

**ANALYSIS OF FACTORS INFLUENCING THE CONSUMPTION OF
HONEY IN MWANZA CITY, TANZANIA**

BY

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE
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ABSTRACT

Beekeeping practice in Tanzania contributes to foreign earnings, employment, food and industrial raw materials. This study was stimulated by the increased tendency of honey consumption in urban centers of Tanzania. However there was little information on present quantity consumed and factors influencing the choice for honey consumption in Mwanza City. Specifically, the study determined the present quantity consumed, examined factors influencing the choice for consumption and forecasted the demand of honey for year 2020 through 2025. Purposive sampling was used to select three strata based on residential cost categories and random sampling technique was employed in selecting 120 households with 40 households from each stratum. Both descriptive and quantitative statistics were used. Binary Logistic Regression was used in modeling the choice for honey consumption, and income demand and population models were used in forecasting future demand of honey in the study area. The results show that total annual quantity of honey consumption was 423 871.8 kg and per capital consumption was 0.6 kg in 2014. Binary Logistic Regression results show that, taste and preference, natural healing characteristic and freeness of cholesterol and dangerous sugar contents and education level of household head were significant at 5% ($P < 0.05$) influencing the consumption of honey in the study area. The estimated consumption income elasticity was 0.312 and the forecasted market demand for honey is expected to reach approximately 824.4 and 1,742.5 tons in 2020 and 2025 per year, respectively. The study concludes that honey is consumed in the study area and adjustment in each one of the significant variables can significantly influence the probability of household choice for honey consumption in the study area. The study recommends awareness creation on the benefits of honey, develop mechanism for traceability and promote beekeeping activity.

DECLARATION

I, Raymond Okick do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my original work done within the period of registration and that it has neither been submitted nor being concurrently submitted in any other institution.

.....
Raymond Okick
(MSc. Candidate)

.....
Date

The above declaration is confirmed by

.....
Professor J. F. Kessy
(Supervisor)

.....
Date

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DEDICATION

This dissertation is dedicated to my beloved parents Celina Ochali and the late Emmanuel Okick who laid the foundation of my education. Daddy; I pray that God in Heaven rests your soul in eternal peace. Amen.

To my treasured wife Grace Raymond who is always standing as an inspiration fountain in my life. May God in Heaven bless you my wife abundantly

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LIST OF ABBREVIATIONS AND ACRONYMS

AAFRD	Alberta Agriculture Food and Rural Development
ARIMA	Autoregressive Integrated Moving Average
BLRM	Binary logistic regression model
DEPM	Double Exponential Projection Model
FCDS	Food Characteristic Demand System
GDP	Gross Domestic Product
IFPRI	International Food Policy Research Institute
KG	Kilogram
MNL	Multinomial Logit
MNRT	Ministry of Natural Resource and Tourism
NBP	National Beekeeping Policy
NGOs	Non-Government Organizations
OLS	Ordinary Least Squares
SMEs	Small and Medium Scale Enterprises
SNAL	Sokoine National Agricultural Library
SPSS	Statistical Package for Social Sciences
TAWIRI	Tanzania Wildlife Research Institute
TNBS	Tanzania National Bureau of Standard
TZS	Tanzania Shillings
URT	United Republic of Tanzania

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Honey is a honeybees' product that stand as one of the natural resource of significant importance socially and economically. It is well known and consumed in various places all over the world (Batt and Liu, 2012), and the consumption by human has been for long time in history (Muli *et al.*, 2007). However, in recent years, human consumption of honey and honey-products has become popular among the people in different countries including Tanzania (Famuyide *et al.*, 2014). The largest consumers of honey in the world market are the United States with around 153,000 tonnes, China with around 123,000 tonnes and Germany that consumes about 90,000 tonnes per annum AAFRD (2005) cited by Batt and Liu (2012).

In Tanzania following the realized potential of honey for economic development, the government and non-government organizations (NGOs) have devoted effort to mobilize and provides support in development of beekeeping sector in order to increase the production capacity of the country (Mwakatobe and Mlingwa, 2007). The initiatives undertaken by the government among others includes; establishment of four zonal demonstration farms, upgrade the beekeeping extension service to acquire modern technologies in the industry and scaling up beekeeping development project to 30 districts in the country (MNRT, 2011). The efforts have resulted to the increase in honey production where it is estimated to increase from 4,860 tons in year 2001 to 9,380 tons in year 2012 of honey (Pass Trust, 2013). However, honey produced is largely consumed by domestic market partly exported, and consumed by external market in the world (URT, 2011).

Based on that fact it is likely that the market for honey in Tanzania is dominated by domestic. As a result, in order for producers and processors successfully market their honey product must understand the trends in consumer behavior. Also, producing a honey that meets the quality demands of consumers and designing appropriate production and marketing policies requires an understanding of the major factors that influence the honey market.

Similar to other countries honey produced in the country is consumed in raw or processed state in the local markets. However, urban centres remain the hub for many foods and non-food product's market in the country (Traidcraft, 2007). Honey is consumed for different uses such as food, medicinal and ingredient for other products. This in effect necessitates honey producers, processors and suppliers to understand the consumers' need in order to increase their product satisfaction as well as development of beekeeping sector in the country.

1.2 Problem statement and Justification of the study.

Aggregate food and non-food consumptions have been studied at household and national levels in Tanzania. They include, the study by Chongela *et al*, (2013) who investigated the budget share of agri-food, estimated own price and income elasticities of demand of agri-food consumed by the households in Tanzanian. Mnasa and Mlambiti (2014) investigated the factors influencing consumption of processed sweet potatoe product in Mwanza and Shinyanga urban centres in Tanzania and found that availability, brand royalty, price and attractive packaging are among factors influencing the consumption. Studies regarding honey have been conducted in Tanzania, including the study by Traidcraft (2007), that analyses the value chain for

honey and beeswax in Tanzania. TAWIRI (2002) cited by Traidcraft (2007) investigated the market awareness on bee products in Tanzania and found that public awareness of bee products was high in the surveyed areas. However, the study by Mlingwa and Mwakatobe (2004) cited by Traidcraft (2007) investigate bee products marketing in southern highland Tanzania and found that availability of honey was low in the area. However, none of these previous studies have paid attention to specifically quantify the emerging pattern of honey consumption despite its awareness and realized economic contribution to beekeepers and country at large. In contrary, the consumption estimates of honey are based on generalization, and it is estimated that over 90% of honey produced annually is consumed locally in the country (URT, 2011). Explicitly, such estimates are likely to be exaggerated and do not provide pertinent information that can aid in effective decision making with regard to beekeeping development plans. For this to be effective there is a need for the systematic empirical study to establish consumption estimates for honey and other honeybees products in Tanzania.

In recent years, many people in Tanzania particularly urban centers have been deeply attracted in honey consumption, thus making beekeeping practice popular in various places in the country. Similar situation is prominent in Mwanza City. However, within the foregoing scenario there is little information on present quantity of honey consumed in Mwanza City. Furthermore, there is scanty information on factors influencing the choice for honey consumption in Mwanza City. The study was an attempt to examine the situation, provide the rationale for carrying out a countrywide survey on consumption of honey and other honeybee products, in order to establish

the national consumptions per capita that stands as a beacon to assist the planning for developments initiatives of the beekeeping sector in Tanzania.

Findings from this study are intended to provide information that will assist the honey producers and processors in production and processing planning.

Furthermore, the information will be useful for policy makers, NGOs and other stakeholders in designing appropriate market interventions for improving performance of beekeeping sub sector in Tanzania

1.3 Objectives of the study

1.3.1 General objective of the study

The general objective of this study was to analyse factors influencing the consumption of honey in Mwanza City, Tanzania

1.3.2 Specific objectives

- i To determine the present quantity of honey consumed in the study area
- ii To examine the factors influencing honey consumption in the study area
- iii To predict the market demand for honey in 2020 through 2025 in the study area

1.4 Research hypothesis

Household socio-economic characteristics, product characteristics and other factors equally influence the choice of honey consumption among households

1.5 Research questions

- (1) What is the present quantity of honey consumed in the study area?
- (2) What are the factors that influence choice for honey consumption? and
- (3) What will be the demand for honey in year 2020 through 2025 which is the development vision target of the country?

1.6 Limitation of the study

The study was a spot survey and not continuous survey in which household consumption data were collected at one point in time. Given absence of consumption records the results were based on the memory of respondents in the households and continuous survey would have yielded better results, but that would have require more time and funds which were both limited in this study. However, the sample size involved in the survey was adequate to provide the better results which reflect the reality of the consumption in the study area. Also despite the fact that record data on honey consumption were not available, the respondents were able to remember the frequency of honey purchase in the household per week or month depending on their respective consumption rates in the household. This enables to determine annual consumption.

1.7 Conceptual framework of the study

The conceptual or analytical framework on honey consumption and the way in which household make decisions is essential as a rule in identifying important variables and for effective and efficient data collection. Figure 1 presents a brief and systematic decision outcome for honey consumption and the factors resulted to such decision at household level.

At the bottom of the figure was honey consumption in the household which considered as an independent variable. This is to the great extent, influenced by maximum utility or satisfactions which household members obtain when consume honey. Household consume honey to maximize the utility or satisfaction which measured by preference subject to other factors. In this continuum, the household chooses to consume honey based on the expected maximum utility which may be provided by honey characteristics such as sweet taste. On the other hand, for individual to derive maximum satisfaction from consuming honey the decision made to consume honey at first ending with acquire or purchase of honey and this depends on honey availability and price as well as household income capability. When this is achieved, such a household is said to be ultimate honey consumer. Therefore, household decision on honey consumption is influenced by a combination of different factors such as household characteristics, honey product characteristics, culture and religion issues, policy and market characteristics (Figure 1).

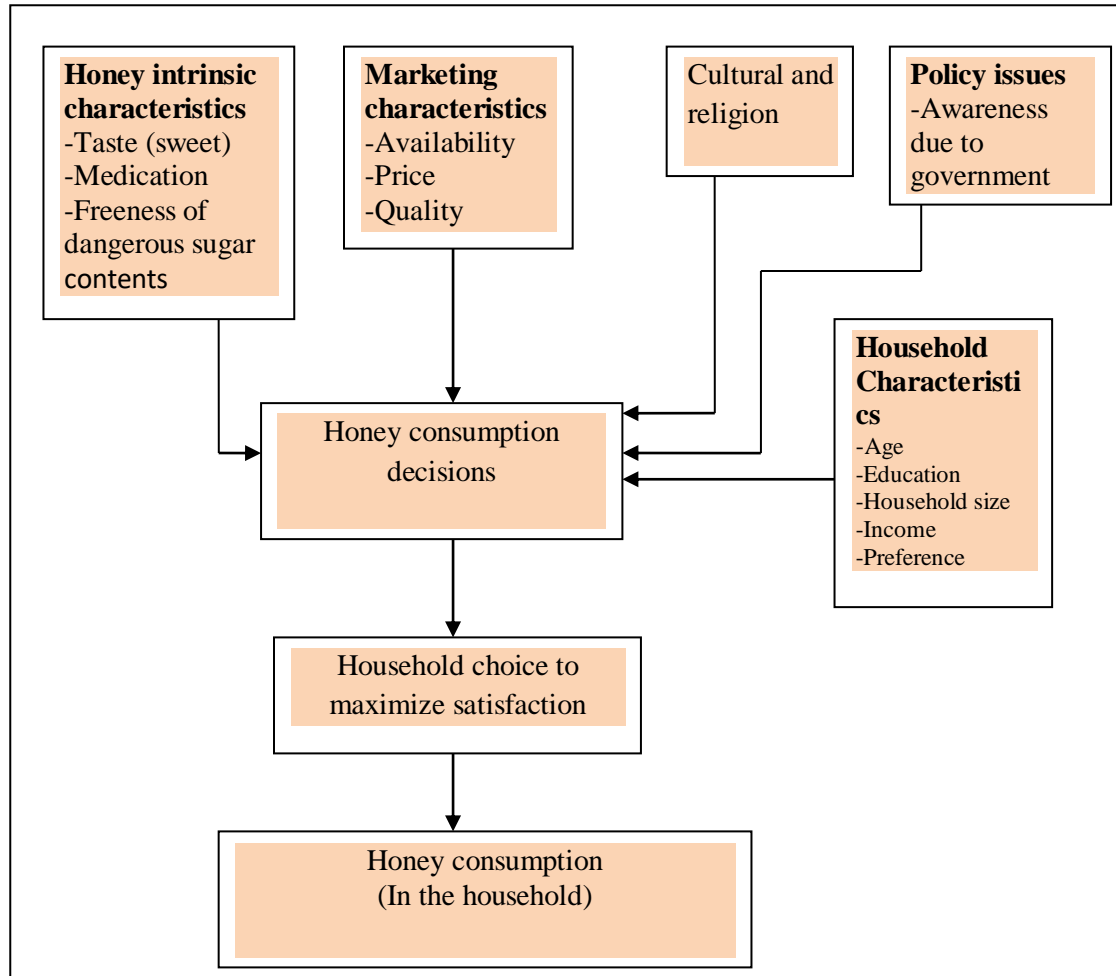


Figure 1.The conceptual framework of honey consumption used in the study

Source: Modified from Nyekanyeka (2011)

Placement of product in the market places at given time influences the consumers to purchase the product, meanwhile its absence result to decreased satisfaction. Similarly, low price influences the demand and quantity demanded for particular good. In this view, market characteristics are potential factors that influence the consumption decision for honey.

The implementation of policy including financial support for beekeeping practices by government and other stakeholders result to stimulate people engage in practices. This in effect creates awareness for the activities and bees products obtained. It also promotes the consumption for the products and results to influence the consumption behavior of people. In some cases, food consumption is associated with religion and cultural beliefs. In addition, the characteristics of the products such as taste and nutritional contents influence the consumption decision for the individual. Similarly, social economic characteristics including age, education, sex and income among others determines the ability of individual with regard to consumption of food commodities. Therefore, better consideration and use of these factors can improve and result to increased consumption of honey in the household.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Conceptualization and Operationalization of Terms

2.1.1 Consumption

Consumption can be defined as the use of goods in the satisfaction of human wants given available resource (Roman, 2013). It represents the purchases by consumers on final goods and services for various uses at a time. Human consumption is becoming increasingly important concept in studying behavior of people in different places. In this realm, it may be considered as a critical determinant of success for the process exercises core values of production for national and global economical development. However, the concept was developed by economists in their studies of how economic agents' decision making is manifested in the market. Similarly, consumer chooses a good that satisfy his or her utility upon consuming that particular good (Chala *et al.*, 2013). This in effect results to preference for the good and often time consumer makes repurchase of that good. There are ranges of consumption goods that are available to consumer in market place. For example, food bundles such as honey, royal jelly, fish and meat to mention few may be available to consumers in time. The choice for honey will depends on the expected satisfaction derived upon consumption. It is worth noting that consumption patterns vary greatly among individual consumers due to differences in preferences and taste. Honey may be used as food, medication and food recipes (Ismail *et al.*, 2014), and the preference varies among the consumers based on the satisfaction derived and exposure (Chala *et al.*, 2013). In this view honey consumption at household considered if the household frequently purchase and uses honey for any use.

2.1.2 Consumers choice

Usually various products are available in the market for human consumptions. Many of them have several brands which attract the attention of buyers. Individual or group considered consumer when choose and make purchase of a particular good for their uses (Adeniyi *et al.*, 2012). However, for individual or group to choose particular good for consumption, they need complete information regarding the good and utility derived (Kivetz and Simonson, 2000). Equally, household choose to consume honey given the information available on honey and utility derived upon consumption. In the recent decades, the discourse of consumers' choice particular for bees' product including honey has become the common denominator of action for plans in both developing and developed countries in the world (Traidcraft, 2007). The emergence of bees' product market as a development topic is due to the overall shift in consumption behavior that resulted to change in life style. In food consumption, people identify the food varieties available in the market place and make purchase for the food desired. In view of that, choice is centrally decision making practice given alternatives available in place (Chala *et al.*, 2013). In consumption perspective, utility maximization drives the consumers to identify and choose the consumption good that maximizes greatly his/her utility level among the consumption bundles.

2.2 Overview of beekeeping industry in Tanzania

Beekeeping practice is the old activity in Tanzania and the activity is carried out using traditional and modern methods that account for over 90% of the total production of honey and beeswax in the country. It is approximated that about 95% of all hives used in beekeeping activity are local, which includes; log and bark, reeds, gourds and pots hives (Mwakatobe and Mlingwa 2007). The activity is mainly practiced in rural areas,

which are adjacent to the forest land, and peri urban areas Tanzania is among countries in the world producing bee products particular mainly honey and beeswax. This is due to presence of a high population of bee colonies that are estimated at 9.2 million, and attributed to the presence of massive and different number of vegetation preferred by bees in many areas of the country (Kihwele *et al.*, 2001; Latham, 2001; Mbuya *et al.*, 1994) cited by Traidcraft (2007).

In order to ensure development of beekeeping industry in the country, the Government of Tanzania formulated the National Beekeeping Policy (NBP) in 1998, which have provided the way to enhance the development of beekeeping sector in the country. The overall goal of the National Beekeeping Policy is to enhance the contribution of the beekeeping sector to the sustainable development among the citizen and country at large, and the conservation and management of the natural resources for the benefit of present and future generations (URT, 1999). Basing on the implementation of policy instrument, the participation of stakeholders have resulted to wide appreciation and realization of the benefits gained from beekeeping activities and its products among people in different places in the country (URT, 2011). Explicitly, beekeeping practice is promoted by the government and other stakeholders and many people have embarked and participate in the activity in various places. This has resulted into increased coverage of beekeeping producing areas in the country as well as production capacity of the country. The producing areas include Kahama, Mpanda, Sikonge, Urambo, Nzega, Tabora, Chunya, Manyoni, Bukombe, Nkasi, Kondoa, Kiteto, Babati, Kibondo, Handeni and Kigoma, to mention few (URT, 2011). However, there are many areas which have not yet exploited for the production in order to reach the potentiality of the country in production of bees products (Traidcraft, 2007).

2.2.1. Honey marketing systems and consumption

Honey and honey products in Tanzania are marketed in both raw and processed state. Raw honey channeled to consumers in raw state or processed through both formal and informal honey marketing systems. Equally, honey sold for consumption comes from small and medium scale enterprises (SMEs) and beekeepers from producing area. However, the SMEs buy raw honey from beekeepers and undertake further processing and packaging processes before channeled for consumption (Traidcraft, 2007). Honey processors mainly practice formal market that distribute and sell their honey produce through their own distribution networks using trucks, the major outlets being supermarkets, hotels and retailing shops while hawkers dominate informal market. The formal market faces competition from the informal market, which is neither regulated nor taxed. Honey is mainly marketed in urban and peri-urban areas and rural, however, the empirical situation indicated urban and peri urban areas have relatively higher consumption than rural area. Honey channeled to supermarket, retailer and hawkers is sold direct to the consumers for final consumptions.

2.3 Theoretical framework and empirical methods

2.3.1 The Theory of Consumer Choice

Ultimate consumers' decisions to choose consumption of honey is a matter of choice that can be scrutinized under the theoretical framework of economics, often called the science of consumers choice (Parkin, 1997). Usually, consumers have many sets of consumption bundles available at the market with which the choice has to be made. The theory assumes that a consumer is rational and aim to attain highest level of satisfaction upon consuming the good. In this ream, a consumer spends part of his or

her income available on particular product with expectation to derive the maximum utility.

The decision of an individual to choose the type and quantity of food to consume is influenced greatly by income at given time period (Friedman and Hechter, 1988). Theories exist in literature that provides description on behavior of people in relation to their income. It includes theory by Milton Friedman on permanent income hypothesis, which hold that the consumption grounded on the long run permanent income (Adeniyi *et al.*, 2012). Thus when people are sure the rise in today's' income is likely to be sustained as higher future incomes will, then large rise in current income will be matched by a large rise in current consumption. The consumption choices greatly influenced by income of an individual. However, details are stripped to expose only specific aspects of behavior relevant to the question being analyzed. Rational choice theory assumes that individuals are purposive and intentional (Friedman and Hechter, 1988). Individual decisions and actions are shaped by rational preferences and constrained by resource scarcity, opportunity costs, institutional norms and quality of information (Kivetz and Simonson, 2000).

2.3.2 Rational preferences

Rationality of preferences constitutes a key assumption in the neoclassical economic analysis of behavior. Individuals are assumed to have explicit, complete, reflexive, and transitive rank ordered preferences over the possible outcomes of their actions (Bicchieri, 2004). Preferences should also assume non-satiation, strict convexity, and continuity properties. Usually, preferences are described by means of the graphical representation of an indifference curve (Figure 2). Such a curve consists of a locus of

pair-wise combinations of outcomes that would provide the same level of satisfaction to the decision maker. Each indifference curve represents a different level of utility. The continuity and completeness of a preference ranking would lead to a dense map of indifference curves. Curves positioned further to the north-east of the map are assumed to provide consumers with higher satisfaction. In addition, the convexity of preferences ensures that the indifference curve exhibits the diminishing marginal rate of substitution (Case and Fair, 1992; Parkin, 1997).

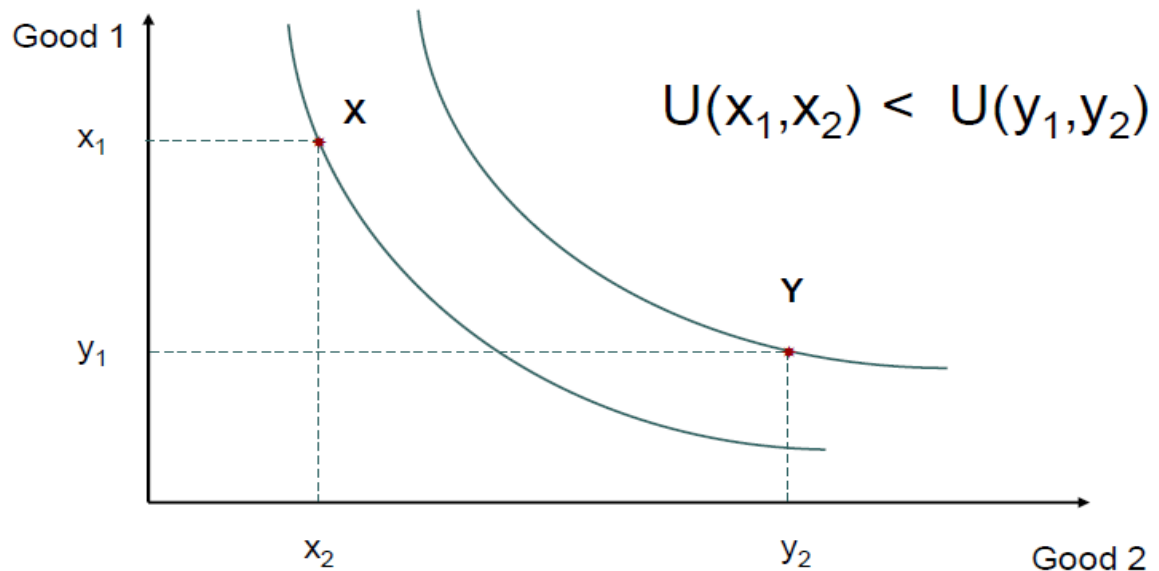


Figure 2 Indifference curve showing difference level of satisfactions

2.3.3 Utility maximization behavior

The fundamental problem in economic sphere has been the limited resources available, such that to satisfy unlimited wants and needs of human beings in everyday life (Parkin, 1997). Resource scarcity drives individuals to make choices to attain satisfactory ends consistent with their preference hierarchy. Disparity in access to resources affects the individual's ability to attain the alternative results, making some easy to achieve, and others more difficult or even impossible to reach (Friedman and Hechter, 1988). However, consumers assumed to conduct rational calculation and

subsequently select the alternatives likely to be associated with the highest outcome values (Figure 3).

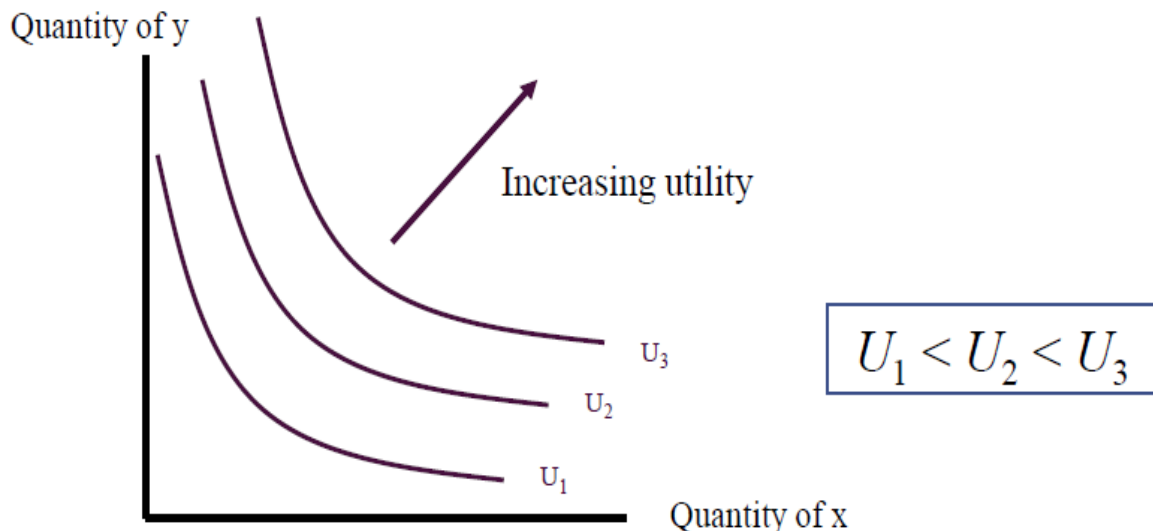


Figure 3. Utility maximization

Utility theory offers an understanding of individuals' choice through utility maximization behavior (Varian, 1993; Parkin, 1997). Individuals' preferences are associated with a real-value indexed utility. Consequently, individuals' choice assumed to favor the course of action that provides the highest utility, or maximum satisfaction. On the other hand, the decision influenced by various factors one that economists term as opportunity cost, which arise with making a specific choice. These implicit costs are associated with the act of foregoing the next best alternative available to decision makers. Individuals must consider these implicit costs in their pursuit of maximum benefits and satisfaction (Rahelizatovo, 2002). High opportunity costs can affect the attractiveness of the most preferred action and may urge decision makers to act accordingly, by choosing a lower level of satisfaction attainment instead. Thus, individuals' choices favor the course of action that would provide the

highest expected net benefits. Similarly, the decision to consume honey at household will be made if honey provides highest satisfaction to the consumers. Equally, institutional norms and rules, as well as access to better quality information at the time a choice has to be made, also influence individuals' decision outcomes. Individuals may also reduce the risk and uncertainty surrounding their choices by acquiring more information (Rahelizatovo, 2002). It is worth noting that lifestyle and income of people in various places including urban cities is not uniform. This in turn influences to a considerable extent their choices on food consumption and consumption patterns.

2.3.4 Discrete choice modeling

Discrete choice models are econometric modeling techniques that focus on the analysis of the behavior of decision makers who face a finite set of alternatives. Such models attempt to relate the conditional probability of a particular choice to various attributes of the alternatives, which are specific to each individual, as well as the characteristics of the decision makers (Judge *et al.*, 1985). The choice behavior of individuals with only two alternatives can be examined using a dichotomous dependent variable as in the case of binary choice models. There are different ways to approach such models. Models relying on the linear random utility assumption are based on an individual decision maker maximizing his or her expected utility derived from the choice. Decision for honey consumption at household can be considered under general framework of utility maximization where household chooses to consume or not consume honey. In such a situation discrete or binary model applied in modeling the dependent variable in relation to explanatory variables.

2.4 Empirical models and determinants of honey consumptions

2.4.1 Aggregate consumption

Consumption of various products is a challenging area when one undertaking the study. This may be attributed by nature of the product consumed, which may cause the difficult in quantification, but also the behavior of the consumers. Modern consumption theoretical works has stimulated empirical work as many researchers turned the use of statistical data in studying consumption behavior for different type of market goods and services. However, the most frequently analytical techniques used in studying consumer consumption include, the aggregate consumption basing on daily, weekly, monthly or annual consumption (Wagenaar *et al* ., 2009). The frequency of use for a given product may be good indicator to obtain the total consumption of product or service in question (Nasreddine *et al.* 2006).

Nasreddine *et al.* (2006), investigated the food consumption pattern of the adult population living in Beirut Lebanon uses aggregate consumption model basing on monthly consumption and found that, the total weight of the daily ration (average daily intake), as estimated by adding the respective mean estimates of all food items, was found to be 3030 g day 21 including beverages and 1335 g day 21 excluding beverages.

Mason and Jayne (2009) determined the households' total value of consumption during each six-month period in urban of Zambia. The study estimated the total consumption by summing the six-month values of consumption of five categories of items consumed at household which were (1) foods purchased and/or grown for preparation at home, (2) non-food groceries, (3) routine non-food monthly items, (4)

other intermittent non-food items, and (5) food bought and consumed away from home.

2.4.2 Factors influencing the choice for honey consumption

Over the last decades, the systematic process for evaluating consumption choices has been developed and continues to evolve. Through that process, the decision on what to consume and the quantity to consume is a difficult practice that consumers face in the market. Mainly it is due to different factors, which most cases restrict the choices among the consumers. Literatures have reported several variables, which influences decisions including consumer consumption pattern for different commodities and the methods used to estimate the relation between the variables.

Similar to other food commodities honey is marketed based on many attributes with which consumers' judge. The attributes may include appearance, organoleptic perception, flavor, taste, texture, color, safety, nutritional value, price, packaging and origin to mention few (Ismail *et al.*, 2014). The explained variable defined shows that they are all concerned with attribution or association and how the observed changes in outcomes link with a particular set of explanatory variables defined. In addition, different statistical methods or techniques have been used in determining the relationship of variables, and their influence over each other. Importantly, the relationships between the variables have to a line and based on the underlying theories and principles.

Many studies have investigated the factors, which influence food choices among consumers. The study by Pocol (2011) on honey consumption determinants in

Romania using descriptive analysis revealed that, demographic factors influence the frequency of honey use, where women were found to have high frequency (26%) than men with (21%). The study also found that economic factor have strong influence on the amount and frequency of honey consumption, where the consumer with low and medium income were found to consume less or been non consumers compared to high income consumers.

Ismaiel *et al.* (2014) conducted study on factors that affect consumption patterns and market demands for honey in the kingdom of Saudi Arabia using an ordinary least square (OLS) multiple regression model. The study found that location, family food expenditures, family size, and primary occupations significantly affected honey purchasing motivations among households

Yayar (2012) when attempting to investigate packed and unpacked fluid milk consumption and preferences among Turkish households used the multinomial logit procedure to investigate the selected socioeconomic and demographic characteristics of consumers that determined households' fluid milk consumption choices among packed, unpacked and both packed-unpacked milk consumption choices. Results indicated that better educated household heads, higher income and larger households, and households with children under seven years of age consumed more packed milk than others. A similar result was found for unpacked milk consumption, except for a negative effect of education, working wife and income.

The study by Bardhan *et al.* (2012) analyzed the factors that determine dairy farmers' choice of marketing channel and degree to which their market choice influence the

level of commercialization or market participation. The study used multinomial logit (MNL) model to ascertain major factors influencing producers' choice of marketing channels and a multivariate regression model to assess the level of market participation. The study revealed that given the right institutional incentives and market infrastructure, marginal and small landholders were capable of scaling-up milk production and hence commercializes their dairy enterprises. The results of MNL analysis indicated that increase in the scale of milk production would lead a shift away from cooperatives to market as point of first sale. Milk production and extension contact emerged as the two most important policy variables favorably influencing intensity of market participation. Distance to market has negatively influenced likelihood of producers' market participation, irrespective of hills or plains.

Chalwe (2011) aiming at understanding Zambian smallholder bean producers and the factors that influence their choice of marketing channels used a probit model. Results from the probit model indicated that the choice of marketing channel was directly influenced by the price of beans, scale of operation (as measured by the quantity of beans harvested, and quantity sold), distance to the market, farming mechanization used and livestock ownership. On the other hand probit results for decision to sell indicated that price, mechanization and farmers age significantly affected farmers' decision to sell. Meaning that price was very important in stimulating both selling decisions and channel selection.

Vergara *et al.* (2004) used a multinomial logit model to analyse farmers' preferences of market contracts. The findings show that farm size can favor pooling than cash sales. Producers willing to incur higher transaction costs tend to choose

futures/options contracts and forward pricing. It was also found that risk-averse producers did not prefer pooling contracts. On the other hand, producers who aimed at abnormal gains through speculation tend to choose pooling contracts. Finally, producers who perceive markets as being price-efficient prefer cash sales.

Kumar (2010) adopted binary logit model to analyse factors that influence the decision of milk traders to participate in the value addition activities of milk. Mbise, (2007) used binary logit model to determine factors influencing the decision of coffee farmers to adopt either co-operative or non-co-operative market channels in Kilimanjaro Tanzania.

Alwis *et al.* (2009) in their study focused on analysing the consumer attitudes, demographic and economic factors that affect fresh milk consumption among the mid-country consumers of Sri Lanka. Factor analysis was carried out in order to weigh up the consumer attitudes and factor scores were introduced to the final model as independent variables which can be categorized as cost and usage, nutrition, sensory factors and availability. An ordered logistic regression was used to find out the relationships between number of demographic and socio-economic characteristics of consumers such as age, sex, level of education, income, size and composition of the household, ethnic group and presence of diseases that affect fresh milk consumption. Results from estimation of an ordered logistic regression model of consumption showed age of the respondent, cost and usage related attitudinal factor and nutrition related attitudinal factors were the key determinants of milk consumption levels; however, household monthly income, health problems affected on fresh milk consumption and level of education played a more important role in consumption.

Aidoo *et al.*(2009) analyses the determinant of consumption expenditure on dairy products in Ghana using double logarithmic regression model found that income level of household head, level of urbanization of consumer location and the distance from home to dairy product purchase point, where the factors were significantly influencing the aggregate consumption expenditure on dairy product. Moreover, the study revealed that elasticity of dairy consumption expenditure with respect to own price was unity. .

2.4.3 Forecasting the future market demand

Forecasting reduces uncertainty that enables decision makers and policy makers to understand the uncertainties and the associated risks. It enable planner to develop appropriate response for the expected outcome. However, in recent decades the forecast and forecasted information have gained wide application in various fields in the world. Several studies have been reported in the literature that attempted to provide useful future information for planning decisions in different places for national and international organizations.

Besides application of forecast, there are number of techniques and methods developed which applied in forecasting. Forecasting techniques among others includes; exponential smoothing methods, single-equation regression models, simultaneous-equation regression models autoregressive integrated moving average models (ARIMA), and vector auto-regression (Gujarati, 2004). However, the choice for the technique and method among other factors depend on the availability and nature of data available (IFPRI, 2012).

Literature has reported studies conducted to forecast future demand and supply for various commodities and services. Kumar (1998) conducted study for food demand (rice and wheat) in India for 2010 and 2020 uses food characteristic demand system (FCDS) and incorporated GDP growth scenarios (4, 5, and 7 percent) and assumptions on population growth rate, urbanization rate, and income. The projected values were 225, 224.3 and 223.7 million metric tons of total cereals for 4%, 5% and 7% GDP growth respectively in 2010, and 267, 265.8 and 265.7 million metric tons for 4%, 5% and 7% GDP growth respectively in 2020.

In addition, Chand (2007) estimated demand for agricultural products in India and projected demand for food grains toward the end of the 11th Five-Year Plan (2007-12) and by the year 2020-21. The study uses the income elasticities based on the food characteristic demand system (FCDS) estimated by Kumar (1998) to incorporate the income effect.

Mittal (2008) cited by IFPRI, (2012) projected the demand for edible oil/oilseeds and sugar/sugarcane under different scenarios for 2011, 2021, and 2026 in India using expenditure elasticities estimates from Mittal (2006)

2.5 Synthesis of literature review

Literature review was done by comprehensively collecting the existing literature on consumptions behavior and underlying factors that influences such consumptions. The review revealed that there is a growing recognition of the relevance of consumption concept and their application in agricultural foods and natural resources for market-led development. The concepts are applicable across a wide range of products and

therefore have great potential to aid in developing both rural and urban investments and economy as whole.

Consumption was defined focusing on the use of goods and services in the satisfaction utility. The assessment of consumption and factors influencing the consumption has substantial merits in highlighting the quantity and type of product(s) and/ or service(s) demanded and the factors which triggers such consumption in urban centers at large, and thus can be used to develop integrative policy recommendations on consumption inefficiencies and address production or supply of honey product.

The theory of choice was reviewed. Rational choice theory (rational preference and maximization behavior) was linked with the utility that individual derive from the choices they make. Rational choice theory was seen to be relevant for analysis of consumption behavior in food choices. This is due to the fact that, not all food bundles guarantee the desired satisfaction to consumers hence consumers utilises the concept of choice in selecting the type and quantity of food to consumed in the market place subject to other factors.

Similarly, methodological approaches were reviewed with a corresponding discussion of each approach. Total quantity and consumption frequencies for a particular product at a time as one of the key measures for quantification for the quantity consumed was evaluated giving weight to the advantages, disadvantages and its applicability in measuring total present consumption of particular product.

Discrete choice models such as binary, multinomial, tobit and probit as econometric modeling techniques that focus on the analysis of the behavior of decision makers who face a finite set of alternative choices were reviewed. It was learnt that such models (e.g. logistic regression) attempt to relate the conditional probability of a particular choice to various attributes of the alternatives, which are specific to each individual, as well as to the characteristics of the decision makers. Additionally, empirical studies under different market settings were reviewed thoroughly with the aim of getting a clear applicability of the choice models among consumers with respect to honey consumption.

In addition, various methods and techniques in forecasting were evaluated and their applicability in the real situation. However, the choice for forecasting method depends largely on the data available in the time and place. With this view, based on the economic theory, which relates consumption and income among other factors, income demand and population analysis was evaluated for its merits and demerits in projection aspect particular for long period considerations. Equally, its applicability was evaluated from various studies in the literature to determine its potential application.

A review on honey consumption has indicated principally different consumption patterns at raw and processed states and the underlying attributes govern such consumption in Tanzania. A description of the two imperative was conducted with the target of determining the prevailing quantity of honey consumed and the factors influencing the consumption within the Tanzania context particular in the study area.

Empirical findings have indicated that honey consumption is vital in the current globalized world where there is rapid and incessant change in life style among people in different countries including Tanzania. Over the last decades, theory and policy shift has taken place, from promoting beekeeping practice as an economic activity and integrate the businesses to formal economy in the world at large. The shift has resulted to substantial increase in honey production in producing countries including Tanzania. On the other hand, for the policies to promote food supply to be effective, improved urban food marketing system and urban food consumption pattern need to be taken into consideration, especially given the rapid rate of urbanization in many developing countries. However, the consumption patterns of honey and the factors influencing the choice for consumption vary from place to place among honey consumers in different countries (Batt and Liu, 2012). The variation found to be contributed in by different levels of income among consumers, sources of honey and its availability and demographic variations.

This disparity in honey consumption pose questions on generalization of honey consumption, and factors influencing the consumption, and this situation need to be answered in specific locale or country. Consumption of honey and honey products is prominent and unquestionable in different places in Tanzania. However, there is diminutive information on present quantity of honey consumed and the factors influencing the choice for consumption in Tanzania.

The present research therefore an endeavour to address this information gap based on factors that determine honey consumption choice among households as well as future market demand for honey in Mwanza City, Tanzania.

CHAPTER THREE

3.0 Methodology

3.1 Description of the study area

3.1.1 Location

The study was carried out in Mwanza city in Mwanza region, Tanzania. The City is situated on the southern shore of Lake Victoria between latitudes 1° 30' and 3° 0' south of Equator, and the altitude 1,134 m above sea level. It covers an area of 1,324 sq kms of which 900 (68%) are covered by water and the remaining land area is about 424 (32%). Of the 424 sq kms dry land area, approximately 86.8 sq kms is urbanized while the remaining areas consist of forested land, valleys, cultivated plains, grassy and undulating rocky hill areas. Administratively, the city is made up of Nyamagana and Ilemela districts which are among the seven districts of Mwanza region. The city has 2 divisions with 21 wards.

3.1.2 Human population

According to National Bureau of Statistics census of 2012, Mwanza City has a population of the 706,453 residents of which 342,530 are male, 363,923 are female with natural growth rate of 3% and urban migration rate of about 8% annually, and population density is 134 people per sq. km.

3.1.3 Economic activities

In particular, industrial and agricultural activities dominate the economy of Mwanza city. It has more than 100 small to large scale manufacturing and processing industries. These include fish processing, cottonseed oil industries, breweries, soft

drink factory, bakeries & biscuits. Others includes medium and small milling machines; timber industries; garages; fabricating workshops; ginneries; foam and plastic industries; soap factories and animal food industries just to mention few. However, agricultural activity is decreasing due to urbanization rate. Livestock rising is also a major activity, particularly dairy cattle production (Mwanza city council office, 2014).

3.2 Justification of the study area

The choice of Mwanza city was justified based on its potentiality in reliable infrastructures and the fact that, the city is among highly populated and fast growing urban centres in Tanzania where consumption of various good and services are very relevant. The study focused on the view of drawing specific impacts of urban market for honey consumption. The case describes the consumption behaviors in household with regard to honey in Mwanza City.

3.3 Research design

This study used cross sectional research design. This is a kind of research design in which the data are collected at a single point in time from a sample to represent a large population (Pocol, 2011). The design is appropriate in descriptive study and for determination of the relationship between and among variables. It is also economical in terms of time and financial resources when the sample size is not large and it does not require experimental materials and control of the study environment (Babbie, 1993). However, more triangulation and probing were involved to get accurate information.

3.3.1 Sampling procedures and sample size determination

The target population for the present study was the households. Both purposive and simple random sampling techniques were adapted in this study. Purposive sampling was used to select wards and streets where households situated. In the first stage the list of wards and streets were obtained from Mwanza City Planning Office. A total of 9 wards were selected of which 3 wards were purposively selected for each category and a total of 15 streets were selected for the study where 5 streets from the three wards for each category were randomly selected. The criterion used for selection of wards and streets was difference in residential cost, where three strata were determined (Pocol, 2011). Due to differences in cost of residences purposive sampling technique was applied to select wards and streets as; low ($\leq 25,000$ TZS), medium ($> 25,000$ TZS and $\leq 40,000$ TZS) and high ($> 40,000$ TZS) residential cost categories. This was done due to the fact that consumption and consumption pattern varies with costs of residence among households in the area (Adeniyi *et al.*, 2012; Chala *et al.*, 2013). A random sampling procedure was deployed to select 40 households of which 8 households from each street in the stratum for data collection through interview in the study area. Therefore, the sample size constituted a total of 120 households with 40 households from each stratum.

According to Manyika (2000) a sample to be representative of the population, a random sample should not be less than 5% of the population under study. However, Bailey (1994) contended that a sample of at least 30 cases is adequate for statistical analysis; and that in most cases a sample of 100 cases is optimum regardless of the population size. Several studies adapted a total of 120 respondents. A study by Chille (2010) on the economics of production and marketing of honey along Tabora-

Manyoni railway line used a sample of 120 respondents and obtained good results. In addition, Rweyemamu (2001), in a study on economic analysis of cash crop production and marketing in Tanzania under liberalized market used a sample of 120 respondents. Similarly, this study employed 120 households for interview and the sample was ideal due to limited time and funds which involving more sample would have require. Also the sample size fulfills the requirements of the study for meaningful analysis (Bailey, 1994). Importantly, the surveyed household samples were randomly selected based on residential cost category with the assumption that household consumption and consumption pattern differ with cost of residence in the study area.

Table 1 Composition of streets and households selected in the study area

Residential cost categories	Ward	Street	Number of households	
Low	Igogo	Bugando "A"	8	
		Igogo	8	
	Pamba	Igoma	8	
		Bugarika	8	
		Mabatini	8	
Medium	Kitangiri	Selemani	8	
		Kitangiri	8	
		Kona ya bwiru	8	
	Buhongwa	Kirumba	8	
		Buhongwa	8	
High	Nyakato	Buzuruga	8	
		Mwananchi	8	
		Mecco	8	
	Nyamagana	Mbugani	Uhuru	8
		Capripoint	8	
Total	9	15	120	

3.4 Data collection

Data for this study was collected using structured questionnaire. Questionnaire was designed in English and then translated into Kiswahili to enable easy communication with the respondents. It was then pre tested in Morogoro Municipality for 10 respondents in order to evaluate its relevance. Appropriate corrections were made in which question number 17 (when did you start using honey) was omitted since many respondents were not able to respond on it. Both primary and secondary data were collected. Primary data were collected in the field from households using both open and closed handed questionnaires (Appendix 1). Secondary data were collected from different sources including books, research reports and journals from internet and Sokoine National Agricultural Library (SNAL). Moreover, the data on honey production and exportation were obtained from beekeeping division head quarter in the Ministry of natural resource and tourism.

Key informant interviews: Key informant's interviews were conducted using semi structured questionnaire to supplement data collected from households. The key informant schedule was designed to provide technical information regarding honey consumption (Appendix 2). The interviews were conducted with beekeeping officer and honey dealers in the study area.

3.4.1 Methods and types of data collected by specific objective

3.4.1.1 Determination of the present quantity of honey consumed

The data on amount of honey consumed in household was collected using openhanded questionnaire. Household heads were asked whether honey is consumed or not consumed in the household, and if consumed the data were collected from that

particular household. Data collected were the quantity of honey purchased, frequency of purchase per month and the uses or consumption patterns of honey in household. In addition, the data on price and purchasing places or source of honey they use were collected.

3.4.1.2 Factors influencing honey consumption

The data collected based on whether or not the selected households consume honey were collected using both open and closed handed questionnaire. Data collected were motivation factors that cause household choice for honey consumption, also social factors such as age, gender, education, religion, origin, household size, occupation and real income were collected.

3.4.1.3 Prediction of market demand for honey in 2020 through 2025

Data for forecasting future requirements of honey for 2020 and 2025 were collect from primary and secondary sources in which the base year was 2015. The prediction interval of ten years was chosen due to fact that smaller the interval, the closer the moving averages are to the actual data points. This makes prediction data more close to the actual data of the predicted period. Primary data sources were households in which open handed questionnaire was used. The data collected were; present annual households' real income and quantity of honey consumed. Secondary data sources were published reports accessed from internet. The data collected were human populations in 2002 and 2012 in the study area.

3.5 Data analysis

Several statistical techniques and methodologies were employed. Data from the primary source were verified, coded and analysed using Statistical Package for Social Sciences (SPSS) computer software. Both descriptive and inferential statistics were employed.

3.5.1 Present quantity of honey consumed

In order to determine total present quantity of honey consumed, the study adapted Mason and Jayne (2009) method by summing monthly values or quantity of honey consumed in household to obtain annual consumption. Descriptive statistics were generated including average household consumption and per capita consumption. Total aggregate consumption was estimated by multiplying per capita consumption and present population in the study area (Ismaiel, 2014).

3.5.2 Analysis of factors influencing honey consumption

The theoretical framework to identify factors influencing household to choose honey for consumption is based on consumer preferences, which is centered in consumer theory. In consumer theory, demand functions derived from considering a model of utility maximization coupled with underlying economic constraints and/or decision making for the set of options that maximize utility (Varian, 1999; Nicholson, 2002; Dwivedi, 2004). In this study households decide to choose honey among other market good for consumption.

Specifically, this study intended to investigate factors influencing households in choosing honey product for consumption between the two consumption scenarios

(Consume or not consume) Thus, the use of dichotomous model is justifiable considering the binary choice of consumption.

3.5.2.1 Binary logistic regression model

Binary logistic regression model (BLRM) allows analysis of different individual characteristics when confronted with two choices. It estimates the probability of individual i choosing an activity j or in particular honey consumption (consume or not consume in the current case) given some set of explanatory variables. The BLRM can be used to predict a dependent variable, based on continuous and/or categorical independent variables, where the dependent variable takes two forms.

Logistic regression does not assume a linear relationship between the dependent variable and independent variables, but requires that the independent variables be linearly related to the logit of the dependent variable (Gujarati, 1992). Pundo and Fraser (2006) explained that the model allows for the interpretation of the logit weights for the variables in the same way as in linear regression. In this study households are faced with two choices which are; consume honey or not consume honey. In consuming honey, household have to decide on the available consumption bundles in the market to be selected so as to maximize their utility, subject to socio-economic and household constraints and the characteristics of the good.

It assumes that if an individual makes choice j from a complete list of consumption bundle then, U_{ij} is the maximum among the j^{th} options. The statistical model is driven by the probability that choice j is made. Based on the theory of consumer behavior, it is postulated that individual will choose a particular option (good bundle) that offers

the greatest utility. An individual i faced with the decision to choose consumption bundle from the market is perceived to make this decision following the utility function (equation 1) formulated by Greene (1993);

$$U_{ij} = \beta Z_i + \varepsilon_{ij} \dots \dots \dots (1)$$

Where;

U_{ij} is the maximum utility that an individual i^{th} derive from choosing j^{th} option

Z_i is a vector of individual characteristics

β is the parameters to be estimated and ε_{ij} is the error term.

The underlying assumption is that individual chooses option j if and only if the utility derived from it is greater than that of all other options

From the utility maximizing function specified in equation 1 it can be seen that households make decisions to consume honey subject to socio-economic and other household factors. It follows that if the costs that are associated with using a particular good are greater than the benefits, households will be discouraged from choosing it and shift to another option that maximizes their utility. For instance, if there are socio-economic and/or challenges specific to honey consumption that increase its consumption cost relative to expected satisfaction, households will be discouraged from consuming honey.

However, it is difficult to measure individuals' utility directly (Sheffrin *et al.* 2006), and therefore, it is assumed that households make choices based on the option that

maximizes their utility. Hence, the decisions to consume honey among consumption bundles signify the path that maximizes utility. With the given logistic postulation, the BLRM was used to relate the decisions to consume or not consume honey, and the factors that influence the decision. The general BLRM model which was used is as specified in equation (2)

Since there are two categories in the dependent variable, the equation was estimated to provide probabilities for choosing honey consumption subject to independent characteristics. The β_i s are the coefficients to be estimated through the maximum likelihood method. It is important to note that the BLR model follows the theory of probability, and therefore the probability that the household prefers honey compared to the other consumption bundles was restricted to a range between zero and one ($0 \leq P_i \leq 1$). A binomial logistic regression model used to obtain the respondent's probability of consuming or not consuming honey was specified as follow:

$$P(HHC_i) = \beta_0 + \beta_1 X_1 + \dots + \beta_{12} X_{12} + \varepsilon_i \dots \dots \dots (2)$$

$$\text{Where } P(HHC_i) = \begin{cases} 1 & \text{if a household consume honey} \\ 0 & \text{if a household do not consume honey} \end{cases}$$

$P(HHC_i)$ = The probability of the i^{th} household to consume honey in this case, the binary variables was used to depict the probability of the households' engagement in honey consumption (dependent variable).

β_0 = is the model intercept which shows the probability of the household to consume honey given no influencing factor,

$\beta_{1...12}$ = The coefficient of independent variables that shows the marginal effect of a unit change (positively or negatively) of the independent variable on the probability of consuming honey

X_1 = SEX (independent variable)

X_2 = ELHH (independent variable)

X_3 = AHH (independent variable)

X_4 = FAVH (independent variable)

X_5 = HOINC (independent variable)

X_6 = HOZE (independent variable)

X_7 = RPHO (independent variable)

X_8 = TPH (independent variable)

X_9 = RCH (independent variable)

X_{10} = AGI (independent variable)

X_{11} = NHC (independent variable)

X_{12} = FCDS (independent variable)

\mathcal{E}_i = error term

The hypotheses tested were as follows:

Ho: $\beta_1 = \beta_2 = \dots = \beta_{12} = \mathbf{0}$ this shows that the regression coefficients of the independent variables are equal to zero, meaning that there is no effect of the independent variables on the dependent variable

Hi: $\beta_1 \neq \beta_2 \neq \dots \neq \beta_{12} \neq \mathbf{0}$, this implies that the regression coefficients of the independent variables are not equal to zero; therefore, there is either

positive or negative effect of the independent variables on dependent variables

3.5.2.2 Justification of the econometric model

The binary logistic regression model is useful in analyzing data where the researcher is interested in finding the likelihood of a certain event occurring. Using data from relevant explanatory variables, binary logistic regression is used to predict the probability (Π_i) of occurrence or not, and not necessarily involving a numerical value for a dependent variable (Gujarati, 1992). This research analyses the probability of choosing honey consumption by household in the urban centre, with given socio-economic and specific household influences.

Empirical evidences shows that the relationship between dependent and independent variables can be explained and determined using several methods (Mohammed and Ortmann, 2005). Such methods among other include; linear regression models, discriminant analysis and logistic regression. However, binary logistic regression has been chosen because it has more advantages, especially when dealing with qualitative dependent variables and which take two values.

Linear regression model (also known as Ordinary Least squares Regression (OLS) is the most widely used modeling method for data analysis and has been successfully applied in most studies However, Gujarati (1992) pointed out that the method is useful in analysing data with quantitative dependent variables but not appropriate with dependent variables that are qualitative (categorical), as in this study. Amongst other

problems, the OLS cannot be used in this study because it can violate the fact that the probability has to lie between 0 and 1, if there are no restrictions on the values of the independent variables. On the other hand, binary logistic regression guarantees that probabilities estimated from the logit model will always lie within the logical bounds of 0 and 1 (Gujarati, 1992). In addition, OLS is not practical because it assumes that the rate of change of probability per unit change in the value of the explanatory variable is constant. With logit models, probability does not increase by a constant amount but approaches 0 at a slower rate as the value of an explanatory variable gets smaller. When compared to discriminant analysis, logistic regression proves to be more useful since discriminant analysis requires all variables to be numerical, but logistic regression can be used when there is a mixture of numerical and categorical independent variables (Dougherty, 1992). In addition, discriminant analysis assumes multivariate normality, and this limits its usage because the assumption may be violated (Klecka, 1980). In this study, the logistic model was preferred because of its comparative mathematical simplicity and fewer assumptions in theory. Moreover, logistic regression analysis is statistically more robust in practice, and is easier to use and understand than other methods.

3.5.2.3 Description of variable included in the model

The study conjectured that, household choice for honey consumption is influenced by socioeconomic factors; however, the study revealed that embedded characteristics of honey product and government policy implementation were among factors influencing the consumption of honey as respondents pointed out and which used in this study as the explanatory variables. The basis for the assumption was theoretical considerations found in the literature in which the independent variables may have influence on

dependent variable in either positive or negative direction (Pocol, 2011; Batt and Liu, 2012; Ismaiel *et al.*, 2014). The variables used in the BLR model are summarized in Table 2.

Table 2. Variables used in the binary logistic regression model

Variables	Description	Type	Values
Dependent variable			
HHC	Household honey consumption	Dummy	0=Not consume and 1= Consume
Independent variables			
SEX	Sex of household head	Dummy	0=Female, 1= Male
ELHH	Education of household head	Categorical	Number of years in school
AHH	Age of household head	Continuous	Number of years
FAVH	Frequent availability of honey	Dummy	0=No, 1=Yes
HOINC	Household income	Continuous	Number in TZS
HOZE	Household size	Continuous	Number of household members
RPHO	Price of honey offered at market	Continuous	Numbers in TZS
TPH	Taste and preference on honey	Dummy	0= No, 1= Yes
RCH	Religious and cultural issues for honey	Dummy	0= No, 1= Yes
AGI	Awareness due to current government initiatives on beekeeping	Dummy	0= No, 1= Yes
NHC	Natural healing (medication) of honey	Dummy	0= No, 1= Yes
FCDS	Freeness of cholesterol and dangerous sugar contents	Dummy	0= No, 1= Yes

3.6. Forecasting the market requirement of honey

Future demand for honey in the study area was determined based on assumptions that demand for honey is deemed a function of population growth, price, and income (IFPRI, 2012). The study adapted Ngaga (1991) method using population and income elasticity of demand to forecast the future requirement of honey in the study area. In order to approach the predicted estimates, three steps were involved in modeling and forecasting demand for honey in the study area. The steps involve: (1) estimation of future human population in the study area (2) estimation of consumption elasticities of honey commodity based on average household real income and household size (3) forecasts of the aggregate household honey consumption in 2020 through 2025.

3.6.1 Projection of human population

In estimation of human population in Mwanza urban centre in the year 2020 and 2025, Double Exponential Projection Model (DEPM) was used with assumption that human population exhibit exponential growth pattern (Ismail *et al.*, 2014). The model projects trends in growth by using two points in time based upon past census data and an upper limit that represents the ultimate growth planned. Two points data used were of 2002 and 2012 censuses, which however were used to estimate an average annual population growth rate (r).

Model specification is as follows;

$$P_t \equiv p_0 e^{rt} \quad (\text{Ngaga, 1991}) \dots \dots \dots (3)$$

Where as

P_t = Population at period t (Forecasted year)

Po = Population at base year (In this case 2012)

e= Natural logarithm (2.7182)

r= Annual population growth rate

t= Forecasted period (Year)

3.6.2 Estimation of honey consumption elasticities

Demand is deemed a function of population growth, price, and income (IFPRI, 2012).

In order to predict the quantity of honey requirement in 2025, the study uses the estimated honey consumption elasticity values to forecast the expected demand for honey in Mwanza urban centre through 2025 (Ngaga, 1991). The study use household real income growth and population growth. Semi log regression function model was used and specified as

$$\text{LN}H_{\text{hc}} = \beta_0 + \beta_1 \text{LNHOINC} + \beta_2 \text{LNHOZE} \quad (\text{Ismail et al., 2014}) \dots \dots \dots (4)$$

Where;

H_{hc} = Quantity of honey consumed at household

LN= Natural logarithm

HOINC= Household real monthly income

HOZE = household size

β_1 and β_2 = Elasticities

3.6.3 Estimation of household honey consumption in 2020 through 2025

The study adapted IFPRI, (2012) model to projected quantity honey that will be required for consumption in the study area. The model involved estimation of per capita honey consumption required in year t (2020 and 2025). Total annual quantity of

honey required was then multiplied by estimated human population for both time periods under projection. The model was specified as follow;

$$P_{Ct} = P_{C0}(1 + g_{0-t})^t \quad (\text{IFPRI, 2012}) \dots \dots \dots (5)$$

Where;

P_{Ct} = Annual per capita honey consumption in year t ; (predicted consumption)

P_{C0} = Annual per capital honey consumption in base year 0;

g_{0-t} = The growth rate (per year) of household real income during the years 0 to t

CHAPTER FOUR

4.0 RESULTS AND DISCUSSIONS

4.1 Socio-economic characteristics of the sampled households

For the purpose of this study, a household was considered as one person or a group of people, who may or may not be related, living temporarily or permanently at the same house and share the common daily living needs at the housestead (Hoffmeyer-Zlotnik, and Warner, (2009). Socio-economic characteristics of households have important social and economic implications on various human aspects including household consumption. Ability of households' decision-making is in most circumstances a result of socio-economic effect. In this study, variables selected to describe the main characteristics of the sampled households are presented in Table 3.

Table 3. Socio-economic characteristics of household in the study area

Characteristics	Proportion of respondents by residential cost category (%)			Overall proportion (%)
	Low	Medium	High	
Household heads				
Male-headed household	85	95	100	93
Female-headed household	15	5	0	7
Education level attained				
Primary	70	55	42	55
Secondary	28	33	35	32
Tertiary	2	12	23	13
Average household income	442625	580000	856250	626291
Average age of respondents				
18 - 35	65	55	35	51
35 - 45	27	28	40	32
46 - 60	8	17	25	18
Average household size	4	5	5	5

4.1.1 Respondents household head and their household size by residential cost category

The results revealed that, the proportion of male-headed households and female-headed households varied significantly ($\chi^2 = 7.5$; $df = 2$; $p = 0.024$) between residential cost categories. In high residential cost male-headed, households constituted 100% with no female-headed households and in medium residential cost male-headed household constitute 95% and female-headed household constituted 5% only. Meanwhile in low residential cost category male-headed household constituted 85% and female-headed household constituted 15% in the study area. Consequently, in the study area the overall proportion of male and female headed households constitutes 93% and 7% respectively. In general, the result shows that the proportion of male-headed households was higher than female-headed households. Importantly, it was revealed that all household headed by males, the males were married. Reasonably, this is a good indication of household labor supply, which can influence the increased household income and consumption. In addition, it is an ideal for household decision making with regard to consumption patterns and expenditures. This finding implies a good and favorable condition for successful choice for honey consumption and consumption patterns in the study area.

On the other hand, the overall proportion of female-headed households in the study area was generally low when compared to the national proportion for Tanzania mainland, which is 43% (URT, 2006).

4.1.2 Education level of respondents

In both theoretical and practical situations, education level plays a vast role in ensuring household access to basic needs such as food, shelter and clothing. Skills and education amplify the working efficiency resulting into more income and food security. Furthermore, education creates awareness and influences decision making regarding consumption options. In overall, primary education level constitutes high proportion of the respondents (55%) followed by secondary education (32%) and tertiary education (13%) in the study area. The result indicates that illiteracy level is high in the study area, and this is good phenomenon for decision making at household with regard to honey consumption and other human consumption bundles at time.

4.1.3 Household real income

Despite the fact that households were categorized based on the residential costs, household real income was important characteristics to understand the expenditure position of the household. The results in Table 3 shows that in average 442,625 TZS, 580,000 TZS and 856,250 TZS were the real monthly household income from low, medium and high residential cost categories respectively. In addition, the overall household income was 626291 TZS. It shows that the income was increasing with increase in residential cost category.

4.1.4 Age of respondents

Considering the average age of the respondents across residential cost category, it was found that 65%, 55% and 35% of the respondents were aged between 18 - 35 years in low, medium and high residential cost category respectively. . The second group that accounted for 27%, 28% and 40% of the respondents was aged between 36- 45 years

old and the last group was 8%, 17% and 25% the respondents was aged between 40-60 years old in low, medium and high residential cost categories respectively (Table. 3). The finding shows that many of the respondents were in the working group age, and who can participate in income generation activities and contribute largely in household income. The overall results shows that, the proportion of respondents aged between 18 -35, 36 – 45 and 46 - 60 years old, were 51%, 32% and 18% in low, medium and high residential cost category respectively (Table 3). These findings show that the household heads in the study area were in the category of economically active and working age group when compared to the average proportion reported for the national statistics, which was 52.2% (15 – 64 years) (URT, 2013). This implies that household heads regarded to have enough energy to undertake productive activities and generate income, which support substantial household consumption and expenditure including on honey. Age influences the ability and capability of an individual in income generation activity. For example, Regnard (2006) argues that, the accumulation of wealthy is highly dependent on age of an individual, whereby a direct relationship is experienced. Similarly, age determines individual maturity and ability to make rational decisions, where it has influence on individual to decide on honey consumption.

4.1.5 Household size

The household composition considered in the study area were the residential groups whose members line together in close contact by sharing resources held in common, such as accommodation and food. The number of persons staying in the household in high, medium and low residential cost categories constitutes 5, 5 and 4 people respectively (Table 3. In addition, the overall number of persons was five (5) people.

However, it was revealed that, in proportion the household members were increasing with residential cost categories, many members were encountered in higher residential costs than in low residential costs category. This may have resulted due to two reasons. Firstly, influence of African culture that, most families are extended, and when one of the relative is well off, relatives from home village tend to come and reside when looking the job since they are sure of accommodation and foodstuff availability. Secondly, many people residing in high residential cost area have high income with which they rent the whole house that accommodated large number of people and employ houseboys and girls compared to low residential cost category with people owing low income. The number of household persons in the study area is ideal and can have influence on the quantity and consumption pattern of honey. Furthermore, these findings were similar to a Tanzanian household budget survey in 2000/01 that indicated that average household size of Tanzania mainland was five people (URT, 2006).

4.2 Sources of honey for household consumption

4.2.1 Source of honey

The survey has established that, honey consumed in Mwanza city was not produced in the area, in contrary it was imported from different places outside the city. During the interview with beekeeping officer of Mwanza city, it was revealed that honey sold and purchased in both local markets and supermarkets for consumption imported from other places outside Mwanza region.

“...as you know this is town and no even place to hang beehives, people are busy constructing tall buildings so honey which is consumed here either in raw state or

processed is imported by businessmen outside the region ...”(Beekeeping officer Mwanza city, 4th February 2015).

However, it was found that, honey dealers imports raw honey from Tabora, Singida, Kigoma, Biharamulo and Bukombe to mention few, and sell to retailers or themselves in a raw or natural state. Importantly, it was revealed that, mostly, honey is imported from Tabora particular Sikonge district and Manyoni district in Singida region this may be due to fact that these areas potentially produces honey in large quantities in the country. Interestingly, it was revealed that, some honey dealers import honey from producing regions to Mwanza city and transport it to Kenya for sale where it is processed and packed then imported back in the city and sold in supermarkets at high price. This may be contributed to lack of processing and packaging industries for honey and other bee products established in Mwanza city, and it provides avenue for venture in the study area.

Since honey consumed at household in the study area outsourced from other places by honey dealers, the result in Fig. 4 show that, 98% of households obtain honey for their use within urban centre while 2% get honey outside urban area particular from major producing areas. This indicates that much of honey consumed at households in the study area is purchased within urban centre.

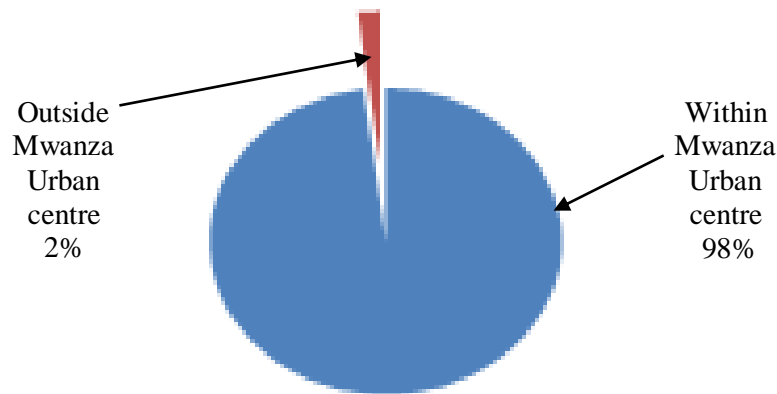


Figure 4. Proportion of households on source of honey

The result implies that honey business in Mwanza city is prominent and many people engage in the business of which the domestic market is the main supplier of honey for household consumption. With this scenario, it provides certainty of honey market to suppliers, which in effect it results to its availability in the area. Consequently, this may stimulate the consumption behavior to consumers, and consumers need for the product (Roman, 2013). Likewise, it may influence the choice for honey consumption among households in the study area.

4.2.2 Purchasing places in the study area

Purchasing places of honey for households' consumptions in the study area were examined. The study revealed three places where households buy honey for their uses, and which are local markets, supermarkets and hawkers (Figure 5). The results show that 59%, 32% and 7% of households purchases honey for consumptions from local markets, supermarkets and hawkers respectively. The finding implies that local market places area the dominant purchasing places where honey product being purchased for household consumptions relative to other places in the study area. With

the given various purchasing places, this may contribute to the availability of honey in the study area and which may influence the consumption of honey in the study area. These findings are consistent with the findings by Pocol, (2014) who found that 33%, 8% and 7% of the respondents purchased honey for household consumptions in the marketplace, supermarket and store in Romania respectively. In addition, Pocol (2014) contended that the choice for purchasing place may be contributed by education level, where market places are preferred by people with low level of education while supermarkets preferred by people with high level of education.

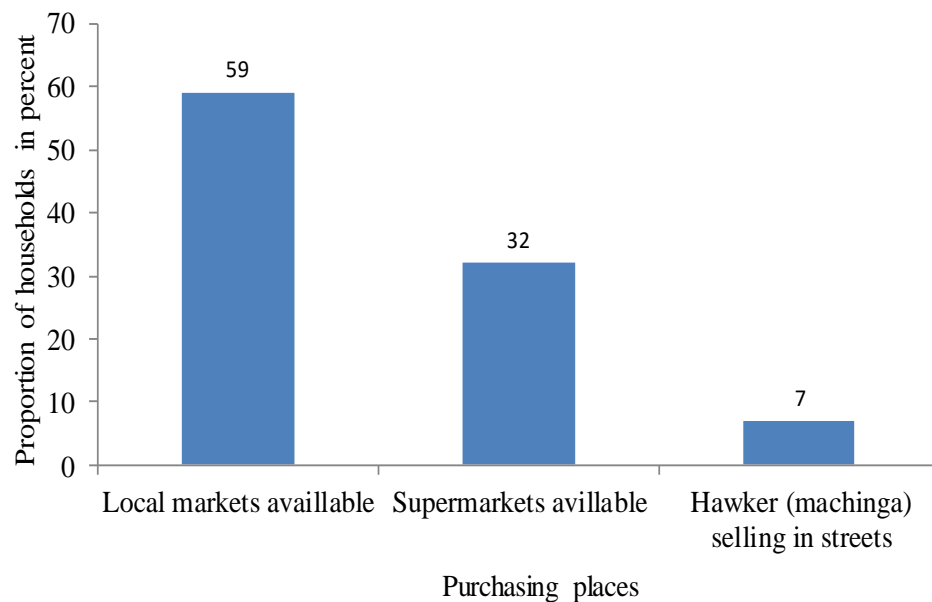


Figure 5 Proportion of households on honey purchasing places in Mwanza city

However, to some extent the concentration of sellers in a given place may attract the attention of buyers, where with this regard it has been observed that local markets are scattered in the study area with large numbers of honey retailers compared to other purchasing places. This makes market place to have large market share for honey product as compared to supermarket and hawkers in the study area. In addition, prices

at these local markets in relation to other sources were selling at relative low prices (5000 – 8,000 TZS per kilogram) as compared to supermarkets (10000 – 15,000 TZS per kilogram). On the other hand, the study revealed that in most cases hawkers “*machinga*” in the streets sells honey at low prices than other purchasing places through bargaining but of low qualities, and with this result to many people unlike to purchase honey from hawkers in the study area. However, the respondents pointed that the prices of honey in local market tend to varies significantly depending on the availability or seasons. During harvesting seasons, honey is more available and the prices tend to be low, however, the interview with one of honey dealer in city \market revealed that the price is highly influenced by the number of large buyers who export honey to Kenya.

“...there are many people who are coming from Kenya and other businessmen here in town buy honey in large quantity from honey producing areas but also here in town which causes the prices to shoot...” (Mzee Hussein Hamisi, February 8, 2014).

Furthermore, in Table 4 proportion of households on purchasing places varies significantly between residential cost category, where 27%, 21% and 11% households purchases honey from local markets in low, medium and high residential cost categories respectively. On the other hand, the none of the household from low residential cost category purchases honey from supermarket place, while 22% and 10% of the households purchases honey from supermarkets in high and medium residential cost categories respectively. Meanwhile, 6%, 1% and none of households from low, medium and high residential cost categories respectively purchases honey from hawkers selling in streets in the study area.

Table 4. Proportion of respondents on purchase place by residential cost category

Residential cost category	Purchase places for honey in Mwanza urban centre (%)		
	Super market available locally	Local market available	Hawkers (machinga) selling in streets
Low	0	27	6
Medium	10	21	1
High	22	11	0
Overall proportion	32	59	7

Note: Overall, do not add up to 100, it is a proportion of households buying honey in urban center

The results indicates that market places remain as the hub for honey product where majority of the household obtain their honey for consumption regardless of residential cost category in the study area. These results are similar to the results obtained by Mason and Jayne (2009) who found that households regardless of their income categories commonly uses market and retail groceries for food purchases while supermarkets are often time used by wealthier households in urban areas of Zambia. As stated above, this may be resulted to the availability of honey in markets places but also the tendency of many people to buy consumption good from the market places than supermarkets in the study area. In addition, household with medium and high incomes only, purchases their honey product from supermarket. It may be attributed by the fact that honey in supermarkets sold at high price such that household from low residential costs are low-income people who cannot afford purchasing honey from supermarkets that sells relatively at high prices.

4.3 Quantity of honey consumed

4.3.1 Frequency of honey purchase per month

Result in Figure 6 shows that, the frequency of purchasing honey for different household uses per month were once and twice in the study area, where majority of the households (94.2%) purchases honey for their consumption once per month and 5.8% of households purchases honey twice per month. This indicates that purchasing behavior for honey is low in the study area, which in turn results to low consumption frequency of honey among the households.

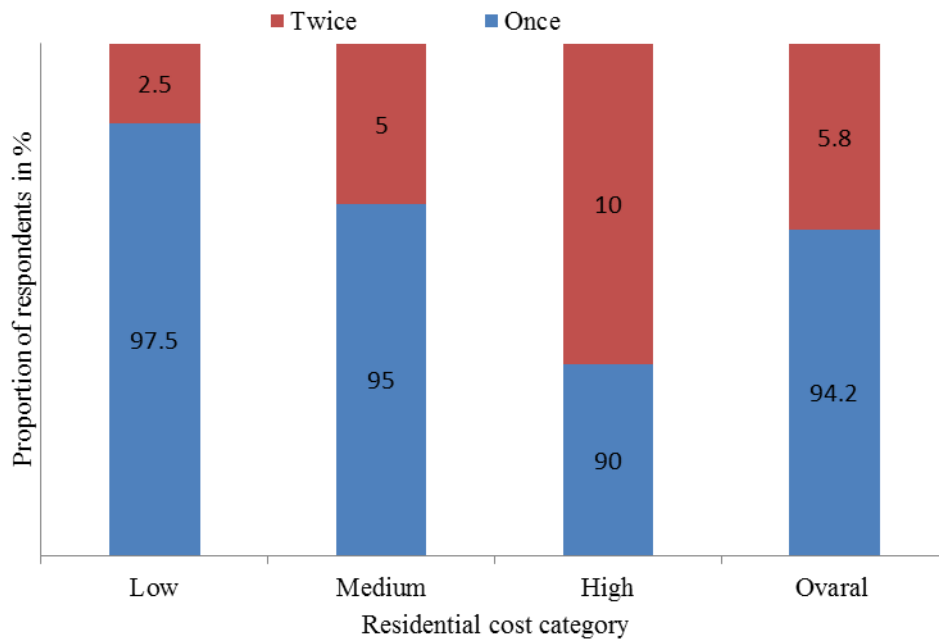


Figure 6. Proportion of household on purchasing frequency

Further, there was no significance difference between residential cost categories' in purchasing frequencies. The result indicates that large proportion of households where 97.5%, 95% and 90% from low, medium and high residential cost categories respectively, purchases honey once in a month for their consumptions while 2.5%, 5%

and 10% from low, medium and high residential cost categories purchases honey twice in a month. The results indicates that the proportion of households' on frequency of honey purchases once per month decreases from low to high residential cost category, which implies that high proportion (97.5%) of household from low cost category purchases honey for their use once per month compared to medium (95%) and high (90%) cost categories. On the other hand, the proportion of households on frequency of honey purchase twice per month increases with increasing residential cost categories in the study area. In general the results imply that the tendency of honey purchase frequency for consumption among honey consumers in the households tend to increase with increasing income in the study area. These findings are similar to the finding by Pocol (2011) who found that frequency of honey consumption was low and high among people with low and high income classes in Romania respectively.

High proportion of households purchasing honey once in a month implies that the consumption habit for honey is low in the study area, and this may be contributed by low consumers' exposure to honey uses. Furthermore, it may be due to low level of awareness on the benefits of honey among people in the study area. However, it is worth to note that, the consumption of honey may not be viewed along the category of general food habits, and being associated with people's welfare (Pocol, 2011) rather it remains the matter of preferences and perceived values of honey among consumers. Worth noting promotion, efforts for the product are inevitable in order to increase the consumption habit among the people in the area

4.3.2 Quantity of honey purchased for household consumption

Results in Table 5 show that the minimum quantity of honey purchased for households consumptions range between 0.25 kg and 0.44 kg, while the maximum range between 1 kg and 5 kg per month in the study area. In addition, mean quantity of honey purchased per month was 0.51 kg, 0.70 kg, and 0.80 kg from low, medium and high residential cost category respectively. Despite the fact, there was no difference in frequency of honey purchase for consumptions among households regardless of residential cost categories, the results in Table 5, indicates that in average the households from low residential cost category purchase little quantity of honey compared to other households categories, and the trend tend to increase with increasing residential cost category in the study area.

Table 5 Distribution of average quantity of honey (kg) purchased per month

Residential cost category	Minimum	Maximum	Mean	Standard deviation
Low	0.25	1	0.51	0.16
Medium	0.25	2	0.70	0.31
High	0.44	5	0.80	0.72

The results imply that household from low residential cost category are low income household with low income such that they purchase little honey for their consumption as compared to medium and high residential cost category households with substantial high income to purchase more honey. Pocol (2011) contended that poor people are to greater extent non consumers and to lesser extent frequent consumers, while those who place themselves in the category of “medium to rich” are high frequency consumers. However, this may be contributed by income level, where poor people

have low income that cannot accommodate purchasing more for consumptions relative to people with medium and high income.

4.3.3 Present total quantity of honey consumed

The present quantity of honey consumed in the study area provided in the Table 6 show that the aggregate consumptions were 84.2 kg, 126 kg and 158 kg while per capita household consumption were 2.1 kg, 3.2 kg and 4 kg of honey in low, medium and high residential cost categories respectively. Similarly, per capita honey consumptions were .0.5 kg, 0.6 kg and 0.8 kg in low, medium and high residential cost categories respectively. The result indicates that the honey consumption tend to increase with increase in residential cost categories. This implies that people with high incomes consume more honey than those with low incomes in the study area. The result affirms Pocol (2011) who ascertained that honey consumption is associated with income, where low income people consume little quantity of honey and high income people consume more honey.

Table 6. Present amount of honey consumed

Residential cost category	Quantity of honey consumed		
	Quantity consumed per residential cost category (kg)	Quantity consumed per household (kg)	Quantity consumed per person(kg)
Low	84.2	2.1	0.5
Medium	126	3.2	0.6
High	158	4	0.8
Overall total	368.2	3.1	0.6
Total aggregate consumption	423871.8		

In addition, the result shows that the estimated aggregate annual quantity of honey consumed was 423871.8 kg with per capita consumption amounting to 0.6 kg in the study area. The results indicates that, the consumption behavior of people in the study area is low compared to Saudi Arabia where annual per capita honey consumption range between 0.45 kg to 11.3 kg with an average of 4.5 kg (Ismaiel *et al*, 2012). However, this may be associated to the prevalence of low per capita income in the study area and nation in general compared to Saudi Arabia (\$27,000).

4.4 Consumption patterns of honey

The study revealed five consumption patterns of honey among household in the study area which include use of honey as food, healing or medication, substitute for sugar in tea, substitute for jam and blue band (margarine) in bread and cream for farcial or body lotion (Figure 7)

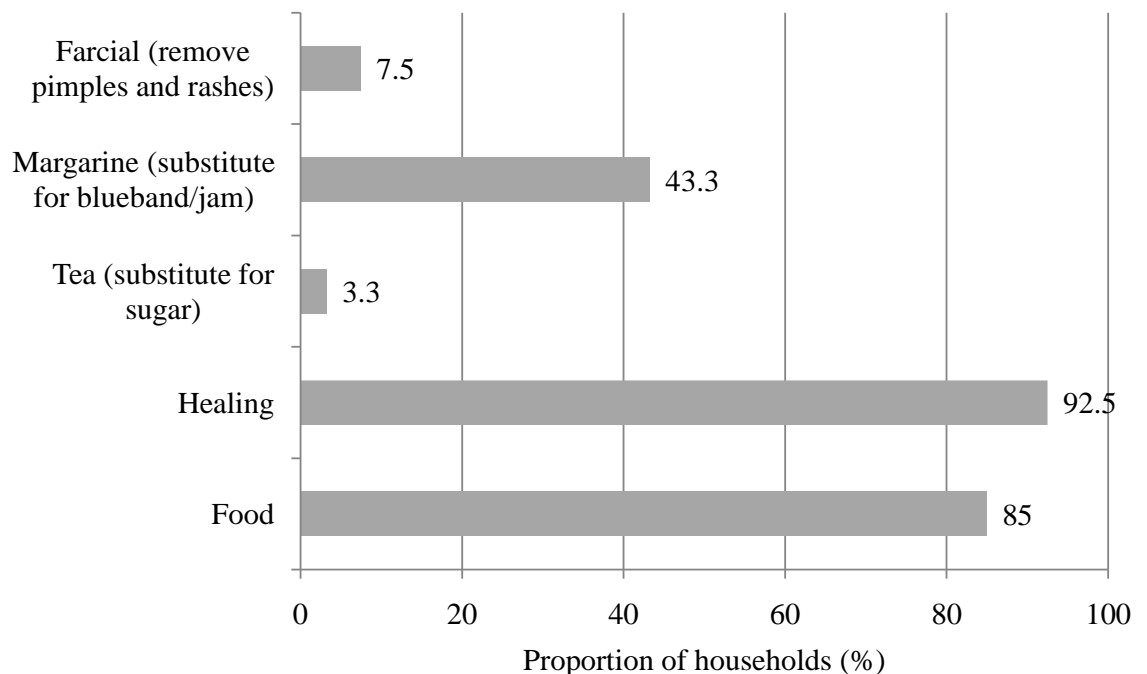


Figure 7. Proportion of household on consumption patterns of honey

In addition, among the revealed consumption patterns it was evident that high proportion of households (92.5%) uses honey for healing or medication, and (85%) for food compared to other uses identified. Meanwhile 43% of households consume honey in bread as substitute to margarine and 7.5% for facial as body cream and 3.3% use honey in tea to substitute sugar. The result indicates that high proportion of households' uses honey for healing, and this may be attributed by the fact that honey is a natural product and has therapeutic as well as medicinal properties, which may attract many people to engage in honey consumption, particular in the current context of health consciousness among people (Pocol, 2011). Similarly, the majority of respondents from the households reported their use of honey for treating coughs as well as burnt body surface and wound dressing. Healing property of honey has been investigated and reported in the literature, for example, according to Batt and Liu (2012), "honey has antibacterial and antimicrobial qualities which have been shown to be effective on *Streptococcus faecalis* and *Shigella disenteria*, organisms which are resistant to some antibiotics". In addition, Scott-Lower, (1987) cited by Batt and Liu (2012), stresses that honey consumption in regular manner has been shown to reduce blood sugar in the body which in turn results to increase metabolism. Moreover, 85% of the households use honey as food substance and this contributed by sweet taste and nutritional value of honey.

It is worth noting that the presence of various consumption patterns of honey may contribute to increase the options or chances for uses that in turn results to influence many people to engage in the use of honey in the study area. Consequently, this may results to increase in quantity of honey consumed at household and in the study area at large.

Furthermore, the study revealed variations on consumption patterns across the residential cost categories. Result in Figure 8 show that household in high residential cost category uses honey in all identified consumption patterns compared to other categories.

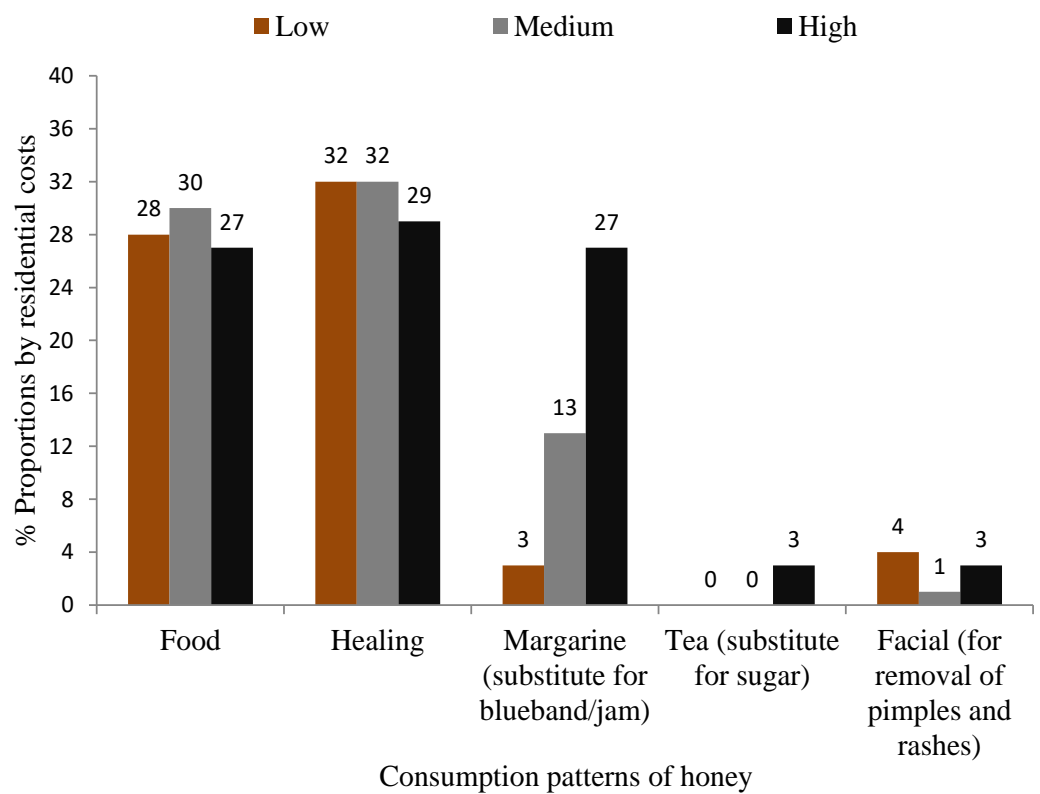


Figure 8. Household consumption pattern of honey by residential costs category

4.5 Factors influencing households' choice for honey consumption

Honey is consumed for various uses in the study area as forementioned above. However, the study revealed seven factors, which were identified to influence the choice for honey consumption among households in the study area. The factors were; frequent availability of honey, affordable purchasing price, taste and preferences (sweet taste), religious and cultural matters, awareness due to current government

initiatives on beekeeping, natural healing characteristics and freeness of cholesterol and dangerous sugar content. Factors influencing honey consumption choice were estimated to determine how household behave in making decision given various products available in the market for consumption. In order to determine the significance of factors that influences households' choice for honey consumption amongst the available options or market goods in the study areas, binary logit model was used. This was done in order to test the hypothesis which states that 'household socio-economic characteristics, product characteristics and other factors equally influence the choice of honey consumption among households'

The model accommodated the binary value, which was a reflective to the consumption situation available in the study areas to represent the dichotomous dependent variable. The logistic binary equation that was developed for this study accommodated the dependent variable that was dichotomized as household consume not consume honey. The explanatory variables that were accommodated in the binary logistic regression equation included the variables, which were revealed by the respondents and selected social economic variables to test their effect and to suit the study goal. The variables revealed by households were frequent availability of honey in the urban centre (FAVH), price per litre/kg of honey offered at the market (RPHO), taste and preference on honey (TPH), awareness due to current government initiatives on beekeeping (AGI), natural healing characteristics (NHC) and freeness of cholesterol and dangerous sugar content (FCDS). On the other hand, social economical variables which were considered to test whether may influence the consumption of honey includes; sex of the household head (SEX), education level of the household head

(ELHH), religion and culture of household (RCH), age of household head (AHH), household income (HOINC) and household size (HOZE).

4.5.1 Results of binary logit model estimation

The BLRM was used to determine the household choices, by examine effects of explanatory variables on the likelihood of choosing honey from a number of alternative products that are available in the study areas. Table 8 summarizes the socio-economic factors hypothesized to influence household choice for honey and the factors revealed in the households. As it can be seen from the table, the specified binary model fits well the data as measured by Pseudo – R^2 (Cox and Snell = 0 .52 and Nagelkerke = 0 .861). The high values of Pseudo – R^2 which are 52%, and 87.78% for Cox and Snell and Nagelkerke respectively, suggest a good predictive ability of the model and implying that the explanatory variables included in the model explain well the variation in the dependent variable. According to Louviere *et al.* (2000) Pseudo- R^2 sometimes though rarely, reaches values as high as those of R^2 in linear regression; therefore, the presented Pseudo – R^2 are still considered having a good fit. Furthermore, the Chi-square statistic shows the model is highly significant at 5% ($P < 0.05$) level of significance, indicating that coefficients for all variables included in the model are jointly different from zero. All these confirm that there is a relationship between the dependent variable and explanatory variables included in the model.

Moreover, the important thing in BLR model for any choice analyst is to describe the overall test of a relationship, in this case a relationship between the dependent and independent variables. The existence of a relationship between the dependent and

independent variables is based on the statistical significance of the final model chi-square termed model fitting information (Table 7). In this analysis, the model reveals that the probability of the model chi-square (81.07) was 0.001, less than the level of significance of 0.05 ($P < 0.05$).

Table 7. Model fitting information

Model	-2log Likelihood	Chi-Square	df	Sig
Final	20.380	81.07	10	0.001

With this regard the hypothesis that household socio-economic characteristics and product characteristics do not influence choice of honey among households was rejected.

The result in Table 8 indicates that, some predictor variables influence honey consumption choice significantly. Of the 12 independent variables used in the model, four factors were statistically significant at 5% significance level. The results indicates that the probability of the choice for honey consumption is significantly and positively influenced by the taste and preference of the household on honey (TPH), natural healing characteristic of honey (NHC), and freeness of cholesterol and dangerous sugar contents which is consistent with the *a priori* expectations. The positive coefficients for these variables imply that increase in any unit may results to increase in consumption of honey among households.

The BLR model coefficients give the change in the log odds of the outcome for a one-unit increase in the predictor variable. In this regard, for every one unit change in taste and preference, natural healing characteristics and freeness of cholesterol and

dangerous sugar content, the log odds of honey consumption (versus non-consumption) increases by 14.18, 5.73 and 1.56 units respectively. On the other hand, education (ELHH) has a negative effect and statistically significant effect (less than 5% probability) on the choice of honey consumption, which is contrary to the prior expectation. The results of the coefficient indicates that any unit change in education level of household head the log odd of honey consumption versus non-consumption decreases by 3.502 units to the prior expectation.

Table 8. Estimated results of the binary logistic regression on honey consumption

Variables considered	95% Confidence Interval for Exp(β)							
	β	S.E.	Wald	Df	Sig	Exp(β)	Lower bond	Upper bound
SEX	4.014	2.313	3.012	1	0.083	55.38	0.173	3.362
ELHH	-3.502**	1.707	4.206	2	0.04	0.03	0.24	1.383
AHH	0.001	0.043	0	1	0.986	1.001	0.821	1.052
FAVH	0.887	5.064	0.031	1	0.861	2.428	2.428	3.998
HOINC	0.486	0.492	0.976	1	0.324	0.615	0.532	1.073
HOZE	0.253	0.209	0.469	1	0.226	1.288	1.007	1.661
RPHO	2.209	38.53	0.003	1	0.954	9.109	9.003	9.879
TPH	14.18**	5.409	6.873	1	0.009	1.44E+06	1.44E+06	1.47E+06
RCH	-2.291	2.032	1.271	1	0.26	0.101	0.101	3.22
AGI	9.077	5.603	2.625	1	0.105	8.75E+03	8.56E+03	8.77E+03
NHC	5.73**	2.37	5.848	1	0.016	3.84	3.425	4.001
FCDS	1.56**	0.767	4.134	1	0.042	0.21	0.162	3.72
Intercept	-20.661	10.363	3.975	1	0.046	0		

Note. ** Significance at 0.005

Number of observation 120 and 87.5% value of PAC (Percentage Accuracy in Classification)

Pseudo R²: Cox and Snell = 0 .52 and Nagelkerke = 0 .861

The significance influence of taste , natural medication, freeness of cholesterols and dangerous sugar content on consumption of honey in the study area may be attributed to the natural inherent of honey spectrum which revealed upon use by the consumers.

Honey has always been contributing in the medical fields by providing varieties of permitted nutritional and health benefits which also includes antibacterial, antioxidant, anti-inflammatory, pre biotic and other nutritional value. Consequently, the growing consciousness on the nutrition, health, and quality of food among people has become one of the important aspects for consumers in consumption choices (Magnusson *et al*, 2001). These results are similar to the finding by Ismaiel *et al*, (2014) who found that medication, food, and sweetening were the major factors which motivates people buying honey for consumption in Saudi and the aggregate scores were 4.52, 3.71, and 1.52, respectively.

4.6 Future requirement of honey in Mwanza City

4.6.1 Projected human population for 2020 and 2025

Based on past censor statistics Mwanza City had 476,646 and 706,453 human population in 2002 and 2012 respectively (URT, 2006, URT, 2013). the data were used to determine average annual population growth rate (r) which was approximately 3% in Mwanza urban centre, the value which is the same with the estimated growth rate of the region at large.

Table 9. Projected human population

Censor	Censor	Annual growth rate (%)	Population projection	
			2020	2025
2002	2012			
476,646	706,453	3%	898,071	1,043,405

The results indicate the increase in human population by 27% and 48% from 2012 base year. This increase in human population may be explained by the natural human growth, which is expected in the study area.

4.6.2 Honey Consumption Elasticities

The variables included in estimation of honey consumption elastic ties were household real income (LNHOINC) and size (LNHOZE). This was due to the fact that, household expenditures in most time dictated by household income and the size under *ceteris per bus*. The result in Table 10 shows the coefficient of determination (R^2) of 0.586, which imply that 58.6% of the variation in the household monthly expenditure on honey were explained by the variables in the regression model with significance F-test. However, the estimated semi-log function of honey indicated positive significance influenced of household real income ($P < 0.05$) on the consumption, while household size shows no significance influence on honey consumption. This may be attributing to the fact that there was no significant variation in household size among the households surveyed in the study area. The estimated honey consumption elasticities values were 0.169 and 0.312 for household size and the average household real income level respectively (Table. 10).

Table 10. Honey consumption elasticity

Variable	β	Standard error	t-test	Significance
Constant	-3.326	0.776	-4.286**	0.000
LNHOZE	0.169	0.12	1.406	0.162
LNHOINC	0.312	0.059	5.274**	0.000
F-test	16.088**			0.000
R^2	0.586			

Note; ** Indicate significance at 0.05 level

This means that household real income variable exerted significance and positive effects on the consumption of honey in the study area. It implies that honey consumption is elastic, which substantiate the supposition that honey is not only basic but also necessary consumable food item in Mwanza urban centre market. This indicates that a 10% increase to the average household income would increase household honey consumption by 3.12% in the study area. The result similar to the findings by Ismail et al, (2014) who reported 0.27 consumption elasticity for honey in Saudi Arabia. In addition, Alali (2008), cited by Ismaiel *et al*, (2014) reported similar trends for other foods consumption elasticity that ranged from 0.11 for red meat to 0.512 for drinks in Saudi Arabia. The estimated consumption elasticity was used in projection of quantity of honey requirement in 2020 through 2025 in the study area.

4.6.3 Projected honey requirement for 2020 through 2025

Basing on the household income as it was revealed during the survey the average monthly household real income was approximately 626291 TZS in the study area in 2014 (Table 3). This means that actual monthly per capita income was approximately 125258.2 TZS. Using the real per capita gross domestic product growth rate of the national level which is 18% or 0.18 (fixed at 2012 prices) (URT, 2013), the present per capita real income was compounded for 2020 through 2025 in order to project the household income in the forecasted years.

The results in Table 11 show that real per capita income in the study area is expected to be 338,141.2 TZS in 2020 (nearly 1.7 more times than that of 2014). Similarly, the per capita real income in 2025 is expected to be 773,585.4 TZS (nearly 5.2 more than

that of 2014). The estimated income/consumption elasticity of 0.312 was then used to forecast the expected demand for honey in the study area.

Table 11. Projected honey demand in the study area.

Base year	Projected year	Projected per capita real income (TZS)	Projected per capita honey consumption (kg)	Projected total honey consumption (kg)
2014	2020	338,141.20	0.918	824,429
2014	2025	773,585.40	1.67	1,742,486

The increase in household real income by 1.7 will result to the expected increase in household honey consumption by approximately 0.53 and average household consumption reaches 1.643 kg, and the total market demand for honey is expected to be approximately 824,429 kg or 824.4 tons in year 2020 in the study area. Similarly, in year 2025 the household real income is expected to increase by 5.2, this increase will cause the increase of honey consumption by 1.78, and, average household honey consumption is expected to be 5.5 kg. The total market demand for honey is forecasted to reach 1,742,486 kg or 1,742.5 tons in 2025 (Table 14). This dramatic increase in market demand (a 53% and 178% increases from 2014) is explained by the increases to household real income level (170% and 520%) and population (27% and 48%) in 2020 and 2025 respectively in the study area.

4.7 Challenges facing honey consumers

Various factors that challenge the consumers upon consumption of honey at households in the study area were reported (Figure 9). The challenges revealed were low quality of honey (74.2%), inappropriate packaging material (41%), frequent

change in prices (22%) and inappropriate weight of honey (16%) and lack of market information (2%).

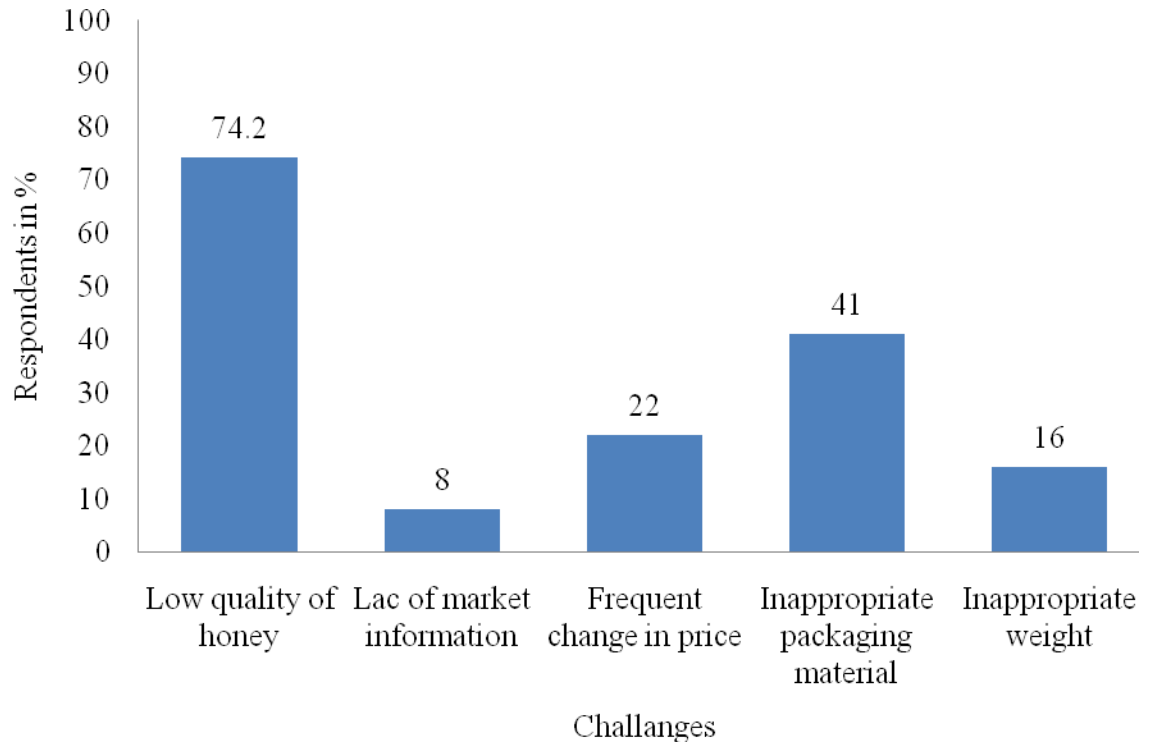


Figure 9. Challenges facing honey consumers

During the interview with respondents and key informants it was found that the quality of honey was a major problem, especially honey sold in local markets available in the study area. It was revealed that honey vendors have a tendency of mixing raw honey with boiled table sugar aiming to increase the volume in order to gain more benefits. As a result of this honey loose the natural sweet taste and expected nutritional and medication values. This requires well-coordinated mechanism of tracing honey from production to packaging point as well as develop quality standard to comply.

It was also found that packing material was a problem and most honey sold in the local markets was packed with used plastic and glass bottles in particular the one used for konyagi alcoholic drink. Packing honey in a used bottle is common in many places in the country. Although considered cheapest and easiest way of packing honey it is not safe to human health since the bottles may not be cleaned well for repacking. Also it may contribute to alter the quality of honey if not well cleaned before packing. Using such materials for packaging may lead to incorrect weights of honey sold and this may in turn affect consumer if packed less or seller when packed more. This requires awareness creation among honey dealers to ensure they use appropriate packaging material for honey and to ensure correct weight for sale.

Unstable selling price was also mentioned as a challenge where it varies from time to time. Despite that change in product prices may be contributed by many factors in fact enabling stable price is an important aspect to consider in product marketing. This enables ultimate consumption of a particular good. Frequent change in honey price may cause consumers to ignore or reduce the consumption of honey and in long term affect the product. However, require provision of marketing information regarding honey product. It was also found that there was no provision of market information regarding honey in the study area. This makes consumers not aware of price and any other changes taking place with regard to honey. It is important to establish marketing information to enable both sellers and consumers aware of the product to ensure better consumption of honey.

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The major objective of the study was to analyse the factors influencing the consumption of honey in Mwanza City. In examination of this broader objective study aimed at determining the present quantity of honey consumed and to examine factors influencing the consumption of honey and to make the study thorough market demand for honey in 2020 and 2025 was estimated.

5.1.1 Quantity of honey consumed

Generally, it was found that the consumption of honey in the study area was relevant across household categories and many household prefer honey for various consumption patterns. However, the quantity of honey consumed was found to vary and increases from low to high income household category. The overall results show that the annual quantity of honey consumed was 423871.8 kg with per capita consumption of 0.6 kg in the study area. In addition, the results revealed that the main consumption patterns were food, medication or healing, replacement for sugar and margarines (jam and blue band) and farcial as body cream mixed with other products.

5.1.2 Factors influencing honey consumption

Twelve factors were found to influence the consumption of honey across households. However, discrete regression analysis was performed to explicitly estimate the extent and significance of the revealed factors influencing the consumption of honey. The result indicated that of the twelve factors modeled four were statistically significance.

The significance factors were taste and preference, natural healing characteristic and freeness of cholesterol and dangerous sugar contents have positive influences while education level of household head has negative influences on the consumption of honey. The noted differences among the factors work against the null hypothesis which was formulated in chapter one stating that the household socio-economic characteristics, product characteristics and other factors equally influence the choice of honey consumption among households

5.1.3 The future demand of honey in 2025

Understanding the future demand is important for better planning. Based on this it was considered wise to forecast the future quantity of honey required to enable producers and suppliers plan. The forecasting estimates indicated that expected quantity of honey will increase and reach approximately 824.4 and 1,742.5 tons in 2020 and 2025 forecasted periods respectively.

5.2 Recommendations

Based on the conclusion made above, the following recommendations are made.

5.2.1 Awareness creation to stimulate the consumption

Although honey found to be beneficial to human health the annual per capita consumption appeared to be low (0.6 kg) among people. There is a need to educate people on the benefits obtained in consuming honey. Awareness may influence the consumption preferences which results to increase in per capita and aggregate consumptions at large.

5.2.2 Develop mechanism of honey traceability

As it was found that natural characteristics of honey influence its consumption it is important to maintain such intrinsic characteristics. In order for this to happen a mechanism for tracing honey from producing areas to final market destination in the country should be developed and maintained. It will enable close supervision of all activities and process carried out in beekeeping sector to ensure natural quality of honey is not diluted.

5.2.3. Promote and empower beekeeper in the country

The expected increase in demand of honey in the study area reflects the situation in other urban places in the country. Therefore, in order to sustain the expected demand it is worth to promote beekeeping activities given the available potential for the activities in the country. This should be complemented with the application and use of modern beekeeping technique. In areas where beekeeper may not afford modern beekeeping equipment stakeholder may empower them so as to engage in the activity. The strategies will boost honey production in order to meet the internal and external demand as well as improving the income of the producers and country's development at large.

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APPENDICES

Appendix 1 Questionnaire for household

THE SURVEY ON THE ANALYSIS OF FACTORS INFLUENCING THE CONSUMPTION OF HONEY IN MWANZA CITY, TANZANIA

SECTION A. GENERAL INFORMATION

1. Name of interviewer..... 2. Date of interview.....
3. Name of respondent (optional).....
4. Street..... 5. Ward 6. City.....

SECTION B: HOUSEHOLD'S CHARACTERISTICS

7. Age of respondent (Years).....
8. What is the nationality of the respondent.....
9. Relation of respondent to household head.....
10. Sex of the respondent [Tick (✓)]: 1. Male..... 2. Female.....
11. Marital status [Tick (✓)]:
 1. Single..... 2. Married..... 3. Divorced..... 4. Widow/ Widower.....
 4. Other (Specify).....
- 12 (a). What is your education level? [Tick (✓)]
 No formal education..... Primary education..... Secondary education.....
 College/university..... Other(specify).....
13. What is your household size 14. What is your occupation
15. How much do you earn per month (TZS)

SECTION C: INFORMATION ON AMOUNT OF HONEY CONSUMED

16. Do you use honey? [Tick (✓)]
 a) Yes b) No
17. What are your main uses of honey?.....
18. Where do you get honey for your use? [Tick (✓)]
 a) Local market b) Outside urban centre c) Other (specify).....
19. What is a price of 1kg/ltr of honey in TZS.....
20. How many kg/ ltrs of honey do you buy at one?
21. How many times do you buy honey in a month?
 a) 1 b) 2 c) 3 d) 4 5) More than 4

SECTION D: FACTORS INFLUENCING HONEY CONSUMPTION

22. What make you use honey?

.....
.....
.....

[Put tick (✓)] if fall in the list below

- 1. It is available in abundant
- 2. It is affordable (reasonable price)
- 3. Preference
- 4. Its sweetness taste
- 5. Cultural and religion reason
- 6. Current government initiatives in beekeeping (Awareness)

23. What are the major problems you have faced in using honey?

.....
.....
.....

[Put tick (✓)] if fall in the list below

- 1. Availability of honey in the market
- 2. Quality of honey
- 3. Distance from home to the market place
- 4. Lack of getting adequate market information on honey
- 5. Regular increase in price

24. Suggest ways in which such problems can be addressed

.....
.....

SECTION E: THE REQUIREMENT OF HONEY IN YEAR 2025

25. Do you think your requirement of honey will increase by next year?

1) Yes 2) No

26. Do you think your requirement of honey will increase by how much Kg/ltr per month?

.....
.....

27. What do you will cause the increase?

.....
.....

SECTION F: ADDITIONAL INFORMATION AND COMMENTS

28. Any additional information and comment with regard to honey

.....
.....
.....

THANK YOU VERY MUCH FOR YOUR TIME AND COOPERATION

Appendix 2. Guiding questions for interview with beekeeping officer of Mwanza City

1. Where does honey consumed in Mwanza urban centre come from?
2. What is the state (raw or processed) of honey consumed regularly in the area?
3. What are the common means of transporting honey coming in the area?
4. What quantity of honey in average have been transported in the area over the past three years?
5. What challenges facing honey marketing and consumption in the area?

THANK YOU VERY MUCH FOR YOUR TIME AND COOPERATION