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MULTINOMIAL LOGIT MODEL APPLICATION: USAGE IN BEEF MARKET CHOICE ANALYSIS IN KAMPALA, UGANDA

BY:

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Bachelor of Agribusiness Management (Makerere University)

A Thesis Submitted in Partial Fulfilment of the Degree of Master of Science (M.sc.) in Research Methods of Jomo Kenyatta University of Agriculture and Technology (JKUAT)

Department of Horticulture

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DECLARATION

I Fred Alinda, hereby declare to the best of my knowledge and understanding that the originality of the findings in this thesis is my work and has never been presented in Jomo Kenyatta University of Agriculture and Technology or any other university for the award of a degree.

..... Date..23-01-2013

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Finally to the Almighty God who saw me through the toughest moments of this program. Thank you Lord for your endless love.

DEDICATION

This thesis is dedicated to my mother, Nakalungi Joyce who has invested in me more than I can ever repay.Finally to my family and friends for the courage and support rendered to me.

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ABSTRACT

Beef markets in Uganda comprises of supermarkets, abattoirs and butcheries with the latter constituting the biggest share in beef supply and demand. Each market alternative can be identified with distinct attributes of beef quality. Distinct socio-economic categories of consumers and characteristics exist. These may foster or constrain consumers' utility associated with buying beef from a particular market and hence their preference and market choice, as rooted in the probabilistic and utility maximization theories. Understanding consumers' underlying market choice determinants is quite relevant to guide policy and strategic interventions to develop beef markets and enhance performance of the beef industry. This studyutilized descriptive statistics and statistical modeling analytical approaches to determine the factors that influence beef consumption and choice between alternative beef markets among beef consumers in urban household of Uganda. Through a face-to-face interview, data from 300 beef consumers were collected. The analysis entailed utilization ofcross tabulations, ANOVA models and more intensively the Multinomial Logit Model. For purposes of hypothesis testing and drawing inferences, Chi-square and T-test statistics were employed.

Descriptive statistics indicated that the majority of households consume beef on a weekly basis and at an average of 3.8 kg per week. The ANOVA results revealed that income, education level and house hold size significantly ($P<0.05$) influence beef consumption among urban households in Uganda. T-test results indicated that with no income constraint, households would significantly increase beef consumption by an average of 0.5Kg per week. Beef consumption was significantly higher among households with more members, earning more income and with higher education level.Likewise, education level had a similar nature of effect on beef

consumption.The distribution of the Cox & Snell R Square and the Nagelkerke R^2 values suggested that the fitted model with socio-economic variables accounted for 9.5-13.4% percent of the variation in consumers' choice among alternative beef markets. The probability distribution of the final chi-square for the log likelihood ratio was less than 5% significance level for the overall model and independent variables income and education level but greater than for sex and household size. Thus, income and education level can be used while sex and household size cannot be used to distinguish or characterize consumers who opt for a particular type of market for beef. The logit model estimates indicted that increase in income or education level significantly increasethe likeliness of buying beef in the supermarkets relative to butcheries and supermarkets relative to abattoirs. Increase in education level furtherincrease the likeliness of buying beef from the abattoirs relative to butcheries.The likeliness of buying beef in supermarkets than butcheries and supermarkets than abattoirs given increase in income was estimated at 76.5 and 79.2% respectively. While the likeliness that more consumers will buy beef from supermarkets than butcheries and abattoirs than butcheries given at higher education levelsestimated at 78.7, and 62.6% respectively. Higher income and (or) more educated consumers were less likely than those of low socio-economic status, to consider price of beef but more concern about, hygienic conditions and convenience and hence more likely to buy beef in supermarkets. Comparably, the low income earners and the less educated, in a bid to circumvent the high price of beef, transport costs for reaching supermarkets located in far proximities and in addition to their demand for fresh beef, were more likely to buy beef at butcheries. The study provides key insights into strategic interventions by stakeholders to enhance beef market competitiveness.

CHAPTER ONE

INTRODUCTION

1.1 Supermarket revolution and changing foot retail systems

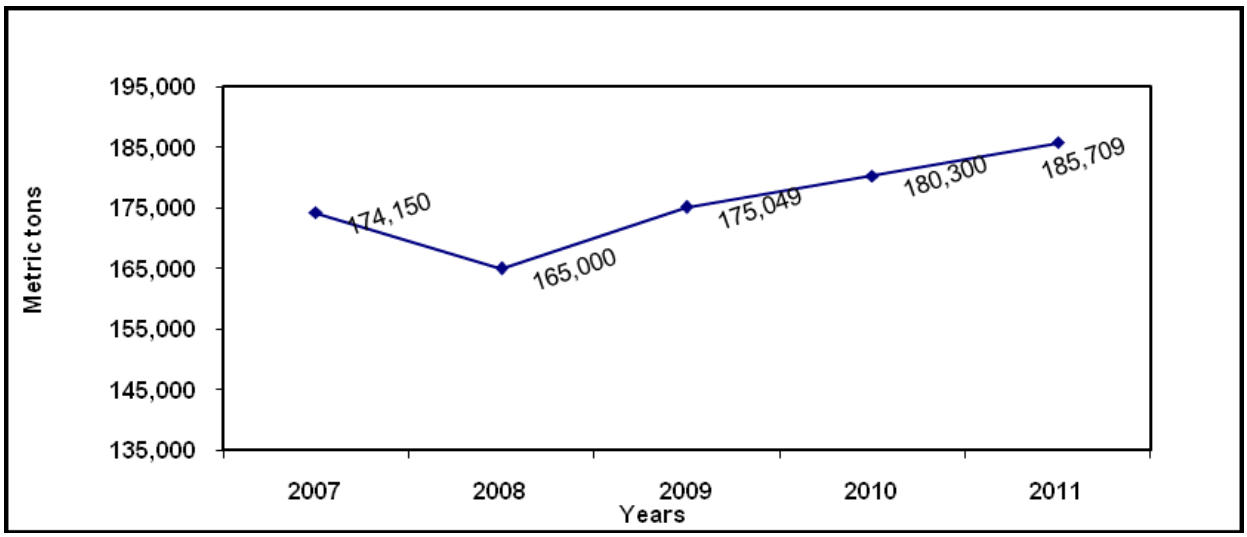
Globalization of the food retail system has impacted on the distribution and marketing of fresh food. For most developing countries, including Malaysia, traditional retail formats are being replaced by supermarkets and hypermarkets (Goldman *et al.*, 1999). In many parts of Western Europe and North America, modern retail outlets now dominate the food retail market (Chen *et al,*. 2005). In Africa, especially in eastern and southern Africa, South Africa is the front runner, with 55 percent share of supermarkets in overall food retail. Kenya is the second runner-up with 20 percent share of supermarkets in urban food retail (Neven and Reardon 2004). In Uganda, supermarkets have just started stemming from the flow of retail foreign direct investment following economic liberalization in the 1990s. The liberalization created a favorable investment climate coupled with the growth of supermarkets demand factors such as rising urbanization, an increasing middle class, and growing population of employed women. Kampala accommodates a number of shopping malls and large super markets constructed and equipped according to international standards. Foreign supermarkets including Metro Cash and Carry, Shoprite, Game, Uchumi, Capital Shoppers, Quality, Tuskys and Nakumattoperatechain stores exist in Uganda alongside many local supermarkets including John Rich, Deep Save, Embassy, and Pay Less, Good price, Cheapex, Half price, Kenjoy and Quality have sprung up especially in downtown and suburban areas of Kampala. In the city center, Top Cuts, Fresh Cut and Quality Cuts are specialized beef supermarkets offering unprocessed beef cuts alongside other markets (regional supermarkets and butcheries. In other urban centers, such as Mbarara, Mbale, Jinja, Masaka and Lira, small local supermarkets are quite common in every corner (Elepu, 2006).

As supermarkets continue expanding in Uganda, the share of fresh agri-food retailing especially in regional supermarkets continues to increase. Fresh foods account for less than one quarter of the total quantity of food products handled in Uganda. Supermarketsare acknowledged by consumers in Ugandafor offering variety and safer products, more convenient, better customer care and a better shopping environment than the traditional food retail outlets such as open and road side markets (Elepu, 2009). Subsequently, the continued expansion of supermarkets together with agri-food supplies offers consumersan option to buy household items including fresh agri-foods in supermarkets or traditional retail outlets.

1.2 Beef consumption and supply in retail markets in Uganda

Beef is one of the most nutritionally essential foods to humans and contains a variety of nutrients. Consequently, it is advisable to consume an adequate amount of beef for healthy lifestyle.Beef production is demand driven and observed to be increasing in Uganda. In 2011, production rose up to 185,709 Metric tons, an increment of about 3% compared to 2010 as seen in Figure 1.

Figure 1: Beef production in Metric tons (2007-2011)



Beef production is in Uganda is mainly for the domestic market due tolimited export opportunities of resulting from prevalence of diseases, a lack of an export standard abattoir and the high demand of the national market (MAAIF, 2012).Beef consumption remains low in Uganda and generally in developing countries compared to international standards. This low beef consumption was reported by the World Health Organization in 2007and attributed mainly to income constraints. Per capita beef consumption stood at only 5.6Kg compared to 50Kg recommended by the WHO and FAO (FAO, 2007). In urban households, per capita beef consumption was estimated at 9.04 Kg in 2004 (MOFPED, 2004), a consumption level that appears much higher compared to that of other meats consumed in Uganda (3.2Kg for pig meat and 0.9 Kg for goats' meat)but much lower thanfor other African countries such as Kenya and South Africa at 12 and 14 kg/person/year respectively.Annual beefconsumption level is estimated at 230,000 tonnes in Ugandaand at 15,500 tonnes (7% of the national consumption) in Kampala (MAAIF, 2012).Unprocessed beef takes a significant share of beef consumed in Uganda with the proportion of meat sold in unprocessed form estimated at 90% (UBOS, 2008).

1.3 Uganda's Beef Value Chain

The most recent study on Livestock Investment Opportunities in Uganda by the Kingdom of Netherlands (Kingdom of the Netherlands, 2012) presents an analysis of Uganda's beef value chain focusing on activities involved, beef sources, markets, demand and supply and regulatory institutions. The study identifies the beef value chain with actorsincluding processors, abattoirs, transporters, butchers, traders, village markets, animal health workers and farmers among others. The value chain involves activities including beef production, beef collection and storage, processing into various products and the offering of the processed beef and other beef products for sale to the final end-user.The study further identifies local farmers and rural traders as the

primary actors in beef supply. These transact at farm level with very minimal volume, just a couple animals per transaction irrespective of species involved. The small traders then bring their livestock to the local markets to sell in secondary markets or truck to terminal destinations in Kampala. Butchers, large traders buy meat from the terminal markets then to the abattoirs for slaughter to obtain beef.

The study further characterizes beef market into 'mainstream' market segment -mainly serviced by the wide network of roadside and market stall butcheries and 'premium'market segment-mainly services by supermarkets. Butcheries are widely distributed and mainly found alongside roads in town centers and local markets in all urban and town localities and remainthe backbone of Uganda's beef supply chain. They are estimated at between 5000-7000 in number and account for 75-80 percent of all beef sales in the country (MAAIF, 2012).The butcheries in Kampala buy their meat from traders at the abattoirs or buy live animals and take them to the abattoirs for slaughter. Demand for beef at the butcheries is mainly supported by beef consumers at household level.

The premium market accounts for about 16 percent of the total meat market(in Kampala), and is served by a growing network of supermarkets (MAAIF, 2012).The supermarkets purchase beef from abattoirs and sells a variety of unprocessed and processed premium beef cuts alongside other meat. Demand for the premium beef cuts in supermarkets is supported by the upper middle class community, hotels, fine dining restaurants and organizations. A study on beef in Uganda by the European Union predicted an increase in the share of Supermarkets in beef supply in Ugandato above 3,300 tonnes in 2017 given the steadily improving standards of living, and a

growing middle class population, (MAAIF, 2012). Supermarkets can be observed to offer beef at significantly higher prices than the butcheries. For instance, a Kilogram of beef fillet will go for an average of USD 4.8 and 9.10 at butcheries and in supermarkets respectively. A Kilogram of meat with bones, the most commonly sold meat cut at butcheries will go for an average of USD 3.2. In supermarkets, minced is the best seller going for USD 4.1 per Kilogram (Kingdom of the Netherlands, 2012)

Abattoirs in Uganda are all characterized by extremely low level of hygiene and poor slaughter facilities.The main slaughterhouses in Kampala are City Abattoir (Kampala City Council), Ugandan Meat Packers Ltd. and Nsooba Slaughterhouse Ltd. A number of modern slaughter facilities have been planned, but so far none of these plans haveresulted in an operational modern abattoir. Some abattoirs are underutilized while others are overstrained. According to the European Union Beef Report, commercial abattoir have a potential to deliver a better return on investment, if it purchases animals itself, and sells good quality carcasses to the market (MAAIF, 2012). This can be perceived an opportunity for investment in technologies and facilities to improve beef hygiene and quality of beef at the abattoirs.

Like abattoirs, butcheries are characterized by unhygienic handling of meat and lack cooling facilities posing a challenge on food safety. Supermarkets unlike butcheries in Uganda meet a higher standard of hygiene and food safety. They are identified with use of standard equipment, such as displays, and freezers and offering beef at higher prices than butcheries. Food safety is further compromised by existence of a weak regulatory system characterized by outdated legislations pertaining meat hygiene and food safety, weak enforcement of and generally absent

regulations. In addition, the meat sector lacks a regulatory body to oversee and enforce the much needed policies and improved practices for the sector. The regulatory activity is focused on the export sector while the usual meat inspections at abattoirs puts limited focus on ensuring that the local and informal meat outlets are regulated and hygiene standards maintained beyond the point of slaughter (MAAIF, 2012).

1.4 Regulatory Framework for Meat Marketing

Beef production and marketing activities are regulated under the Ministry of Agriculture Animal Industry and Fisheries through the Department of Livestock and Entomology and the Department of Animal Production and Marketing. The former is responsible for development of policies and regulations on animal diseases, the development of veterinary inspection procedures, and the inspection and certification of imports and exports of animal products while the latter is responsible for formation of standards regarding the quality and safety of livestock and livestock products. Besides, private sector institutions also play key roles in the management of trade-related quality, food safety for instance, Chemiphar Ltd, an affiliate company of a Belgian company while the Uganda National Bureau of Standards (UNBS) developed a meat grading system for Uganda. The key focus of the regulations includes Meat Quality and Safety (MAAIF, 2012).

The current regulations for beef marketing areembedded in the National Meat Policy (2003). Overall, the policy defines institutions and institutional arrangements fordevelopment of the meat industry. The policy is aligned within the Poverty Eradication Action Plan (PEAP) which is the Uganda's development agendato date. The policy contributes to development of agricultural marketing, a focal area of the Plan for Modernization of Agriculture – one of the strategies for implementation

of PEAP. The National Meat Policy provides a regulatory framework for meat production, processing and marketing of Meat, meat products and by-products for sale locally and abroad. The Regulatory framework for development of the Meat Industry was established in recognition of the role of livestock to National Gross Domestic Product and Agricultural Domestic as well as the huge potential of the Livestock sub-sector in general and the meat industry to lead the economic development and poverty eradication for the rural population.

The policy aims at providing a conducive environment to attract investment in the industry and to build capacity for the country to supply meat and meat products to the domestic and export markets. Supporting value addition and promoting meat marketing are among are higlighted within the specific objectives of the policy.Among the strategic interventions, the policy identifies the need for promoting sustainable production of quality meat, satisfying the national demand and export market and building capacity for increased supply and improved quality of meat and meat products. It places emphasis on quality assurance, and meeting international codes. The policy places emphasis on enforcement of standards, providing the market with a variety ofwholesome quality products to fit the tastes of a wide range of consumers and maintaining meat hygiene to the required standards. It identifies the need for support to the establishment of appropriate facilities at all slaughter places (slabs, slaughter houses and abattoirs) and building capacity of farmers, butchers, processors, extension staff and consumers in meat hygiene, quality, grading among others (MAAIF, 2013).

1.5 Retail beef market challenges and appropriate market choice for development of domestic markets for beef

Food safety at butcheries unlike supermarketscould be an issue of concern to the current and potential beef consumers in Uganda due to poor hygienic conditions at the abattoirs and butcheries. Poor hygiene at the butcheries creates room for beef contamination which could pose a challenge on consumers' preferenceof beef supplied at butcheries. Besides, consumers in Uganda could develop a negative perception towards beef when perceived to be unsafe due to unhygienic environment. The Ministry of Agricultural Animal Industry and Fisheries of Uganda highlights on poor hygiene and beef quality as key challenges constraining development of the livestock industry in Uganda (MAAIF, 2008). In the face of such a scenario in the beef industry, information regarding consumers' preference of markets for beef would bevital for strategic development of the beef industry but inexistent. It is also worth noting that the Ministry looks forward to address these challenges to enhance the industry's competitiveness.

The environment of supermarkets in respect to beef marketing would be embraced and supported by government considering a number of benefits consumers and the beef industry could realize through increased competitiveness of supermarkets in beef retailing. Supermarkets have capacity to; offer lower priced products than traditional markets (Chakravarty 2007), hold retail prices down, especially for mass-consumption and keep inflation low and provide production incentives (production inputs, extension services support, better prices, transport services among others) through institutional arrangements with producers (Nestle India Limited, 2006), which can eventually boost farm production through increased input productivity and profitability (Gupta *et al.,* 2006 and Birthal *et al.,* 2006).

However, potential strategic intervention for development of beef marketing systems and the industry as a whole would necessitate understanding of the behavior of consumers with regard to their choice of market for beef. The factors that influence consumers' choice among alternative markets of food products have been established from previous studies in Malaysia, China, Taiwan among other countries. Among the studies include those conducted (Munoz (1998); Zinkhan *et al.*(1999); Verbeke and Viane (1999); Farhangmehr *et al.*(2000); Hsu (2001); Goldman and Hino (2004); Selim *et al.*,(2005); Shamsudin and Selamat (2005)). Among the factors established include freshness of beef, relationship with buyers, quality perception, convenience and price of the product. Among the house hold characteristic include education, sex and income of consumers. In Uganda, such information remains unknown. The government of Uganda is pursuing a strategy "Government interventions to promote production, processing and marketing of selected products" (MAAIF, 2008). Thus this study focused on the beef consumption and consumers' choice among alternative markets for fresh beef in Uganda.

1.4 Problem statement

Limited information on beef consumer preferences (Baffoe,2000) and beef quality (MAAIF, 2002) remain among the major challenges that impend development of Ugandas' beef industry. While consumers have to opt among market alternatives for beef (UPBA, 2005), limited empirical evidence exist to explain preferences among beef supplied at butcheries, supermarkets or abattoirs among beef consumers. Previous studies on choice of market for beef elsewhere have established perception of freshness of beef (Munoz 1998; Verbeke and Viane 1999), relationship between buyer and sellers (Zinkhan *et al.,* 1999), quality perception of beef (Farhangmehr *et al.,* 2000; Goldman and Hino 2004), customer convenience and price (Kaufman 1996; Pride *et al.,* 2005; Goldman *et al.,* 1999; Shamsudin and Selamat 2005; Muharam 200;

Hsu and Chang; 2002; Abu, 2004) among the major determinants of consumers' choice of market for beef. According to Selim *et al.,* (2003), Rudolf *et al.,* (2000) and Hsu (2001) consumers' choice of market for food products is influenced by their socio-economic characteristics. No such study has been done to explore the same in Uganda. Given that the government is pursuing a strategy to promote production, processing and marketing of beef alongside other products (MAAIF, 2002), such information would be quite relevant to guide policy and strategic interventions to develop beef markets and enhance performance of the beef industry. Thus, this study was advanced to determine the factors that influence beef consumption and choice between alternative beef markets among beef consumers in urban household of Uganda.

The analysis features utilization of simpler research approaches and models such ascross tabulations in analysis of variation between a single independent and dependent categorical outcome/variable, Analysis of Variance(ANOVA) models in analysis of the effect of several independent categorical variables on a normally distributed dependent outcome/variable. More importantly, the analysis entailed utilization of the multinomial logit model in exploring the effect of several explanatory variables on a single dependent categorical/outcome variables. The analysis made use of both the chi-square of t-test statistics to test for significance of the set hypotheses upon which inferences were made.

1.5 Purpose of the study

The main purpose of this study is to utilize appropriateresearch methods that do determine the factors that influence market choice among alternative markets for beef consumers in urban households of Kampala in Uganda.

1.5.1 Specific objectives

1. Determine the socio-economic characteristics that affect beef consumption among urban household beef consumers in Uganda;
2. Establish the market related attributes that influence consumers' choice of market to buy beef
3. Determine the consumer socio-economic characteristics that influence market choice among alternative markets of beef

1.6 Hypotheses

1. Consumers' socio-economic characteristics do not influence beef consumption in urban house hold of Uganda.
2. Consumers' socio-economic characteristics do not influence their choice among the alternative beef markets.

1.7 Significance of the study

Whereas literature on beef markets in Uganda (UBPA, 2005; Kiziba, 2008) classifies beef markets in Uganda into supermarkets, butcheries and abattoir, it does not characterize consumers who source beef in the three market types. Besides,the beef market continues operating in dilemma of imperfect information about the factors that influence consumers' choice among alternative beef markets for beef. According to Schroeder *et al*. (2000), understanding consumer behavior in regard to market choice is vital to guide appropriate interventions to increase consumer satisfaction and market competitiveness. Furthermore, understanding consumers' characteristics that influence their consumption behavior of a particular product is vital for developing strategies to increase consumer demand. Thus the need to understand the factors that influence consumers' choicea mong alternative markets for beef was a cause for this study.

With the empirical findings of this research, stakeholders in the beef market such as beef producers, beef sellers and potential investors would be able to make strategic interventions to enhance competitiveness of the beef market. Findings would help to guide policy intervention to put in place market incentives to develop appropriate beef markets and enhance performance and competitiveness of beef markets looking forward to development of the beef industry.

1.8 Organization of the study

The study is organized into five chapters. Chapter one provides the background of the study with focus on the changing food retail system following the rise of supermarkets and their increased share in agri-food retail. The background further presents an overview of challenges in beef retail markets and gives a highlight on market alternatives for interventions to develop beef markets. It opens an insight into the existing information gap regarding consumers' choice among alternative markets for beef. This constitutes the research problem presented in the same chapter. The chapter also presents the study objectives, hypotheses and justification. Chapter two presents a review of the literature on beef markets in Uganda and consumers' choices among traditional and modern retail markets for beef elsewhere, a theoretical framework for analysis of market choice and determinants of market choice. Chapter three outlines the study methodology including study design, sampling, data collection methods and analysis procedures of research methods used. It also presents an empirical model for analyzing consumers' choice among beef sold in the butcheries and that sold in supermarkets. In chapter four, study findings are presented, interpreted and discussed. Finally, the summary and conclusions drawn from the empirical data are presented in chapter five.

CHAPTER TWO

LITERATURE REVIEW

2.1 Conceptual framework of the Multinomial Logit Model (MLM).

Data involving relationship between explanatory variables and binary responses proliferate in just about every discipline including engineering, natural sciences, health, education, marketing among others. The Multinomial Logit Model (McFadden, 1974) is one of the choice models that can be used to explain and predict the choices that customers make (Gary *et al.,* 2007). The model is also among the most widely used approaches for modeling individual customer behavior. The MLM model stems on the theory of rational choice within a probabilistic framework. The model employs the utility maximization hypothesis which assumes that a decision maker's choice is the result of their preferences.

The model is built on four core concepts: (i) the customer has an unobservable (at least to the modeler) preference or utility for each of the choice alternatives, (ii) the utility of each choice alternative is composed of two additive terms, namely, a deterministic component (the intrinsic value or attractiveness of the choice alternative), and a random component that varies randomly across choice alternatives, customers, and purchase occasions, (iii) the distribution of the random component can be specified, and (iv) on each choice occasion, the customer chooses the alternative that provides him or her the highest utility (Gary *et al.,* 2007).

Consequently, the decision maker is assumed to select the alternative with the highest preference or utility. The utility that a decision maker associates with an alternative is specified to be the sum of the deterministic and random components. Utility is a function which depends on observed attributes of the alternative and observed individual characteristic of the decision

maker. The random component is a random process representing the effect of unobserved attributes of the alternative and unobserved characteristics of the decision maker. The MLM applies concepts from simple and multiple linear regressions which are carried over to Multinomial Logit Regression. Additionally, ideas of maximum likelihood estimation are central to the modeling of the Multinomial Linear Regression data.

2.2 Previous Studies Utilizing MLM in Choice Analysis

Many recent studies have applied the Multinomial Logit Model in analysis of individual's choice determinants. Among these studies include; factors influencing choice of health service provider (Halasa and Nandakumar, 2009), determinants influencing commercial banks decision to ration agricultural credit (Rahji and Fakayode, 2009), understand the determinants of land use decisions to explain the formation of land-use patterns (Carmen *et al.,* 2009), determinants of urban household energy choices (Boukary, 2005) and determinants of choice of school to take education courses (Porter and Umbach, 2006).

Halasa and Nandakumar, (2009) applied the Multinomial Logit Model on a sample of 1031 outpatients, to examine the factors influencing a patient's choice of provider for outpatient health care services in Jordan. The study investigated the socio-economic characteristics of the consumers of the services and the attributes of the services including quality and cost of the health care services. Results indicated that the patient's socio-economic and demographic characteristics affected provider choice. Patients utilizing the public sector were price sensitive. Key among the recommendations, the study identifies the need to critically consider the socio-economic status of the people in any attempts to improve accessibility to health care services in Jordan.

Carmen *et al.*,(2009) explored the factors that drive the land use conversion process in attempt to explain the growth of the exurban areas that had been observed to outpace growth in urban and suburban areas, resulting in growth pressures at the urban-rural fringe. A multinomial discrete choice model with spatial dependence was estimated using parcel-level data from Medina County, Ohio. Of interest was to identify the determinants of the decision to convert a given parcel from one use to another which was expected to depend on several economic factors such as the size of the parcel, its distance to the nearest urban center, its road accessibility, the availability and level of amenities, among others. Land characteristics, density of the parcel and characteristics of the surrounding area such as population density were found to positively influence the likeliness of using land for agricultural or residential relative to commercial purposes.

Boukary, (2005) used the Multinomial Logit Model to analyze the determinants for urban household choices among the alternative energy choices in urban Ouagadougou, Botswana. The model analyzed the sociological and economic variables of household energy preferences for cooking in Ouagadougou. Wood fuel had been utilized more extensively than other fuel energy sources (i.e Liquid Petroleum Gas, Kerosene, Charcoal), portending a threat to the savanna woodlands and the economy. Among the factors analyzed included the socio-economic characteristics of the household (i.e income age, gender, education level and household size). The study results indicated that household cooking energy preferences were determined by poverty factors such as low income, poor household access to electricity for primary and secondary energy, household standard, household size, and high frequency of cooking certain meals using wood fuel as cooking energy. More significant, the likeliness of using

firewooddecreased with increasing household income, suggesting that income was a key constraint to utilization of other cooking energy sources besides firewood. Accordingly, a price subsidy policy for Liquid Petroleum Gas and cooking stoves was recommended to decrease utilization rate of wood-energy in a bid to minimize household wood-energy consumption by substituting it with alternative sources of fuel.

Porter andUmbach, (2006) used the Multinomial Logit Model to analyze the determinants for college major choice. Given the larger social issues involved in college major choice, this analysis explored the relationship between race and gender and the selection of majors including arts and humanities, interdisciplinary, social sciences and natural sciences. Among the factors analyzed included gender, race, age of the students and a socio-economic status factors including education level and income of parents. Results indicated that political views, personality, racial differences, self-efficacy and beliefs about the major, significantly influenced students' major choice. Forinstance students with more liberal views were more likely to choose a non-science major. Blacks were more likely than Whites to choose an interdisciplinary major. The study recommended the need to understand how students form interests in particular school majors, looking forward to balance the representation by ethnicityof students in science subjects.

Rahji and Fakayode (2009) utilized theMultinomial Logit Model to identify the determinants for Commercial banks decision to ration agricultural credit in South-Western, Nigeria. Results indicated that farm size, previous income, enterprise type, cooperative membership, household net-worth and agricultural commercialization level significantly influenced the banks' decision to fully reject, partially satisfy or fully accommodate the borrowers' credit demands. The study

hypothesized credit rationing by the banks to be determined by; age, gender and education level of the borrower, their farm size, previous income, enterprise type, dependency ratio, co-operative membership, level of remittances and level of agricultural commercialization. Findings indicated that farm size, previous year farm income, enterprise type, dependency ratio and agricultural commercialization significantly influenced banks' decision to fully reject, partially satisfy or fully accommodate the borrowers' credit demands. The study called for; the farm-size expansion policy and measures to encourage; cooperative membership, agricultural commercialization and improve reproductive health systems to reduce dependency ratio, looking forward to enhance access to credit.

2.3 Prior Studies Utilizing MLM in Market Choice Analysis

In the field of marketing, the Multinomial Logit Model has been widely used in analysis of determinants of; choice of market channel (Marco, 2008; Imre and Gábor, 2002) and purchasing sources of households (Selim *et al.,* 2003). The objective of the MLM model in Marketing is to predict the probabilities that a customer would choose among several alternatives which are available on a particular purchase/selling occasion.

Marco (2008) utilized the Multinomial Logit Model on survey data to estimate the impacts of growers' business characteristics on choice among three market channels (mass merchandiser, garden center and wholesaler). The study attempted to create more understanding of the behavior of sellers in regard to their choice of market channel for ornamentals, looking forward to facilitate development of appropriate sales strategies for better income and profits. The re-wholesaler channel had been perceived to be most frequently used and fastest-growing market

channel than the rest in the industry. Choice of marketing channels was expressed as a function of business characteristics including firm age, categories of plants sold, trade shows attendance, contracts with specific kinds of buyers and advertising expenditures. Results indicated that producers with a more diversified marketing strategy were associated with higher use of the mass merchandiser and garden center channels. In addition, trade shows advertising had a strong positive impact on choice and sales to the re-wholesaler and mass merchandiser channels. The study provided valuable information to aid producers understand the functioning of the marketing sector and choice of channels in the ornamental industry.

Imre and Gábor (2002) utilized the Multinomial Logit Model within the transaction costs framework, to analyze thedeterminants of farmers' choice among three supply channels (i.ere-wholesalers, co-operatives and local retail markets) in the Hungarian vegetable sector. Their study sought to provide understanding of how the agricultural reforms had impacted on agriculture, food industry and food retailing. The study explored independent variables including transaction costs, physical asset specifity and human asset specifity including age and education level. The results indicated that the farmer's decision to sell to wholesalers relative to other markets was negatively influenced by age, information costs, the bargaining power and monitoring costs while their choice to sell to co-operatives relative to other markets was positively influenced by age, information costs and negatively influenced by asset specificity and bargaining power.

Selim *et al* (2003), applied a Multinomial Logit Model on household milk consumption survey data to analyzethe factors influencing consumers' choice among three fluid milk purchasing

choices (i.e unpacked, processed andprocessed-unpacked) in Turkey. The analysis explored the effect of buyers' socio-economic characteristics including their; household size, number of children in a household, education level and income and compared choice among buyers who considered price as a major factor with regard to their fluid milk choice vs. those who never considered it otherwise. The results indicated that fluid milk purchasing choice was significantly influenced by number of children; household size, educational level and income of the buyers. More specifically, households with high-income levels, more educated and small households were found to purchaseprocessed fluid milk relative to unpacked fluid milk. Results further indicated that response of households to price deference and other usages of fluid milk significantly stimulated households to choose unpacked and processed unpacked alternatives over the processed fluid milk choice.The study recommendedthe need for actions to prevent marketing of unpacked fluid milk; the need to establish some standards in the fluid milk marketing system and impose high amount of charges to unpacked fluid milk sellers in order to improve fluid milk marketing system; the need to support modern farms and encourage market co-operatives to address structural problems of dairy farms and the need to improve milk processing technology levels to reduce cost of processing fluid milk to attract the income constrained consumers.

Most of these studies (Halasa & Nandakumar, 2009; Carmen *et al.,* 2009; Boukary, 2005 and Selim *et al.,* 2003) have modeled choice on a set of explanatory variables including socio-economic characteristics. In the context of this study, the MLM can be regarded most appropriate in analysis of determinants of consumers' choice among alternative markets for beef in Kampala, Uganda. The model takes on a simple closed form structure, which makes it easy to estimate and interpret.

2.4 Socio-economic Studies on Beef Consumption

Beef consumption has in the most recent studies (e.g Lynn *et al.* 2012) been linked with positive and negative concerns to human health. Red meat consumption particularly processed red meat has been associated with; an increased risk of Type 2 Diabetes (An *et al.* 2012), and pancreatic cancer risk in men (Larsson andWolk, 2012). Contrarily other studies (Am, 2010 and Singh*et al.,* 2012) have associated beef consumption with weight gain and longevity.While these studies opens insight into perceptions of health risks and gains as an issue of concern to potential research on factors influencing beef consumption, some studies clearly indicate the worth of exploring the socio-economic characteristics of consumers. Beef consumption has in previous studies been found to be influenced by socio-economic characteristics such as, location, gender, education level, income and age of consumers.

Other studies (Senhui *et al.*,(2003)*;*Schmit *et al.*,(2000) and Jensen, (1995)) identified gender, education level and income status among thesignificant socio-economic factors influencing beef consumption. More specifically, males tended to eat beef more frequently than females who instead ate more poultry than males. A plausible reason for this observation is that more educated people are more informed about the health risks of consuming cholesterol-rich beef. Hence they tended to eat beef less frequently and sea foods more frequently than the less educated consumers. Households with many members and children consumed more beef than those with fewer members and less children. It is worth to note that such studies have been conducted on beef consumers in the developed countries including US, Sweden and Germany among others. Beef consumers in Uganda arecharacterized by varying gender, age income and education status (Kiziba, 2008 andAlinda*et al.,* 2011). These socio-economic variables were

discovered to influence beef consumption as well as consumers' willingness to pay for quality beef in Uganda (Alinda*et al.,* 2011). While the some variables, as discovered in other countries, could influence consumer' choice among alternative beef markets in Uganda,no study has been done in regard to this. Consequently, the influence of consumers' socio-economic characteristics on their choice among alternative beef markets in Uganda was worthy exploring in this study.

2.5Market attributes that influence consumers' choice of market for beef

The factors that influence consumers' choice among alternative markets for food products have been established from previous studies in Malaysia, China, Taiwan among other countries. (Munoz 1998; Zinkhan *et al.* 1999; Verbeke and Viane 1999; Farhangmehr *et al.*, 2000; Hsu 2001; Goldman and Hino 2004; Selim *et al*,2005; Shamsudin andSelamat, 2005). Among the factors established include freshness of beef, relationship with buyers, quality perception, convenience and price of the product.

2.5.1 Freshness

Previous studies (Chamhuri and Batt, 2008; Chang 2002 and Cowan*et al*., 1999) cited freshness as one of the most influential variables impacting on the consumers' decision to purchase fresh beef from specific markets. According to Kennedy *et al.,*(2004) and Warriss (2000), consumers can judge freshness of meat by its physical appearance particularly the color of the meat. For instance, fresh meat was expected to have a bright red color or beef from a cow that has been slaughtered. According to consumers in Malaysia, freshness will affect the taste of food. Goldman and Hino (2004) gave a positive argument on the importance of purchasing fresh food to maintain good health and enjoy the taste of food.

2.5.2 Good relationship with retailers

Traditional markets are known for building relationships between sellers and buyers. According to Zinkhan *et al.,* (1999), the process of bargaining for best price before a transaction is made fosters social relationships and develops trust between the retailer and buyer. Consequently, the trust will attract the consumers, keep them bound to specific sellers and markets and enhance customer loyalty. Goldman and Hino (2004) reported that Arab Israelis preferred to buy fresh meat from a known and trusted source. This enhances consumer loyalty.

2.5.3 Good quality

Consumers will become more demanding of food quality as their income increases. According to Sloan *et al.*,(1984) and Steenkamp and Van (1989), consumers are willing to pay more to purchase the quality food they demand. With more consumers having higher education and being more practical, Farhangmehr *et al.,* (2000) highlighted the importance of quality, followed by price when purchasing food. Previously, consumers were more concerned about low prices.

Consumers today are concerned about beef quality unlike in the past whenthey considered low prices. With regard to beef consumption, consumers are very keen on quality than price. Alinda *et al.*,(2011) established that beef consumers in Kampala, Uganda were willing to pay for quality beef irrespective of their income status. Mceachern and Schroder (2002) established quality and taste among the most important criteria in selecting meat to buy among consumers in Scotland. Quality means many different things to different people. To the consumers in Scotland, beef at the butcheries was perceived to be of better quality than in supermarkets because of perceived freshness. For Arab Israelis, meat is of high quality when it is freshly killed, still ‘warm’ and not chilled or frozen (Goldman and Hino 2004). These characteristics of quality are the preferences of the consumers and have been perfected by the traditional markets to meet their tastes.

2.5.4 Competitive price

In marketing, price is a powerful and convincing tool to attract consumers to purchase from particular retail (traditional and modern) outlets. According to Pride *et al* (2005), price is a tool which informs consumers about the value of the product. Value ultimately brings satisfaction to the consumer. Generally, markets offering good quality products at a lower price will attract more consumers. Though supermarkets are prominent for offering lower priced commodities than traditional markets, this is not the case with regard to price of beef in the two markets in Uganda. Fresh beef in Uganda is offered at a higher price in Supermarkets than butcheries and abbatoirs (UBPA, 2005; Alinda *et al.*,2011). Offering lower prices is an important reason for consumers to shop in supermarkets (Farhangmehr *et al.,* 2000) and traditional markets (Trappey & Lai, 1997). The ability to offer more competitive prices by supermarkets has often been attributed to their economies of scale in procurement. For example in Malaysia, Giant, Tesco and Carrefour Supermarket engaged in a price war to entice consumers to purchase from their stores. Carrefour Supermarket cut prices for about 1,200 products and Giant Supermarket reported to have sacrificed profits in order to maintain their low-price leader position in the country (Arshad *et al.,* 2006).

2.5.5 Convenience

Convenience has been mentioned in previous studies as one of the factors attracting consumers to shop specific retail markets. Convenience was seen from the shoppers' perspective as selecting their preferred shopping outlets based on hours of operation and travel time (Kaufman 1996). According to Pride *et al.,* (2005), convenience not only saves time, but also reduces stress, cost and other expenditures. Basically, convenience eases consumer discomfort. Convenience has different meanings, depending on which retail outlet is chosen and to which

age group the consumer belongs. The concept of convenience and location is very much related. Retail location theory states that consumers prefer to shop as close to home as possible (Kaufman 1996). According to Tang*et al.* (1998), location of retail outlets indicates where consumers purchase their food. Their argument is that consumers are more likely to visit the retail store which brings the lowest total shopping cost. Mui *et al.,* (2003) reported a significant correlation between the place of residence with the shopping premises that shoppers patronize. Consumers in Malaysia, were willing to spend no more than 15 minutes to travel to retail outlets. Shoppers prefer to shop at retail outlets which are nearer to their home or place of work. According to Goldman and Hino (2004) the probability of shopping at traditional relative to supermarkets increased as the distance to supermarkets increased. According to Farhangmehr *et al.,* (2000), consumers perceived convenience in terms of buying everything at the same time from the same place. Finally Mui *et al.,* 2003 reported that supermarket consumers perceived convenience in terms of accomplishing other activities such as relaxing and dining with family and friends, watching movies, bowling, visiting the hair salon and banking at modern retail premises.

2.5.6 Good environment and Hygiene

Store environment and layout may influence the consumer's choice of retail store (Baker 1990). The concept of store image is the way consumers 'see' the store in their minds (Farhangmehr *et al.,* 2000). According to Yalch and Spangenberg (1990), the right use of colour, lighting, sound and furnishing may stimulate perceptual and emotional responses within consumers, which eventually affects their behavior. Espinoza *et al.,* (2004) further state that a good store atmosphere and pleasant surroundings may increase the consumers 'willingness to buy. Although the prices of certain similar items may be relatively higher than traditional markets, consumers

still shop at modern retail outlets due to comfort and good parking facilities (Abu 2004). The good environment provided by most modern retail outlets is used as a marketing tool to attract more customers. Conversely, participants described traditional markets as crowded and the market was hot and stuffy. However, the traditional markets may offer a more convenient location, a greater variety of products and superior product quality which may outweigh the inferior shopping atmosphere (Goldman *et al.*, 1999; Hsu and Chang 2002).

The environment of the butcheries will partly define the hygienic conditions at the butcheries. Butcheries in Uganda are mainly found alongside roadsand local marketsand are characterized with poor hygienic conditions and operate under unsanitary environment (MAAIF, 2012). Such condition, in the view on food safety by the Food and Agricultural Organization (FAO), poses a serious risk of food poisoning. FAO further identifies a lack of knowledge among street food vendors about the causes of food-borne disease as a major risk factor for food poisoning. The health literature associatespoor hygiene with food poisoning that results into various bacterial, viral and parasitic infections including abdominal pain, diarrhea, cholera and gastroenteritis. The category "diarrhea" includes some more severe diseases, such as cholera, typhoid and dysentery. Food poising is described as food that contains a toxin, chemical infectious agent like bacteria, virus and parasite. Diarrhea diseases remain a principal cause of preventable death, in developing countries (Bloomfield *et al.,* 2009). In Uganda, diarrhea prevalence was estimated at 14.4% and accounted for 12.3% of total mortality in Kampala (UBOS, 2002).

2.6Socio-economic characteristics that influence consumers' choice of market

There are a few previous researches to help in selecting exogenous variables that might haveeffect on choice of beef market alternatives. In previous studies of food purchases,

educational status, household size, income have been included as exogenous variables (Hsu & Liu, 2000; Schmit *et al.,* 2000).

Ayo *et al.* (2012) assessed the characteristics influencing the consumption of fast-food in Kampala, Uganda. The study assessed the factors influencing the likeliness of consuming fast foods given certain factors including taste, convenience, education level and household size of consumers. The study utilized a descriptive analysis and Heckman model. Results indicated that consumption of fast-food was most motivated by their taste and convenience. Results from the Heckman model indicated that household size and education level influenced the probability of fast-food consumption and level of expenditure on fast-food while disposable monthly income had a positive effect on the probability of consumption and level of expenditure on fast-food. The study recommended the need for proximity of fast food businesses to the consumers.

2.7 Uganda's Demographic, Education, Poverty and Consumption trends.

Uganda's demographic and socio-economic transition is characterized by an increasing population, decreasing poverty, increasing student enrollment, literacy, household income, household expenditure, percapita consumption and income inequality. The Uganda Bureau of Statistics (UBOS) provides statistics on population trend, education, poverty and consumption in Uganda comparing between urban and rural areas.

Between 1991 and 2002, Uganda's population increased at an average annual growth rate of 3.2 percent. The population was estimated at 5.0 Million people in 2012, an increase from less than 0.8 million persons in 1980. 73% of the population is literate with the literacy rate (88%) higher in urban areas than the 66% in rural areas (UBOS, 2011). Literacy is the ability to read with

understanding and write meaningfully in any language. As key indicators for improved access to education, enrollment in primary and secondary school increased by 0.9% and 2.0 % respectively in the period between 2005/06 and 2009/10 and has been projected to continue increasing in the face of Universal Primary Education and Universal Secondary Education policies (UBOS, 2011). Poverty level remains high though having reduced from 31% to 25% between the period 2005/06 and 2009/10. Nearly 7.5 million Ugandans, living in 1.2 Million households, were considered poor in 2009/10. In urban households, the share of poverty instead increased to 15% in 2009/10 up from 13.8% in 2003 (UBOS, 2011).

The Uganda National Household Survey, between the periods 2005/06 and 2009/10, estimated an average annual increase in average monthly income earnings at 11%, increase in income inequality (Gini coefficient) from 0.408 to 0.42and an average increase in household monthly expenditure at 10.4%. Household monthly expenditure rose to an average of Ugshs 232,700 in 2009/10 from Ugshs 210,750 in 2005/06 (UBOS, 2011). The Gini Coefficient is a measure of inequality in household consumption per adult equivalent. Per capita consumption expenditure rose by 10% in real terms. The expenditure rose from 462,550 to 475,500 in the same period in Kampala district. In terms of Per capita consumption, the expenditure rose from 109,200 to 131,600. The share of food, drinks and tobacco in total household expenditure stood at 45% overall and 32% in urban areas (UBOS, 2011)

2.8 Summary of the Literature Review

The studies on the beef industry have identified butcheries, abattoirs and supermarkets as the existing beef market segments in Uganda each with distinct characteristics in terms of the location distribution, price charged for beef and hygienic conditions. The studies further indicate

that beef consumption is mainly consumed in urban households and in fresh form. Consumption is highest in urban households particularly Kampala than any other district in Uganda. The households in Kampala have been identified with varying socio-economic characteristics including the gender of the household head, size, education leveland income among others. Such socio-economic characteristics have been observed to influence consumer's willingness to pay for quality beef in Uganda. The socio-economic characteristics as well as the market attributes have in other countries been established as key drivers for consumers' choice of food items beef inclusive. The market attributes include; the convenience associated with reaching the market, the hygienic conditions of the market and the freshness of beef offered by the market. The studies have used descriptive statistical approaches or Multinomial Logistic Regression which have proved effective. In Uganda, the determinants for consumers' choice of market for beef remain unknown. While based on studies elsewhere outside, such market attributes could influence consumers' choice of market for beef no researched evidence exists in the context of beef consumers in Uganda. The current study was advanced to build on this existing body of knowledge. The study would explain why consumers opt for a particular beef market segment looking forward and draw policy recommendations relevant for the development of beef marketing in Uganda.

CHAPTER THREE

METHODOLOGY

3.1Theoretical framework of the Multinomial Logit Model

In this section, the basics of the Multinomial Logit model are presented. Specifically, the section

presents a conceptual, theoretical and contextual background of the multinomial logit model its methodological application in analysis to determine the socio-economic characteristics that influence consumers' choice among alternative markets for beef in urban households of Uganda. The Multinomial Logit Model is built on the theories and assumptions embedded in the probabilistic theory and the random utility maximization theory. The theories are described, the structural, econometric model and estimation procedure are presented and finally the model in the context of the analysis in the study specified.

3.2 The probabilistic theory and utility maximization theory

This theory is based on the fact that analysts lack understanding of the internal decision making processes of the choosers as well as their perception of alternatives, which limit their capacity to describe the process and predict choice using deterministic utility models. The theory provides a basis for description of preferences and choice in terms of probabilities of choosing each alternative rather than predicting that an individual will choose a particular mode with certainty. The probabilities effectively reflect the population probabilities that people with the given set of characteristics and facing the same set of alternatives choose each of the alternatives.

As with deterministic choice theory, the individual i is assumed to choose an alternative t if its utility $U_{it} = V_{it} + \epsilon_{it}$, is greater than that of any other alternatives. The probability prediction estimates the utility of the alternative, from the perspective of the decision maker can be broken into two components (i) the portion of the utility observed by the analyst (V_{it}), often called the deterministic (or observable) portion of the utility and (ii) the difference between the unknown utility used by the individual and the utility estimated by the analyst, presented as the

random error ϵ_{it}.

The deterministic or observable portion $V_{ti} = V(S_t)+V(X_i)+V(S_tX_i)$, of the utility of an alternative, is a mathematical function of the attributes of the alternative and the characteristics ofthe decision maker.This portion often can take on any mathematical form but the function is most generally formulated as additive to simplify the estimation process. It includes unknown parameters which are estimated in the modeling process. It can be broken into components that are (1) exclusively related to the attributes of alternatives S_t, (2) exclusively related to the characteristics of the decision maker X_i and (3) represent interactions between the attributes of alternatives and the characteristics of the decision maker (S_tX_i).

The total error represented as a random variable, is the sum of errors from many sources including imperfect information, measurement errors, omission ofmodal attributes, omission of the characteristics of the individual that influence his/her choicedecision and/or errors in the utility function. By definition, error terms are unobserved and unmeasured.

The mathematical form of a discrete choice model is determined by the assumptions made regarding the error components of the utility function for each alternative. The specific assumptions that lead to the Multinomial Logit Model (MNL) are (i) the error components which are extreme values (or Gumbel) distributed, (ii) the error components are identically and independently distributed across alternatives, and (ii) the error components are identically and independently distributed across observations/individuals.The Gumbel distribution is selected because it has computational advantages in a context where maximization is important.

3.3 The Multinomial Logit Model (MLM)

The multinomial logit is used for the same type of choice situations as the conditional logit model: $y_n = \epsilon\{1, 2,...J\}$ where the values of y_n have no natural order. However, unlike the conditional logit, the multinomial logit uses only variables that describe characteristics of the individuals and not of the alternatives. The MNL gives the choice probabilities of each alternative as a function of the systematic portion of the utility of all the alternatives. The model describes the probability of choosing an alternative i= 1, 2 3,….,j) from a set of j alternatives. The general equation of the model is given below.

$P(i) = \exp(Vi) / \sum_{j=1}^{j} \exp(Vj)$……[i]

3.3.1 The Econometric Model

The multinomial logit model constitutes the deterministic part of the indirect utility function specified as follows: $V_{nj} = x'_n \beta_j + \epsilon_{nj.}$ The exogenous variable x_n describes only the individual and are identical across alternatives. The parameter β_j differs across alternatives. The observed choice y_n of an individual n is V_{nj} less or equal to V_{ni} for all is and j categories. The error term ϵ_{nj} follow independently and extreme values distribution. The probability that an individual n chooses alternative j is $P_{nj} = P(y_n = j|x_n) = e^{xn} \beta_j / \sum_{i=1}^{j} exn\, \beta j$. The odds ratio P_{nj}/P_{ni} depends on loglineality onx_n $\text{Log}(P_{nj}/P_{ni}) = x'_n(\beta_j - \beta_i)$.

3.3.2 Model Estimation

Logit model development consists of formulating model specifications and estimating numerical values of the parameters for the various attributes specified in each utility function by fitting the models to the observed choice data. The critical elements of this process become the selection of

a preferred specification based on statistical measures and judgment (Koppellman, 2006). Under some circumstances, the model developer may impose constraints on the estimation to ensure desired relationships with respect to the relative value of different variables. Multinomial logit models are estimated using the maximum likelihood procedure.

Basically, the maximum likelihood method entails finding model parameters which maximize the likelihood (posterior probability) of the observed choices conditional on the model. That is, to maximize the likelihood that the sample was generated from the model with the selected parameter values. The estimation procedure involves (i) developing a joint probability density function of the observed sample, called the *likelihood function*, and (ii) estimating parameter values which maximize the likelihood function.

The values of the parameters which maximize the likelihood function are obtained by finding the first derivative of the likelihood function and equating it to zero. Since the log of a functionyields the same maximum as the function and is more convenient to differentiate, we maximizethe *log-likelihood function* instead of the likelihood function itself. The expressions for thelog-likelihood function and its first derivative are shown in equations.

$$LL(\beta) = \text{Log}(L(\beta)) = \Sigma\, \delta_{jt} x \ln(P_{jt}(\beta)) \quad [i]$$

$$\frac{\partial(LL)}{\partial\beta} = \Sigma\Sigma\, \delta_{jt} x \frac{1}{P} x \frac{\partial \text{Pjt}(\beta)}{d\beta} \quad [ii]$$

Where LL is the *log-likelihood function and* β is its respective coefficient.P_{jt} is the posterior probability i.e probability that an individual chooses alternative j relative to others in the model.

Further development of the derivative requires representation of the derivative function P_{jt}

$$P_{jt} = \frac{\exp(x'jt\,\beta)}{\Sigma \exp(x'jt\,\beta)} \text{[iii]}$$

And the first derivative with each element of β gives

$$\frac{\partial Pjt}{\partial \beta} = P_{jt}\,(X'j_t - \Sigma P_{jt}) \text{[iv]}$$

Substituting equation [iv] with equation [i] gives

$$\frac{\partial LL}{\partial \beta} = \Sigma\Sigma\, \delta_{jt}(X'j_t - \Sigma P_{jtx} X_{jt}) = \Sigma\Sigma(\delta j_t - P_{jt})\, X'j_t \qquad \text{[v]}$$

The maximum likelihood is obtained by setting equation [v] to zero and solving for the best values of the parameter vector β. The solution for the maximum value is reached when the second derivative is negative definite for all values of β. The maximum likelihood estimator is consistent, asymptotically efficient and normally distributed.

3.3.3 Interpretation of parameters

The parameters of themultinomial logit model are difficult to interpret. Neither the signnor the magnitude of the parameter hasany direct intuitive meaning (Kurt, 2007). The marginal effect of an independent variable x_k on the choice probability for alternative j

$\frac{\partial P\,(y=j|X}{\partial Xk} = P_j\,(\beta_{jk} - \beta_k)$, depends on the parameter β_{jk} but also on the mean of all other alternatives $\beta_k = 1/J\sum_j \beta jk$. The log of odds ratio gives a more direct interpretation of the parameter estimates $\frac{\partial P \text{ Log } (\frac{Pj}{Pi})}{\partial Xk} = \beta_{jk} - \beta_k$, which reduces to $\frac{\partial P \text{ Log}(\frac{Pj}{Pi})}{\partial Xk} = \beta_{jk}$.

For comparison with the reference category i, a positive parameter β_{jk} means therefore that the relative probability of choosing j increases relative to the probability of choosing i. The

multinomial logit model can also be used to predict probabilities of specific household types (Kurt, 2007).

3.4Multinomial Logit Model: Application in analysis of market choice

3.4.1 Model specification

The multinomial logit function expressed the choice of market consumers to buy beef as a function of socio-economic characteristics of consumers. The hypothesis that none of the socio-economic characteristics significantly influence consumers' choice among alternative markets for beef was tested against the alternative that at least one of the socio-economic characteristics of consumers' choice of market for beef among urban household beef consumers in Kampala, Uganda. The likelihood ratio for each independent variable provided the basis for determining which variables had significant influence on choice among alternative beef markets. Finally, the magnitude of effect of each significant independent variable on the likelihood of choosing among a couple of alternative beef markets was obtained. The model equation was specified as follows

$MKTCHOICE_i=\alpha+\beta_1 HHSIZ_i+\beta_2 SEX_i+\beta_3 EDUC_i+\beta_4 INC_i+$error……5

Where:

α = Constant

$\beta_1-\beta_5$ = parameters estimated

$MKTCHOICE_i$ = Choice of market consumers often buy beef (1=Butcheries, 2=Supermarket, 3=Abattoir)

3.4.2 Market choice model variables

Previous studies have modeled market choice with socio-economic characteristics including educational status, household size, income and sex of consumersas exogenous variables (Hsu & Liu, 2000; Schmit, Chung, Dong, Kaiser, and Gould, 2000). In the context of this study,the MNL

was applied for analyzing consumers' socio-economic characteristics that were hypothesized to influence choice among the three alternative beef markets. The variables hypothesized to affect choices of households among alternative markets for beef include average household size (AHS), education level (EDU), income level (INC) and consumers' perception of price difference among alternative markets (PRICEDIFF). Owing to limited number of observations in each group, variables were coded as binary variables to enhance reliability of model estimates (Kennedy, 1996). Table 3.1 summarizes codes for these variables.

Table 3.1: Definition of variables

Variable	*Definition and measurement*
Dependent variable:	
MKTCHOICE	Consumers' choice among beef markets including supermarkets, Butcheries and abattoir. Choice was measured on a nominal scale *(1=Butcheries, 2=Supermarket, 3=Abattoir)*
Independent variables:	
HHSIZ	Household size in terms of number of members in the household. The size is expressed as a dummy variable *(1 if the average household size is 4 or higher and 0 otherwise)*
SEX	Sex of household head = 1 if the household head is female and 0 otherwise
EDUC	Education level of house hold head = 1 if the highest level of education by the head of household is higher than secondary and 0 otherwise
INC	Income of household head =1 if the household income is more than Ugshs 500,000 and 0 otherwise

According to the Bank of Uganda Official Exchange Rate, One USD is exchangeablefor 2500 Uganda Shilling.

The three market choice alternatives are non-ordinal, and independent. In addition, the choice of one alternative relative to the other leads to a binomially distributed outcome of the dependent variable. These conditions justify suitability of the Multinomial Logit Model and hence its application in this study.

3.5Descriptive statistics: Application in Analysis of variation in beef consumption and Market attributes that influence consumers' choice among alternative beef markets

The ANOVA was used to determine whether beef consumption vary significantly across socio-economic characteristics. The dependent variable included the average weekly beef consumption per household. This was normally distributed to allow for ANOVA analysis. The independent variables constituted distinct categories and includededucation level, income, household size and sex of consumers. The likelihood ratio was used to determine the variables that held a significant effect on the rate of beef consumption. And finally post hoc tests were done to compare means among the different categories of each significant independent variable and determine those that were significantly different.

To determine the market attributes that influence consumers' choice among alternative beef markets, percentages of respondents who consider a particular market attribute as their primary and secondary determinant for their choice among alternative beef markets was estimated.

Cross tabulations were used to determine whether the determinants varied significantly across the three market alternatives. The factors considered here include freshness of beef, price of beef, market convenience and hygienic conditions at and the surrounding environment. All the data entry coding and analysis was done in SPSS.

3.6*Aprior* expectations

Household income level and the difference in price of beef between markets are among the essential characteristic that influences household purchasing behavior. It is hypothesized that high-income households would be more likely to buy beef in supermarkets than other income level households. Regarding price variable, the study considers price of beef as one of the major

factors that could determine households' decision since there is a significant price difference between beef in supermarkets and butcher abattoir.

It was hypothesized that consumers who consider price of beef important when making their choice of market for beef would be less likely to buy beef in supermarkets relative to butcheries or abattoir. Beef is a food product with a variety of substitutes that competes with it during decision making on household expenditure on food. In supermarkets, the price of beef is relatively higher than at butcheries and abattoir. Thus beef sold in supermarkets could be perceived to be unaffordable by the low income class of consumers. Given their low disposable income, the low class of consumers would be expected to opt for the low priced beef at butcheries that fits in their budgets. Household size was expected to have a significant influence on consumers' choice of market for beef. We hypothesized that household whose number of members is less than four(4) would be less likely to buy beef from supermarkets compared to those with morethan four (4) members. Beef is expensive compared to other sauce implying that large sized household spends more than smaller sized households to meet consumption quantity demands. Thus large sized households are expected to opt for the lower-priced beef at butcheries for beef quantities at a minimal cost.

3.7 Description of the study area.

Kampala district is the capital city of Uganda, bordered by Wakiso and Mukono districts(Appendix 1).Administratively, the city is divided into five divisions/sub counties, 100 parishes and 208 zones/villages. The divisions include Central, Nakawa, Kawempe, Makindye

and Rubaga (Appendix 2). The city has 309,093 households and an average household size of 3.8 members (KCCA, 2002).

Being a centre for economic and industrial activities, Kampala city has attracted a lot of population. Like the overall national trend, the city is characterized by fast urbanization and population growth. The most recent 2002 National Census estimated the resident population in the city at 1,208,544 people, growing at an average of 4.1% (higher than the 3.2% national average growth rate in the same period). 47.9% of the total population are economically active while 52.1% are dependants. Trade is among the major source of livelihood for 22.7 % of the the economically active population in the city.

The population in the city is poorer, more literate than and dominated by males as national wide. The Uganda National Household survey estimated the share of poverty in urban areas of Uganda at 15%, an increase from 13.8 % in 2005/2006). The overall national poverty stood at 31% in 2009/2010-an increase from 25% in 2005/2006 (UBOS, 2010). In Kampala, the share of poverty was estimated at 20% in 2002, the share of male population was 51.3% while literacy rate was 88% (MOES, 2002).

Population growth and urbanization are linked with solid waste management and sanitation of the city. Solid waste management can be perceived a challenge in Kampala with only 55% of the solid wastes collected (UBOS, 2002). This poses a threat to the hygienic environment round the city and particularly to beef market sources in the context of this study. According to the health indicators' statistics of 2012, diarrhea an infectious disease that arise from food poisoning due to

poor hygiene, ranked second to Malaria in terms of prevalence and contribution to human mortality. Diarrhea prevalence was estimated at 14.4% and accounted for 12.3% of total mortality in Kampala (UBOS, 2002).

3.8Scope of the study

The study was conducted on a sample of 300 beef consumersselected using a multi-stage sampling procedure from four divisions namely Central, Kawempe, Nakawa and Rubaga.It explores the beef quality attributes and consumers' socio-economic characteristics that determine preference and choice among alternative markets (i.e butcheries, supermarkets and abattoirs). Kampala district was purposively selected for the study since it has the highest concentration of beef consumers in Uganda (UBPA, 2005). The district is also the most urbanized in Uganda and according to UBOS (2008), urban households account for 80% of total beef consumption. Besides, the district has the highest population increasing at a rate of 3.14 to 5.61% per year indicating a high potential for beef consumption.

3.9 Sample selection and sample size

The study was done on a sample of 300 beef consumers from selected households in Kampala District. The sample size was determined with an objective of generating more precise, reliable and generalizable results while minimizing the cost of time and financial resources. The study opted to allow a 0.05% risk of the true margin of error exceeding the acceptable margin of error (0.05 alpha level). To achieve this objective, the study opted to determine the sample size based on the type of analysis in the study. Given that the analysis would entail a regression using multiple categorical independent variables and as recommended by Miller and Kunce (1973) and Halinski and Feldt (1970) for this case, the decision was taken to draw a sample at a ratio of 10:1. This ratio according

to Hair *et al.,* (1995) could lead to an adequate sample size necessary to allow the factors to load and be significant at 5% level. Besides,it would lead to a minimum sample size which according to Hair *et al.,* (1995) is necessary to avoid the risk for over fitting that could make the results too specific to the sample, thus lacking generalizability. The four multiple independent variables with 11 categories in the Multinomial Logit Model that was to be fitted, could lead to a minimum sample size of 110 observations. To ensure that the study can have adequate observations to allow comparison of beef consumption and market determinants across socio-economic characteristics, the sample size was increased to 300. The same magnitude of sample size was used in the study on fast food consumers (Ayo, Bonabana and Sserunkuma, 2012) and beef consumers (Alinda, *et al.,* 2011) in Kampala, Uganda. Both studies involved regression analysis using categorical variables.

There are significant differences in income education level status among the households across zones while households across divisions have similar socio-economic characteristics. All divisions unlike zones constitute the high, low and middle income, less and more educated households. Hence, simple random sampling was used to select divisions and proportional stratified sampling based on geographical location of households used to select zones. This sampling procedure was meant to ensure that; the sample drawn is a representative of households in Kampala and the different socio-economic characteristics of households are represented in the sample. A similar sampling technique was used by Selim (2004) for purposes of guaranteeing representation of defined groups in the population and improving the precision of inferences made to the full population. Four (4) divisions (Kawempe, Nakawa, Lubaga and Central) and one (1) zone were selected.

In this study, the low income households were defined as those households for which the household head earned a monthly income of less than Ugshs 0.5 million, the middle income were those households for which the head earned a monthly income of Ugshs 0.5-1.0 million while the higher income were those households for which the head earned a monthly income of more than Ugshs 1.0 million. Identification and grouping of households into the three income groups was achieved with guidance from local leaders. They included Community Development Officers and Local Council heads that were more knowledgeable about household distribution by incomes across zones in their respective administrative zones.

From each of the four (4) zones, two (2) parishes were selected using the same procedure (used for selection of zones) to maintain the desired low, middle and high income distribution of households in the sample. For each of the eight (8) parishes, a list of households by income status (low, medium and high) was generated with guidance by local leaders at parish levels who were more knowledgeable on the income status of households in the locality. Households in the same income category across the four parishes were combined making three sub-samples or groups (low, middle and high income groups) of household. It was assumed that income status, household expenditure and decisions regarding household consumption choices are mainly dependent on the household head whose socio-economic characteristics could influence willingness to pay for beef consumed in the household.

From each of the three sub-samples or income-groups of households, one hundred (100) households were selected by simple random sampling and the head of each household considered a respondent in the study (household beef consumer). The criteria followed to select households

was that the head, (1) buys unprocessed beef at least once a week for household consumption, (2) attained at least primary level education and (3) was willing to participate in the survey interview. This sampling procedure led to total sample size of 300 households representing the entire population of beef consumers in urban households of Uganda.

3.10 Data collection and data types

A field survey using a structured and pre-tested questionnaire (Appendix 1) was conducted to obtain primary data from the selected beef consumers. The questionnaire was pretested on a sample of nine (9) beef consumers; three (3) from each income-group (low, income and high) as earlier on defined in this study. The criteria used for selecting the consumers to participate in the pre-test was similar to that already described for the selection of household heads for the entire study. The questionnaire was designed to obtain data on the socio-economic characteristics of beef consumers, their market choices for beef together with the determinants for their choices. The socio-economic variables included sex, education, income and household size of respondents. Among the market choices include supermarkets and butcher stalls. The data was collected for the period December 2011-January 2012.

Previous studies in the analysis of choice ormarket choice determinantsin particular (Bayaga, (2010), Shamsudin and Selamat (2005); Goldman and Hino (2004); Abu, (2004); Hsu and Chang; (2002); Muharam (2000); Farhangmehr *et al.*, (2000); Zinkhan *et al.*, (1999)) have employed a two step procedure that (i) captures the experience of food buyers with regard to what they primarily consider when making choice of where to buy various food items and (ii) provides a buyer's rating of the importance of the identified factors while comparing among all the important factors identified. The procedure proved effective in determining the most

important factors that influenced consumers' market choices and was in this study, adopted to obtain data for analysis of market attributes that influence consumers' choice of beef markets.

Respondents were asked to; choose among a list, the primary and the second most important factor that determines their choice of market to buy beef. Each of the identified factors was explored further to provide understanding and establish the extent to which it influences consumers' choice among alternative beef markets. The market place where the consumers often buy beef was obtained. Data on socio-economic characteristics including household size, sex, education level, and income of household head was gathered. Data collected on household beef consumption included the frequency of beef consumption, quantity of beef consumed at the current income level of consumers and the quantity they would consume if their disposable income increased.

Secondary data included consumer characteristics affecting consumers' choices among alternative markets for food products specifically beef was obtained. This information provides a basis for selecting explanatory variables in the study. The data was obtained from various institutions including National Agricultural Research Organization (NARO), Uganda Beef Producers Association (UBPA) and Agricultural Research Information Service (ARIS) library, and Internet. This consisted of mainly statistics and literature on beef consumption and trade.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Consumers' socio-economic characteristics and household beef consumption

Tables 4.1 and 4.2 show the descriptive statistics of the study. According to the survey results, the average household size was found to be 5.8 people among the surveyed households. This is higher than the estimated 3.8 average in Kampala city in 2002.The increase in household size could be attributed to the fast growing populationin the city and with more dependantsthan working class of people.The dependants are assumed to have no incomes to acquire their own accommodation but rather stay with relatives or friends in the same households.The majority of the households (55%) consist of 4-6 people suggesting that nucleus family type was dominant in the research area. The survey results demonstrated that the majority (65%) of the households' head had attained more than Ordinary Level Education, 29% had attained ordinary level education, 4% had attained primary level and only 1% wasilliterate.According to the structure of Uganda's Education system that has been in existence since the publication of the Castle Commission Report (1963), Primary education is defined as seven years of basic education. It is followed by Ordinary education defined as a four- year cycle of lower secondary, then a two-year cycle of upper secondary and a two years cycle of Tertiary education (MOES, 2004). Regarding income, the majority (52%) of respondents earned a monthly income of less than 0.5 million (almost twice the 0.237 Million Ugshs-average household monthly expenditure reportedfor Uganda in 2009/2010 (UBOS, 2011). 26.7 % earned between 0.5 and 1.0 million while 22% earned more than 1.0 million Uganda shillings. 53% of the households were male headed while 47% were female headed (Table 4.1).

The majority (95.7%) of households consumed beef on a weekly basis. Fish (68.3%)appearedto be the next most dominant type of meat consumed in households. 68.3 percent of the households consumed fish at least once a week. Besides pork, every respondent consumed at least a particular type of meat. Average household consumption of beef was estimated at 4.34 Kg per week. At a constant rate of consumption this translates into 15.4 Kg per household per month (Table 4.2).

Table 4.1: Descriptive statistics of the studied sample of beef consumers and beef consumption

Variable	Percentage of respondents	Beef consumption (Kg per week)	
		Mean estimate	Std. error
Income (Ugshs per month)			
<0.5 million	52	3.3	0.12
0.5 – 1.0 million	26	3.7	0.20
>1.0 million	22	5.3	0.32
Education level of household head			
Attained primary level	4	3.0	0.22
Attained Secondary level	29	3.9	0.29
Tertairy	65	4.6	0.19
Household size			
< 4 people	12	2.0	0.16
4-6 people	55	3.1	0.14
>6 people	33	5.6	0.23
Sex of household head			
Female	47	3.9	0.21
Male	53	3.8	0.17

Source:Sample survey of household beef consumers in Uganda, November 2011-January 2012

Table 4.2: Beef consumption frequency compared to other meats

Frequency of consumption	Percentage of respondents				
	Beef	Chicken	Fish	Pork	Goat meat
Every day	0.3	0.3	0.3	0	0
Weekly	95.7	37.7	68.3	5.3	1.7
Monthly	0.3	29.3	19.7	1.0	1.0
Over a month	3.6	32.6	16.7	76.0	97.3
Don't consume at all	0	0	0	17.7	0

Source:Sample survey of household beef consumers in Uganda, November 2011-January 2012

4.2 Beef consumption variation across socio-economic characteristics

Socio-economic characteristics had an implication to intensity and rate of beef consumption. The ANOVA results indicated that the rate of beef consumption varied significantly across the level of income, levels of education, household size and insignificantly across gender of consumers. The test results suggested that household beef consumption was significantly influenced by income levels, education level and size of beef consuming households. Tables 4.3and 4.4 respectively, presents a summary of the statistical test results upon which this inference is drawn.

Table 4.3: Socio-economic characteristics and beef consumption - Statistical test results

Consumer characteristics	F-Statistic
Income level	21.94*
Education level	10.09*
Gender	0.18
Household size	64.13*

** The mean difference is significant at the 0 .05 level.*

Table 4.4: Comparing the rate of beef consumption across income, education level&household size

Variable group	Mean difference (Kgs consumed per week)	Std error of the difference	95% Confidence interval	
Between consumers earning more than1Million& those earning 0.5-1Million Ugshs/ month	1.7*	0.36	0.9	2.3
Between consumers earning 0.5-1Million &those earning less than 0.5 Million Ugshs/month	0.5*	0.28	0.2	1.0
Between consumers who attained more than & those who attained not more than secondary education level	1.4*	0.29	0.7	1.8
Between households with more than 6 &those with 4-6 people.	2.3 *	0.24	1.9	2.9
Between households with & those with less than 4-6 people	1.2*	0.35	0.5	1.9

** The mean difference is significant at the 0 .05 level.*

The quantity of beef consumed per week was significantly lower for the low income households; earning less than 0.5 million Ugshs compared to that consumed by the high income households; earning above 1.0 million Ugshs ($p<0.05$). Households whose heads earned more than 1.0 million Ugshs per month consumed 1.7 more Kgs of beef than those whose heads eanrned 0.5-1.0 million. And those who earn 0.5-1.0 million consumed 0.5 more Kgs than those who earn less than 0.5 million.

To affirm the effect of income on beef consumption, a comparison of quantity of beef consumed at the current income level and the quantity that respondents would be willing to consume in case their income increased was made. The quantity of meat consumers would buy at no income

constraint was estimated at 3.8 Kg per week. The paired sample t-test results showed that this quantity was significantly higher by 0.49 Kg than the quantity they were currently buying per week ($p<0.01$). The statistics suggest that income is one of the key factors influencing beef consumption. At a given level of disposable income, the consumer is faced with a decision to share the income among the competing needs of which beef is considered next to pecuniary. Thus consumers decide to increase the quantity of beef bought with increase in their disposable income

The observed positive and significantrelationship between income and beef consumption is quite consistent with economic theory and previous survey studies, on consumer demand in Uganda.Akankwasa (2007)established that demand for improved desert bananas in Uganda is highly elastic with income. The observed beef consumption variation across income is also consistent with findings on frequency of beef consumption in this study. The high income class of households consumes beef more frequently than the low class. Also, when asked to account for the frequency of beef consumption, it was reported by the majority (88.5 percent) and especially the low income class consumers that beef is too expensive and un affordable.

Education level was another socio-economic characteristic that was observed to exert a significant influence on household beef consumption. Households headed by more educated people on average, exhibited a significantly higher level of beef consumption than those headed by less educated people. Households headed by individuals with more than advanced level education on average consumed 1.3 more kilograms of beef per week than those headed by individuals with less than advanced level education. And those who attained at most advanced level consumed 0.4 kilograms more than those who attained at most primary level.

Households with more than 6 people on average consumed a significantly higher quantity of beef than those with 4-6 people and less than 4 people ($p<0.05$). However, the difference in beef consumption between male and female headed households was statistically insignificant ($p>0.05$). Households with more than 6 people on average consumed 2.4 more Kilograms of beef per week than those with 4-6 people and those with 4-6 people consumed 1.2 Kilograms more than those with less than 4 people (Table 4.5).

4.3 Factors influencing consumers' choice among beef sold at the butcheries, abattoirs and supermarkets

Beef in Uganda is supplied in butcheries, abattoir and supermarket, but with the distribution of butcheries more than supermarkets and abattoirs. In addition, the quality of beef, hygienic conditions and prices for beef remaingenerally different across the three alternative markets. Butcheries remain the major market source for beef to a majority (67.6%) of urban households in Kampala. Only 11.8% and 20.6% of urban households in Kampala depend on the abbatoir and supermarkets respectively as their primary source of beef (Table 4.5). In a bid to provide understanding of the determinants for choice among the three alternative markets for beef and as embedded in the objectives of this study,the relationship between socio-economic characteristics and choice among beef sold at butcheries, abattoir and supermarkets was determinedfrom the Multinomial Logit Model estimates (Table 4.6). In addition the possible influence of market attributes on choice among the alternative beef markets was determinedfrom descriptive statistics estimates.

4.3 Consumers' socio-economic characteristics &choice among alternative beef markets

It was observed that consumers of varying income levels, education level and gender visit the three markets to buy meat. The Multinomial Logit was estimated to explore the extent of variation of households' choice of beef market across income level, education level and gender.

Table 4.5: Descriptive statistics for socio-economic characteristics that influence beef market choice

Variable	Abattoirs (%)	Supermarkets (%)	Butcheries (%)	Percentage of the total sample
Income (Ugshs per month)				
<0.5 million	5.4	2.0	43.4	50.8
0.5 – 1.0 million	2.7	2.0	22.2	26.9
>1.0 million	2.7	4.0	15.5	22.3
Total	10.8	8.1	81.1	100
Education level of household head				
Attained primary level	2.7	1.7	29.6	34.0
Attained ordinary level	1.0	0.7	17.5	19.2
At least high school	7.1	5.7	34.0	46.8
Total	10.8	8.1	81.1	100
Household size				
< 4 people	1.3	1.3	9.4	12.1
4-6 people	5.4	4.7	45.8	55.9
>6 people	4.0	2.0	29.9	32.0
Total	10.8	8.1	81.1	100
Gender				
Male	6.4	3.7	43.1	53.2
Female	4.4	4.4	38.0	46.8
Total	10.8	8.1	81.1	100
Overall percentage	11.8	20.6	67.6	100

Source:Sample survey of household beef consumers in Uganda, November 2011-January 2012

The majority of consumers who buy beef from abattoirs or butcheries are male and from low income households. For either abattoirs or butcheries, this proportion represents slightly more than half of the consumers. Compared to consumers who buy beef from supermarkets, the majority were female and from high income households.Choice of market for beef did not vary across education level of consumers. The majorities of consumers who buy beef in supermarkets, abattoir or butcheries were members of households with an average size (4-6 people) and headed by more educated member. Overall, butcheries remain the dominant source of beef for household beef consumers.

4.3.1 Evaluating the appropriateness of the fitted model

This Multinomial Logit Model analysis assumed that consumers' preference and hence choice between buying beef at a particular market relative to the other is influenced by their socio-economic characteristics. The socio-economic characteristics including income, education level, sex and household size tested negative for multicollinearity and were therefore considered independent. The model was fitted and results presented in Tables 4.6 and 4.7.

Table 4.6: Test results for significance and strength of the Model

	-2 Log Likelihood of Reduced Model	Chi-Square	Df	Sig.
Intercept only	108.275(a)	0.000	0	.
Final intercept	108.275	29.548	10	0.001
Income level	118.692*	10.417	2	0.005
Education level	123.295*	15.021	2	0.001
Gender	109.570	1.295	2	0.523
Household size	112.541	4.266	4	0.371
Cox & Snell R Square = 0.095				
Nagelkerke R square values = 0.134				

**indicates coefficient statistically significant at 5% level*

The probability distribution of the final chi-square for the log likelihood ratio, was 0.001 less than the level of significance (i.e $p<0.05$) indicating overall significance of the fitted logit model. Consequently, the null hypothesis that there was nodifference between the model without independent variables and the model withindependent variables was rejected.

The strength of the logistic model fitted was evaluated, using the Cox & Snell R Square and the Nagelkerke R square values (Table 4.6), to determine the extent to which the variation in choice among alternative beef markets is explained by the socio-economic characteristics in the model. The distribution of the Cox & Snell R Squareand the Nagelkerke R square values was 0.095 and 0.134 respectively (Table 4.6); suggesting that between 9.5% percent and 13.4% percent of the variability in choice among market alternatives is explained by this set of socio-economic variables in the model.

The significance of each of the socio-economic characteristics variables (income level, education level, gender and household size) was tested using the likelihood ratio. The probability distribution of the final chi-square for the log likelihood ratio was less than 5% significance level for income and education level and greater than 5% for gender and household size (Table 4.6). This indicated that income and education level could be used while sex and household size could not be used to distinguish or characterize consumers who opt for a particular type of market for beef. Finally the estimates of the effect of each explanatory variable with the dependent variable were obtained and the results are presented in Table 4.7.

Table 4.7: Multinomial Logit Model estimates

	Abattoirs Vs Butcheries				Supermarket Vs Butcheries			
	B	Sig.	Exp(β)	Odds	B	Sig.	Exp(β)	Odds
Intercept	-1.555	0.000			-1.470	0.004		
Income	-0.119	0.760	0.888	0.112	-1.569	0.003	0.208	0.792*
Educ.Level	-0.985	0.016	0.374*	0.626	-1.548	0.013	0.213	0.787*
Gender	0.137	0.724	1.147	-0.147	-0.463	0.306	0.629	0.371
HH size	0.320	0.623	1.377	-0.377	1.420	0.059	4.138	-3.138

**indicates coefficient statistically significant at 5% level*

4.3.2 Income and consumers' choice among beef sold in supermarkets relative to butcheries or abattoirs and abattoirs relative to butcheries

Income was observed to bear a statisticallysignificant ($p<0.05$) influence on consumers' choice of supermarkets relative tobutcheries and supermarkets relative to abattoirs. Results indicated that respondents who had less income were more likely to buy beef from the butcheries or abattoirs relative to supermarket and butcheries relative to abattoirs.The odds values indicated

that for each unit increase in income, the odds of buying beef in the supermarkets relative to butcheries and supermarkets relative to abattoirs was 79.2% (1.0-0.208) = 0.792and 76.5% (1.0-0.235) = 0.765 respectively. This implies that increase in level of income would significantly lower the risk of buying beef in supermarkets relative to butcheries and supermarkets relative to abattoirs by 20.8% and 23.5% respectively. Regarding preference of beef at the abattoirs relative to butcheries, increase in income was found to bear no significant effect.

4.3.3 Education level and consumers' choice among beef sold in supermarkets relative to butcheries or abattoirs and abattoirs relative to butcheries

Like income, education level was observed to bear a statisticallysignificant ($p<0.05$ significant level) influence on consumers' choice of beef sold at the supermarkets relative to butcheries, supermarkets relative to abattoirs as well as from abattoirs relative to butcheries. The results indicated that respondents who were less educated were more likely to buy beef from the butcheries or abattoirs relative to supermarkets and butcheries relative to abattoir. The odds values indicated that for each unit increase in education level, the odds of buying beef in the supermarkets relative to butcheriesand supermarkets relative to abattoirs increased by78.7% (1.0-0.213) = 0.787 and (1-0.235)% (0.765) respectively. The odds also increase for choice of beef at the abattoirs relative to butcheries by 76.5% (1.0-0.374) = 0.626. This implies that increase in level of education would significantly lower the risk of buying beef in supermarkets relative to butcheries, supermarkets relative to abattoirsand abattoir relative to butcheries by 20.8%, 23.5% and 37.4% respectively.

Such a positive relationship between; educational level, income level and purchasing behavior were hypothesized and agree with the *apriori* expectations in this study. Regarding preference of beef at the abattoirs relative to butcheries, increase in income was found to bear no significant effect.

However, though households with larger family size (above the average of 6 people) seemed less likely to buy beef in butcheries than supermarkets, this relationship was not statistically significant ($p>0.05$)even comparing between the rest of the market alternative combinations.Likewise a higher likeliness of male than female preferring to buy beef in butcheries relative to supermarkets was observed but not statistically significant ($p>0.05$). This implies that there was no sufficient evidence to reject that household size, gender of beef consumers in Uganda did not influence onconsumers' choice for beef supplied in supermarkets relative to butcheries or abattoirs relative to butcheries

4.4 Market attributes that influence consumers' market choice

The analysis of market choice determinants, drawing insight from the literature, assumed a possible variation of the choice determinants across the market alternatives. Owing to this, cross tabulations was used to generate percentages of respondents who opt for a particular market of beef. Generated alongside this analysis, the Chi-square tests provided a basis for determining the extent to which market choice varied across the attributes of the beef markets. The attributes tested include consumers' rating/perception of (i) freshness of beef supplied in a particular market alternative compared to other alternative markets, (ii) level of convenience associated with a particular market compared to other markets, (iii) hygienic conditions at and around the market and (iv) the extent to which they perceived price to be different (lower/higher) in the

alternative beef markets. As indicated earlier in the hypothesis, these factors were expected to influence consumers' choice of a particular market alternative relative to other markets. Table 4.8 presents a summary of the statistical test results from this analysis.

Table 4.8: Comparing market attributes choice determinants across butcheries, supermarkets and Abattoirs- Statistical test results

Variable	d.f	Chis-quare	P-values
Market attribute determinants across the three alternative markets	8	241.05*	0.001
Rating of beef freshness preference and choice of market	4	4.76	0.313
Rating of market convenience and choice of market	8	154.02*	0.002
Rating of market hygiene and market choice	2	85.54*	0.001
Rating of price difference and market choice	8	310.69*	0.001

** indicates significant at 5%*

The market choice determinants varied significantly ($p<0.05$) among the three markets, particularly comparing between consumers who buy meat from the abattoirs and butcheries with those who buy from supermarkets. Unlike beef consumers in supermarkets whose market choice is driven mainly by the quality perception determined by the hygienic conditions at the market and surrounding environment, consumers' choice of beef sold at butcheries or the abattoirs was found to be primarily driven by their desire for fresh beef. In addition, the importance attached to beef freshness was found to vary significantly ($p<0.05$) between consumers who buy beef from abattoirs and butcheries compared to supermarkets. Likewise, the importance attached to hygienic conditions of the market place also varied significantly ($p<0.05$) between consumers who buy beef from abattoirs and butcheries compared to supermarkets. Consequently, it was worth to estimate and compare the distribution of beef consumers by market attribute determinant as well asmarket attribute determinant and market alternative. A summary of these distributions is presented in Table 4.9

Table 4.9: Percentage distribution of market attributes preference and comparingmarket choice

Market attribute	Percentage of the total buying from a particular market			Percentage of the total who prefer a particular market attribute			
	Abattoirs	Supermarkets	Butcheries	Abattoirs	Supermarkets	Butcheries	Total
Market Attribute							
Freshness of beef	59.4	8.3	69.3	6.4	0.7	48.1	55.2
Price difference	31.3	0	30.2	3.4	0	32.7	36.1
Quality perception	9.3	66.7	0.5	1.0	5.4	0	6.4
Convenience/shopping or mkt envt	0	25.0	0	0.3	2.0	0	2.0
Total	100	100	100	10.8	8.1	80.8	100
Preference for freshness							
Very fresh	100	71.4	91.3	11.8	14.7	61.8	88.2
Just fresh	0	14.3	8.7	0.1	2.9	5.9	8.9
Do not attach value to freshness	0	14.3	0	0	2.9	0	2.9
Total	100	100	100	11.9	19.5	67.7	100
Preference for convenience							
Very convenient	18.8	91.8	5.0	2.0	7.8	4.0	13.8
Convenient	81.2	4.2	88.2	8.8	0.3	70.7	80.8
Do not care about convenience	0	0	5.8	0	0	7.4	7.4
Total	100	100	100	10.8	8.1	81.1	100

determinants across the beef market alternatives

Source:Sample survey of household beef consumers in Uganda, November 2011-January 2012

Key:

- Most determinant market attribute among beef consumers in general
- Most determinant market attribute among beef consumers considering a particular market (abattoirs, supermarkets or butcheries)
- Extent of importance of beef freshness
- Comparing extent of importance of beef freshness by market type (abattoirs, supermarkets or butcheries)
- Extent of importance of convenience
- Comparing extent of importance of beef freshness by market type (abattoirs, supermarkets or butcheries)

4.4.1 Freshness of beef and consumers' choice of beef sold at butcheries and abattoir relative to supermarkets

The majority (55.2%) of surveyed beef consumers reported that they primarily consider the possibility of getting fresh beef when opting among alternative beef markets. This proportion is dominated by consumers who buy beef from butcheries (48.1%) and accounted for more than half (69.3%) of surveyed consumers who buy beef from butcheries. Likewise, the proportion of surveyed beef consumers who buy beef from abattoirs was dominated by those consumers who primarily consider the possibility of getting more fresh beef in the market of their choice (Table 10).The proportion 100% and 91.4% of surveyed beef consumers who buy beef at abattoirs and butcheries respectively, reported to prefer very fresh beef, significantly higher than that of consumers supermarket beef buyers who prefer very fresh beef (71.4%). This result indicates a higher preference for fresh beef or a greater consideration of beef freshness among consumers who buy beef from abattoirs or butcheries than those who buy in supermarkets.

To emphasize the preference for freshness, consumers prefer buying beef early in the morning at slaughter houses since beef is delivered directly to retailers from the abattoir. And because of their great desire for fresh beef, the majority (74 percent) of the consumers who buy beef in butcheries and abbatoir reported that beef in supermarkets over stays in freezers, a reason why they would not buy it even if the quality at the butcheries deteriorated.They would rather opt for other types of sauce rather than going for supermarket beef. In addition, 80 percent of the surveyed consumers would still buy beef in butcheries even if its price exceeded that of the same quality in supermarkets.

This situation among Ugandan consumers is similar to that identified among consumers in Taiwan (Chamhuri & Batt, 2008) and Malaysia (Hsu and Chang, 2002). The freshness of beef, perceived as a major pre-determinant for its taste was found to underlay consumers' decision among alternative beef suppliers. Fresh beef was considered to be more taste by consumers and was often cited as one of the most influential variables impacting on the consumers' decision to purchase fresh meat (Munoz, 1998; Verbeke and Viane, 1999).The finding is also consistent with earlier studies which indicated that consumers consider freshness alongside factors such as the reputation of the place of purchase (Cowan *et al.*, 1999; Hsu and Chang 2002). Goldman and Hino (2004) consider that buying fresh food is important to maintain good health and enjoy the taste of food. They further revealed that consumers emphasized the use of fresh products and were less likely to buy fresh produce from supermarkets. According to Kennedy *et al.*, (2004), consumers are able to judge freshness from product appearance. At the time of purchase, consumers rely entirely on visual cues. For instance, in red implies that the beef is still freshand the cow has just been slaughtered. Further probing of respondentson beef freshness established that consumers perceive beef to be fresh by considering the period between slaughter and the time they offer to buy the beef. According to consumers, beef that has not stayed longer is more fresh. In emphasis of this,consumersoften opted to buy beef early in the morning preferably immediately after slaughter.

4.4.2Quality/Hygiene perception and consumers' choice of beef sold in supermarkets relative to abattoirs and butcheries

In contrast, the majority of consumers (66.7%) who buy beef from supermarkets reported that they are primarily motivated by their expectation of getting quality beef from the preferred market alternative. More specifically their decision to opt for beef in supermarkets than abattoirs and butcheries is motivated by the ever and very hygienic environment associated with supermarkets. 90.1% of the surveyed consumers who buy beef from supermarkets were found to prefer beef from a market place of very good hygiene. Further probing of respondents on the issue of hygiene established that they defined a market offering good hygiene by the environment freefrom flies, free from dust, clean handling equipments and clean sellers. This study further established that less than one quarter of the consumers who buy beef from the butcheries or abattoir, rated the hygienic conditions in these respective markets as at least good compared to three quarters who made a similar rating of the hygienic conditions of beef in supermarkets.

Indeed, supermarkets will more likely than butcheries and abattoirs, offer such hygienic environment/conditions, a big incentive to attract beef consumers and increase their customer base. Unlike that supplied at the abattoir or butcheries, beef in supermarkets is processed and differentiated by part of carcass, fat content and bone content and parked in see-through trays. More critical, consumers were found to hold a negative perception towards the quality of beef at the butcheries due to the poor hygienic environment at and around the butcher stalls. For this matter and given increased incomes, they would consider a potential shift from buying beef at butcheries to supermarkets due to hygienic and safety concerns. This was observed from some of

their sentiments. *‘’If I can have a higher income,I would not continue buying beef from the butcheries. Though it is near and cheaper, I am more concerned about the hygiene and safety. Beef has too much flies on it, they irritate and may carry germs’’.*

4.4.3 Price differences and consumers’ choice of beef sold in supermarkets relative to abattoirs and butcheries

Indeed, the majority (36.1%) of consumers perceive price to be much higher in supermarkets than abattoir and butcheries and slightly lower at the abattoirs than the butcheries. Because of this and in addition to convenience and the excellent hygienic conditions at the supermarkets, consumers werefound to go for beef in the supermarkets rather than abattoirs or butcheries.

4.4.4 Convenience and consumers’ choice of beef sold in supermarkets, abattoir or butcheries

Irrespective of type of market, consumers were found to be significantly driven by the desire for convenience when opting for a particular market where to buy beef. All the three alternative beef markets (supermarkets, butcheries and abattoir) were perceived convenient by their respective customers, though the nature of convenience varied across the three alternative beef markets. Some consumers, who buy beef at the butcheries and abattoirs respectively, consider the fact that the respective market, being proximal to their places of residence or work, saves them travel time to the beef markets. For those who go for beef in supermarkets, they consider the fact that beef is readily packed, differentiated into cuts/grades and price tagged, which offers them an opportunity to just “pick and pay”.

More explicitly, consumers' drive to convenience when making choice among alternative beef markets is consistent with a wide variety of literature on market choice determinants. According to retail location theory, consumers prefer to shop as close to home as possible (Kaufman 1996). In a study by Farhangmehr *et al.,* (2000), convenience was perceived in terms of accessing a variety of good in modern markets. Mui *et al.,* (2003) reported a significant correlation between the places of residence with the shopping premises. In Malaysia, 45% of respondents stated that they were willing to spend no more than 15 minutes to travel to retail outlets. And besides buying daily necessities, Malaysian consumers were reported to accomplish other activities such as relaxing and dining with family and friends, watching movies, bowling, visiting the hair salon and banking at modern retail premises (Mui *et al.,* 2003). Goldman and Hino (2004) indicated that the probability of shopping at traditional markets increase with reduced proximity to supermarkets. When shopping from a modern retail outlet, convenience means anything that saves or simplifies work and brings comfort to consumers. Pride *et al.,* (2005) argued that convenience not only saves time, but also reduces stress, cost and other expenditures.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Beef marketing system in Uganda is quite different from developed countries and a very big proportion of beef is consumed in fresh form at household level. In addition, its consumption compared to other meats is higher reflecting a higher preference compared to other meats which is potentially vital to expand the beef market. This study utilized quantitative research methods to determine the factors that influence beef consumption and choice between alternative beef markets among beef consumers in urban household of Uganda.

More specifically, the analysis entailed utilization of simplerapproaches and models such ascross tabulations in analysis of variation of market choice determinants across market alternatives, ANOVA models in analysis of beef consumption variation across beef consumers' socio-economic characteristics. More significant, the analysis entailed utilization and application of the Multinomial Logit Model in determining the consumers' socio-economic characteristics that influence choice ofalternative beef markets. The analysis made use of both the chi-square of t-test statistics to test for significance of the set hypotheses upon which inferences were made.

Descriptive statistics indicated that the majority of households consume beef on a weekly basis and at an average of 3.8 kg per week. Drawing from the ANOVA results, beef consumption among urban households in Uganda is influenced by income and education level. Consumption remains higher among households with more members, earning more income and with higher education level. In the analysis for further exploration of this potential income effect on beef

consumption, t-test results indicated that consumption would significantly increase by an average of 0.5Kg per week among consumers whose beef consumption is not constrained by income. It was evidenced in this study that despite their huge desire and willingness to increase beef consumption to their satisfaction, some households remain constrained by disposable income owing to a wide variety of competing household needs. Likewise, education level had a similar nature of effect on beef consumption. Unlike in other countries or for other food items as observed in previous studies, highlighted in the literature presented in this study, gender does influence household beef consumption in Kampala, Uganda.

The Multinomial Logit Model, as indicated by the statistical significance of the probability distribution of the final chi-square for the likelihood ratio, is appropriate for analysis of choice among alternative beef markets as a function of socio-economic characteristics of consumers. The statistical significance of chi-square for the log likelihood ratio in the reduced Multinomial Logit Model results revealed that choice among alternative beef markets by beef consumers in urban households of Uganda is attributed to differences in income and education level rather than gender and household size, a case in other countries or for other food items as observed in previous studies, highlighted in the literature presented in this study.

Drawing from the logit model estimates, increase in income or education level would significantly increase the likeliness of buying beef in the supermarkets relative to butcheries and supermarkets relative to abattoirs. Increase in education level will further significantly increase the likeliness of buying beef from the abattoirs relative to butcheries. In other words, there exist a 76.5 and 79.2 percent likeliness that more consumers in urban households of Uganda will buy

beef in supermarkets than butcheries, and supermarkets than abattoirs respectively given higher incomes. As with education level, there exist a 78.7, and 62.6 percent likeliness that more consumers will buy beef from supermarkets than butcheries, supermarkets than abattoirs and abattoirs than butcheries respectively given higher education levels. Unlike the case in other countries or for other food items as observed in previous studies, highlighted in the literature presented in this study, household size did not influence beef consumption in urban households of Kampala, Uganda.

5.2 Recommendations

Results from this study have several implications and may help government agencies and marketing participants in planning marketing strategies and anticipating future trends in the beef market. It is noted that; despite the emerging supermarkets in Uganda, butcheries remain a major potential market for fresh beef particularly for the lower income and less educated consumers, who even dominate the population of beef consumers in Kampala. However, with most butcheriesbeing located along streets in the city and suburbs and some operating under unsanitary environmental, chances are high that the meat sold at the butcheries will be subjected to food poisoning, a critical concern for the health of consumers. Poor hygiene is associated with a risk of food poisoning resulting in various bacterial, viral and parasitic infections including abdominal pain, Diarrhea, cholera and Gastroenteritis. Diarrhea an infectious disease that arise from food poisoning due to poor hygiene, ranks second to Malaria in terms of prevalence and contribution to human mortality in Uganda. Poor hygiene at the Butcheries which handle 75-80 percent of all beef sales in the country and serves 67.6 percent of beef consumers in Kampala can be perceived a social problem necessitating strict measures.

Government should enact and update the Meat Policy with regulations that institute strict hygienic standards in the local market particularly butcheries as it is with the export market. The policy should also institute a meat regulatory body to oversee and enforce compliance to hygienic standards and improvement practices with a focus on the local beef market (butcheries). This should be followed by strict measures by government to enhance compliance to hygienic standards perhaps through monitoring and compliance enforcement. Government through the respective institutional structures particularly those in the Ministry of Health, should sensitize butcher traders and consumers on good hygiene to reduce the health burden. The sensitization will awake consumer's demand for good hygiene at the butcheries. Finally, ensuring hygienic handling of beef right from the abattoir to the butcheries and final consumer will necessitate investment in modern beef handling facilities for which, given the financing bottlenecks, boosting capacity for investment in these facilities will necessitate developing beef traders' linkages with financial institutions for access to finance. Support from government and private development partners with an interest in the meat industry will be needed which will however necessitate putting in place a fully developed and costed strategy to enhance access to finance for investment in modern beef slaughter and handling facilities. Consequently, a study to identify the capacity needs for investment in modern beef handling facilities is recommended.

Besides, the findings in this study, the above recommendations are informed by evidence on the prevailing poor hygiene at butcheries and abbatoirs as well as the weaknesses in the Meat Policy established by recent studies on Uganda's beef industry. The weaknesses in the regulations pertain meat quality assurance, maintaining meat hygiene to the required standards and enforcement of meat regulations. The regulatory system is characterized by outdated legislations

pertaining meat hygiene and food safety, weak enforcement of and generally absent regulations, lacks of a regulatory body to oversee and enforce the much needed policies and improved practices for the sector, limited focus on local and informal meat outlets regulation and maintaining hygienic standards beyond the point of slaughter. Such a weak meat regulatory system together with poor slaughter and beef handling facilities have been linked with poor hygiene at the butcheries and abattoirs.

The recommendations respond to the phenomenon which can be regarded as a "market paradigm" in the beef industry and ultimately, As a description of the market paradigm, beef consumers are unsatisfied with the hygienic conditions at the butcheries and yet they are financially incapable of going for beef in supermarket which they perceive to be of good hygiene. Besides, the distribution of supermarkets in Kampala is still low translating into high transport costs for accessing associated with accessing the already highly priced beef in supermarkets. This implies that given the low disposable household income, butcheries remain a major potential source of beef for the majority of beef consumers particularly the low income and less educated class.

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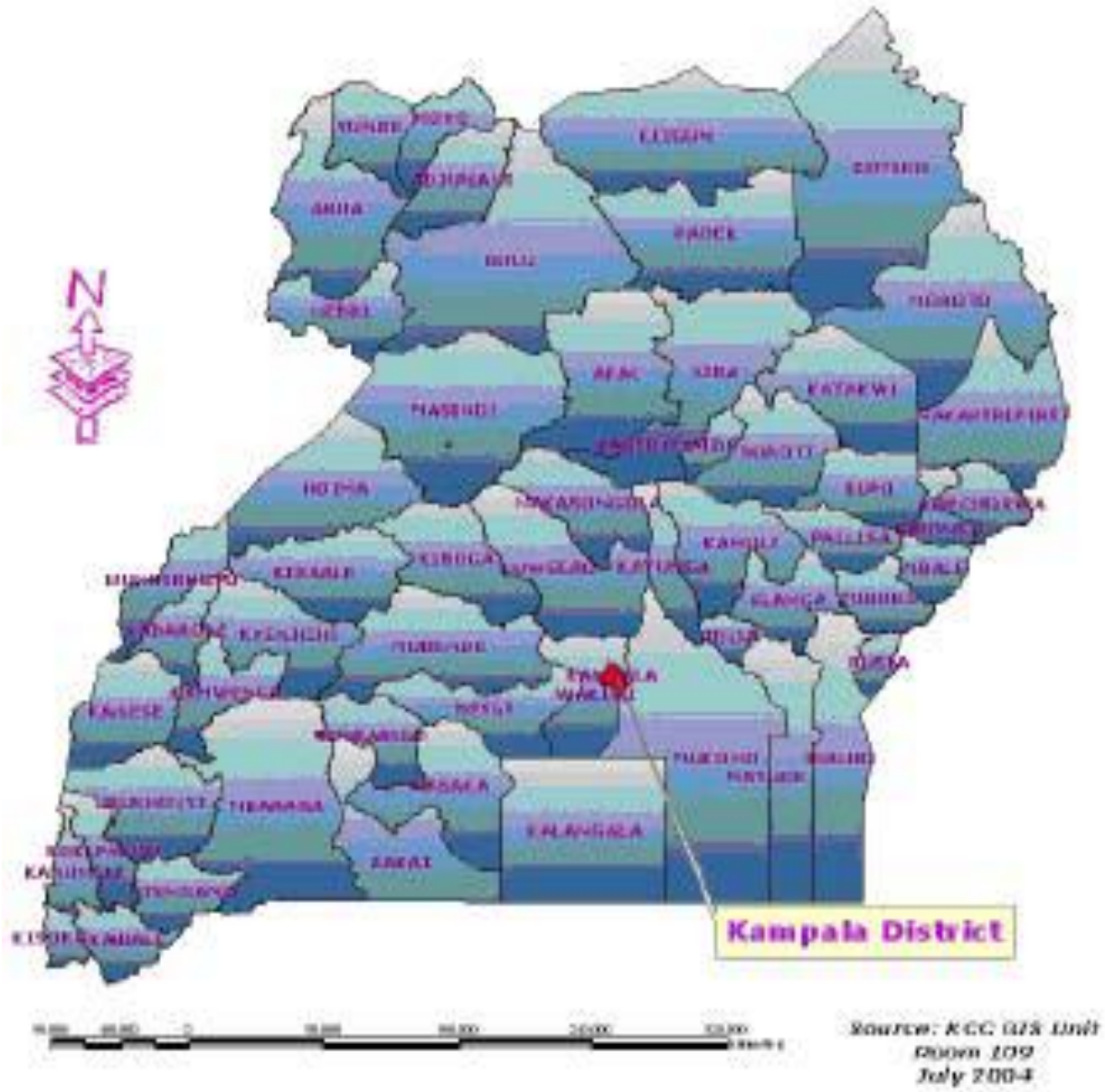
Appendix 1: Map of Uganda Showing Location of Kampala Diustrict



Source: Kampala, the Capital City of Uganda, 2005.

Appendix 3: Survey questionnaire

Beef Consumption and Consumers' choice among alternative beef markets in Kampala, Uganda

Academic Research carried out by MSc. Research Methods student in Collaboration with Jommo Kenyatta University of Agriculture and Technology,Faculty of Agriculturedetermine the factors that determine consumers' choice among alternative beef markets in Kampala, Uganda.

Section 1: Household/ Respondent

Section A: Socioeconomic Characteristics of Household Beef Consumers

1.1 Household/ Respondent ID No. ☐

1.2 LocationDistrict……Division……Zone ……

1.3 Interview date (dd/mm/yr)……../……./……

Section 2: Consumer characteristics

2.1 Sex of household headC ☐ *[1=Male, 2=Female]*

2.2 Age of household head (number of years of respondent) ☐

2.3 Household size ☐: *[1=less than 4 members, 2 =above 4 members]*

Codes: [1=Government employee, 2=Crops,3=Livestock, 4=Private sector employee, 5=Own business, 6=others (specify)…….]

2.4 Average income (Ugshs per month) earned from the above activities ☐

Codes:[1=less than 0.5M, 2=0.5-1.0M, 3=Above 1.0M]

2.5 Level of Education attained by household head ☐

Codes: [0=Never went to school, 1=Primary, 2=Secondary, 3=Tertiary and University]

Section 3: Beef consumption in household

3.1. Number of household members who eat meat ☐

3.2. How often do you buy beef in your household? ☐

Codes: [1=every day, 2=Weekly, 3=Monthly]

3.3 Number of times the household often consumes week in a week ☐

3.4. Quantity (Kg)of beef often bought ☐

Reason(s).....

3.5 If all factors you require to buy meat (including income) are met, what quantity (Kg) of beef would you buy? ☐

Section 4: Consumers' choice among alternative

4.1 Choice of market to buy beef

4.1.1 Market where the consumer often buys beef? ☐

Codes: [*1=Butcheries, 2=Supermarket, 3=Abbatoir]*

4.2 Underlying determinants consumers' choice of market in 2.1

4.2.1 Which one(s) among the following factors determine your choice of market in 4.1?

Codes (Factors): [1= Freshness of beef, 2=Relationship with buyers, 3=Quality perception, 4=Price of beef, 5=Shopping or market environment 6=Convenience, 7=others (specify)……..]

Factors	1	2	3	4	5	6	7	Other
Codes: *[1=atleast important, 0=not important]*								
Magnitude of importance *(Rank if important)*								

4.2.2 If more than one factor in 2.2.1 above, rate in table above the importance of each factor in determining consumers' choice of beef market.

Scale of rank: *[3=Very important, 2= Less important 1=Important]*

4.3 Understanding the nature of influence of the important factors established in 4.2

4.3.1 Convenience offered among alternative beef markets

(i) How do you evaluate convenience of the market place you buy beef offers to you?

Codes: *[3=Very convenient, 2=Convenient, 1= inconvenient, 1=very inconvenient]*

(ii) If convenient, how convenient is the market in (above) compared to other alternative markets? ☐☐☐☐☐☐

Codes:

1=Saves cost of transport since the market place is very near my place of residence or work

2=Saves timesince the market place is very near my place of residence or work

3=I can buy beef alongside other items

4=Beef is already packed that I just pick and pay for the beef quality I want which saves time

5=others (specify

(iii) If inconvenient, would you buy beef in an alternative market if it offered beef in a convenient distance?C[ ]s: *[1=yes, 2=No]*

(iv) Specify the market you would opt for in (iii) [ ]

Codes:Codes: [1=Butcheries, 2=Supermarket, 3=Abbatoir]

4.3.2 Hygienic conditions among alternative beef markets

(i) How do you rate the hygienic conditions of the market where you buy beef?

Scale of rank= [5=Very good, 4=fairly good 3=good 2=average, 1=poor)

How do you define the hygiene? (Probe the respondent) [ ]

(ii) How do you rate the hygienic conditions of the surrounding environment at the market you buy beef?

Scale of rank= [5=Ver[ ]bod, 4=good 3=average, 2=poor, 1=very poor)

How do you define the hygiene? (Probe the respondent)

(iii) How do you compare the hygienic environment in the market you buy beef and other market places of beef? [ ]

Codes: [1=Much better, 2=better, 3=no difference, 4=worse, 5=poorer]

(iv) If the alternative market (besides where you buy beef) offered the similar quality of beef in a better hygienic environment than other alternative markets, where would you buy? [ ]

Codes: [1= Go for the better hygienic beef in the alternative market, 2=Continue buying beef in the usual market I buy]

(v) Specify the alternative market for beef you would opt for in (iv)

Codes:Codes: [1=Butcheries, 2=Supermarket, 3=Abbatoir]

4.3.3 Price of beef among alternative markets

(i) How do you compare the magnitude of price of beef where you buy beef and the price in [ ]

other markets?

Codes: [1=Much higher, 2=slightly 3=higher, 4=Higher, 5=Lower, 6=slightly lower, 7=Much lower]

(ii) If the alternative market (besides where you buy beef) offered the similar quality of beef at a lower price than where you currently buy, which option would you take?

Codes: [1= Go for the lower priced beef in the alternative market, 2=Continue buying beef in the usual market I buy]

(iv) Specify the alternative market that consumer will opt for (ii) ☐

Codes:Codes: [1=Butcheries, 2=Supermarket, 3=Abbatoir]

4.3.4 Freshness of beef

(i) How do you rate the freshness of beef supplied in the market you buy beef? ☐

Scale of rank= [5=Very fresh, 4= fresh, 3=fairly fresh, 2=not fresh, 1=not fresh at all]

How do you determine beef freshness? (Probe the respondent)

(ii) How do you compare the freshness of beef in the market you buy beef and other market places?

Codes: [1=More fresh, 2= no difference, 3=less fresh, 4= Unable to compare]

Thank you and may you be blessed!