis College of Business & Economics, Addis Ababa University*
- Haftey S., Gashaw E., Ayalew N. and Tsehaye N., (2018), et al. Assessment of honey production system, constraints and opportunities in Ethiopia. *Pharm PharmacolInt J. 2018;6(1):42–47. DOI: 10.15406/ppij.2018.06.00153*
- Haftu Kebede and Yoseph Baraki, (2018), Challenges and Prospects of Honey Bee Production in Ethiopia: A Review, *Journal of Biology, Agriculture and Healthcare*, Vol.8, No.13, 2018
- Hailemichael Tsehaye Bahta. (2018). The Status of beekeeping practices and honey production system in Ethiopia: A review. *Int J Eng Develop Res. 6 (2): 581-585.*
- Holeta Bee Research Center, (2015), Apiculture research Status and Achievements in Ethiopia, Oromia Agricultural Research Institute, Holeta Bee Research Center, Ethiopia
- IBAR Inter-African Bureau for Animal Resources. (2016). Special Edition 2016: Honey Production, Bee Health, and Pollination Services African; The Honey Industry In Comesa: Opportunities And Challenges, *Bulletin of Animal Health and Production in Africa.*
- Improving Productivity and Market Success (IPMS, 2012) of Ethiopian Farmers Project— International Livestock Research Institute (ILRI), Addis Ababa, Ethiopia
- Kassa Degu T, RegasaMegerssa G. (2020). Role of beekeeping in the community forest conservation: Evidence from Ethiopia. Bee World. 97 (4): 98-104.*
- Kassa Tarekegn and AssefaAyele, (2020), Impact of improved beehives technology adoption on honey production efficiency: empirical evidence from Southern Ethiopia, Open Access, <https://doi.org/10.1186/s40066-020-00258-6>*
- Kenesa Teferi. (2018). Status of beekeeping in Ethiopia: A review. Dairy and Vet Sci J. 8 (4): 555743.*
- K. Aregawi, W. Zewdu, and T. Woreknes. (2018). Challenges and Opportunities of Honey Production in Amhara National Regional State, Ethiopia, *J. Agric. Biotechnol. Sustain. Dev.*, vol. 10, no. 4, pp. 67–88.
- Lijalem T, Zereu G, Tebeje M. (2017). Opportunities and constraints of beekeeping in Wolaita and Dawro Zones, Southern Ethiopia. *Afri J of Agri Res. 12 (18): 1587-1592.*
- Mamo YS. (2016). The honey industry in comesa: Opportunities and challenges. *Bulletin of Animal Health and Production in Africa 64 (1): 207-216.*

- MEFCC (2015) Ministry of Environment, Forest and Climate Change: Study of Causes of Deforestation and Forest Degradation in Ethiopia and the Identification and Prioritization of Strategic Options to Address those. Final Report. Addis Ababa, Ethiopia.
- Minwuyelet M. 2004 and ESS web.). City expansion, squatter settlements and policy implications in Addis Ababa. *Ethiopian Journal of the Social Sciences and Humanities*, 2(2), 50-79.
- Mitikie A. (2017). Characterization of beekeeping system and evaluation of honey quality in Tehulderif District of the South Wollo Zone, Amhara Region, Ethiopia.
- Negash D, Mengeste B. (2019). Assessment of honey production system, constraints and opportunities in selected kebeles of Hawassa City administration, Ethiopia. *Int J of Res Granthaalayah*. 7 (8): 78-87.
- Paulos D (2012) Ethiopian Honey: Assessing International Markets with Inclusive Business and Sector Development.
- Sahle H, Enbiyale G, Negash A, Neges T. (2018). Assessment of honey production system, constraints and opportunities in Ethiopia. *Pharm PharmacolInt J*. 6 (1): 42-47.
- SebsibAbabor and YibrahTekle. (2018). Beekeeping Practice, Opportunities, Marketing, and Challenges in Ethiopia: Review vol. 5, no. 3.
- SileshiYeserah, AbebeJenberie&DesalegnBegna / (2019) Honey marketing, structure and conduct of honey market in Gozamen district, East Gojjam Zone, and Amhara Region, *Cogent Food & Agriculture*, 5:1, 1620153
- Sponsler, D. B., &Bratman, E. Z. (2020). Beekeeping in, of, or for the city?A socioecological perspective on urban apiculture.
- Tekle G, Weldeyohanis S. (2016). Review on challenges and opportunities of honey marketing in Ethiopia. *J of Market & Cons Res*. 23: 33-37.
- Teklu Gebretsadik and DinkuNegash (2016), Honey Bee Production System, Challenges and Opportunities in Selected Districts of Gedeo Zone, Southern Nation, Nationalities and People Regional State, South Agricultural Research Institute, Hawassa agricultural Research center, Ethiopia, Vol.4
- Temesgen Terefe, (2018), Practices and Challenges of Beekeeping in Chiro District of West Hararghe Zone, Eastern Oromia, Ethiopia, *East African Journal of Sciences*, Volume 12 (2) 127-136

- Tessema Aynalem and Zeleke Mekuriaw, (2017), Study on the Beekeeping Situation, the Level of Beekeepers Knowledge Concerning Local Honeybee Subspecies, Their Productive Characteristics, and Behavior in Eastern Amhara Region, Ethiopia, *Research Article / Open Access, Volume 2017 | Article ID 6354250 | <https://doi.org/10.1155/2017/6354250>*
- UNEP, (2014), Building Urban Resilience, Assessing Urban and Peri-urban Agriculture in Addis Ababa, Ethiopia
- USAID (2012) United States Agency for International Development/ Ethiopia: Cost-Benefit Analysis of the Grad Honey Value Chain. Cambridge, USA.
- Weidmann, G., & Kilcher, L. (2011). African organic agriculture training manual
- Wolay Kiros and Teklebirhan Tsegay, (2017), Honey-bee production practices and hive technology preferences in Jimma and Illubabor Zone of Oromiya Regional State, Ethiopia, *open access journal. Agriculture and Environment*, 9 (2017) 31–43
- Yemane, M. (1967). Elementary Sampling Theory, Printice-Hall Inc. *Englewood Cliffs, New Jersey, USA*

Appendix 1

ST. MARY'S UNIVERSITY, SCHOOL OF GRADUATE STUDIES

Questionnaire for a contribution of social and economic factors on income generation among urban apiculture households' in Gullele sub city, Addis Ababa, Ethiopia

First, I would like to thank you for your time. My name is **TIGIST ADAMTE** and I am a graduate student at **ST. MARY'S UNIVERSITY**. I am conducting this study for the completion of Master's Degree in business management.

The purpose of the study is to measure contribution of urban apiculture income generation at household level in Gullele. Your kind cooperation will help me to find reliable data and will be used only for this study. Please try to answer all stated questions and I would like to thank you for your time again.

Please mark your response with “√”

Part one: Demographic information of respondents.

1. Gender Male Female
2. Age Age (18-30) 31-45 (46-55) (Above 56)
3. Do you think urban apiculture contribute for house hold income generation
Yes no
4. How did you start beekeeping?
By training Learning from family As a Hobbies
5. How do you sell your honey
By setting price by negotiation not sell only for consumption purpose
6. Have you skills on bees management
Yes no
7. access of training for beekeeping management training
yes no

8. Apiculture land position

Governmental Private Rental Back yard
 On the building roof On the fence wall If any other

9. Have you got enough credit for your business?

Yes No

Part 2. Please show the extent to which your perceptions, described in the statement. (1= Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5= Strongly Agree)

No		SD	D	N	A	SA
	Perception towards households income.					
1	Urban apiculture, supportive and has contribution for household consumption and income generation					
	Institutional factor					
1	extension service provided to beekeepers by government					
2	training/and advices, achieve improvements in your colony					
3	There is market access in locally					
4	Government identified problems and constraints in the beekeeping					

	development and marketing accessibility					
5	city administrations have strategy for urban beekeeping					
6	governmental supports organizations for the cooperative input, market linkage, training and extension service/ follow up					
Access of input						
1	There is you got enough credit for apiculture business					
2	There is honey processing facility					
3	There is beekeeping extension packages					
4	There are training/ advice to improved beekeeping management practice by government					
5	there is an increase in trend in honey yield over the years					
6	association/union which supplies beekeeping equipment for the beekeepers					
Social factor						

1	There is urban apiculture production potentials and honey forage availability					
2	Beekeepers have swarms catching experience					
3	There are apiculture professionals alone in the sub-city					

Part 3. Source and level of income

Source of income		Lively Hood Activity During The Last 12 Months		Order Of Importance For House Hold Income Contribution	Total Annual Income Earned While Doing This Work (mean Birr Per Annual)
		Yes (%)	No (%)		
Urban agricultural activity	poultry				
	dairy				
	Honey production/apiculture				
	Garden vegetation				
Non- agricultural activity	Public Work (Food For Work, Cash For Work)				
	Daily Laborer				
	Trading Livestock				
	House Rent				
	Selling Fire Wood Or Charcoal				
Others					

Part 3 honey yield, selling and consumption amount

	min	max	total
Amount of honey yield/production in k/g			
Selling amount of honey in k/g			
Consumption amount of honey in k/g			
selling price in BIR			