ANALYSIS OF THE DEMAND FOR LOCALLY PRODUCED RICE IN KUMASI, GHANA

BY

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DECLARATION

I hereby declare that this submission is my own work towards the M.Phil Degree in Economics and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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DEDICATION

To the Almighty God for his steadfast love that never ceases. Also dedicated to my parents Mr. and Mrs. Addo and selfless brother Mr. Bright Addo, without whose encouragement and support I would not have come this far. To all rice consumers and food vendors who continue to use local rice, this piece is also dedicated to you.

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ABSTRACT

In a country where rice has become the second most important cereal and staple food consumed by almost everyone, then issues pertaining to rice demand should become a matter of great concern especially when import, production and consumption statistics reveals the dominance of foreign rice demand over local rice. Surprisingly, this phenomenon has received less research attention in the Ghanaian context. The purpose of the study was to analyse the demand for locally produced rice in Ghana. Specifically, it sought to identify factors that affect the demand for local rice, determine the price and income elasticities of local rice and identify ways to improve on the demand for local rice. The design was a cross-sectional non-experimental study of 370 rice consumers (of which 120 were only local rice consumers, 100 local and foreign rice consumers and 150 non-local rice consumers) between the ages of 18 and 60 years who were sampled using the multistage cluster sampling technique according to sub metros and communities in the Kumasi Metropolis. A semi logarithm model was used to determine the factors (that is sex, age, household size, prices, income, taste, availability, foreign materials, cooking time, aroma and color) that influence the demand for local rice. The results of the study showed that household size, taste, presence of foreign materials, price and income significantly influenced the demand for local rice. The demand for local rice was fairly price inelastic as well as a normal good. Prominent among the factors cited by consumers and non-consumers to improve on the demand for locally produced rice included polishing, improved packaging, increased advertisement, availability and affordability. It is recommended that the findings of this study be utilized by governmental and nongovernmental institutions such as the Ministry of Food and Agriculture to improve on the local rice industry in Ghana.

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LIST OF ABBREVIATIONS

EIPs	Environmentally Identified Products
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GOG	Government of Ghana
GSS	Ghana Statistical Service
IFPR	International Food Policy Research Institute

KMA	Kumasi Metropolitan Assembly
MOFA	Ministry of Food and Agriculture
MOTI	Ministry of Trade and Industry
NGOs	Non-governmental Organizations
NRDS	National Rice Development Strategy
SRID	Statistical Research and Information Directorate
USDA	United States Department of Agriculture

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Rice over the years has become a staple food for many Africans and constitutes a major part of the diet for many others. According to a report by the Food and Agriculture Organization (1999) rice is now considered as the world's single most important food crop after maize and provides a significant amount of calories for the human system. Rice is cultivated widely around the globe with mass production in South-East Asia, the United States and Southern Europe Regions (FAO, 1999).

Rice has become the fastest growing staple food and provides a bulk of dietary energy to the growing population in most African countries. According to Kassali et al., (2010), rice accounts for 715/cal/caput/day, 27 percent of nutritional protein and 3 percent of nutritional fat. Similarly the FAOSTAT (2012) asserts that, rice is ranked the 5th most prominent source of energy in diet responsible for about 90 percent of caloric intake. Aside its importance in diet intake rice also serves as a source of raw material for industries.

In Ghana the agricultural sector is well noted for supplying food, raw materials and the possible generation of income for households that engage in all sort of farming activities. Some of the major food crops grown in Ghana include rice, maize, millet, sorghum, cassava, yam, groundnut and vegetables, with maize being the dominant food crop followed by rice (Ministry and Food Agriculture, 2010). The relevance of these commodities to consumers and the generation of revenue as well as food security cannot

be overemphasized in the economy. Local rice is widely cultivated from the north to the south of Ghana with mass cultivation in the eastern and middle belt of the country (MOFA, 2012).

Ghana, a developing country continues to depend on large quantities of imported products especially consumable goods to supplement what is produced locally. Most developed countries' like China were able to develop their economies by promoting the consumption of domestically produced goods which was strictly enforced and supported by their government. According to Schiffman and Kanuk (2007) the intensity of dedication to the consumption of locally produced goods and services depends greatly on the extent of ethnocentrism.

Consumption of rice in Ghana over the past years has increased tremendously. This increase in rice consumption in the country can be attributed to the increasing population, rapid urbanization, growing number of restaurants and fast food joints, industrialization and most importantly the ease with which rice is prepared (United State Department of Agriculture, 2014).

Almost every household and food vendor in the country uses some quantities of rice in preparing meals for household consumption or for sale due its ease and ability to be used in preparing a wide variety of rice dishes. However this increase in demand for rice both in quantity and quality far outweighs local production, hence the need to import foreign rice to add up to what is produced locally.

The mass importation of foreign rice into the country raises the concern to increase production and improve upon the quality of locally produced rice since it can be produced locally to make it more competitive with imported rice. Some of the benefits that will accrue if this phenomenon is taken into keen consideration include employment mostly in the rural areas where most of the local rice is produced which in turn will solve the problem of rural-urban migration. Another benefit the country can derive from improving the local rice industry; would be curtailing of the current exchange rate problems in the county. Also if the country is able to produce more than what is demanded, the surplus can be exported to other countries which would generate revenue for development.

Recognizing the enormous benefits the country can accrue from expanding and improving upon the production of local rice, the government of Ghana in 2008 established the National Rice Development Strategy (NRDS). The objective of the NRDS was to double local rice production and curb the massive importation of foreign rice. Unfortunately since its establishment the NRDS has not been able to make much impact in terms of achieving its objective of increasing production by 10% annually. This is evident from production statistics as production at the time of establishment stood at
289,000MT and increased up to only 300,000MT in the year 2014.

With the establishment of the NRDS, it is clear that the government of Ghana's interest is to increase local rice production. To achieve this feat, the role of consumer preference for rice, specifically local rice becomes vital in the chain of production to consumption. The future of local rice production therefore to a large extent becomes dependent on consumer preferences and attitudes towards local rice consumption, with particular emphasis on what

would or not influence local rice demand. On this premise, it is important and timely to understand consumer decision-making regarding locally produced rice and to seek appropriate strategies about how local rice consumption can be improved. It is in this vein that the study reported herein was conducted to explore and analyze the factors that influence demand for local rice in Ghana using the Kumasi Metropolis as a case.

1.2 Problem Statement

As the importation of rice continues to increase ahead of production in Ghana, increasing rice production and quality in terms of what is produced locally has become an issue of great concern. The annual per capita consumption of rice in Ghana over the last decade have been increasing; from 17.5-kg during 1999–2001 to 24-kg during 2010–2011 (MOFA, 2012). The per capita/consumption of rice in 2012-2014 was estimated at 32kg35kg. Consumption of rice in Ghana is projected to reach it's a mile stone of about 63kg in the year 2015 (MOFA, 2014).

Rice consumption in the mid-year of 2014/2015 was estimated at 950,000 metric tons up from 850,000 metric tons in the mid-year of 2013/2014 (MOFA, 2014). The increasing demand for rice can be attributed to the increasing number of hotels, fast food restaurants and vendors in the major cities. Unfortunately the sharp increase in the consumption of rice hasn't impacted positively in the production and consumption of locally produced rice.

Several governmental programs have attempted to increase domestic rice production with the aim of bridging the demand-supply gap making Ghana to be more self-sufficient in rice

production (MOFA, 2009). Though much has been achieved over the years in terms of the country been able to marginally decrease the gap, a cursory look at import statistics indicates a continuous or sharp increase in the importation of rice topping consumable imports with a whopping amount of $600 million in the year2013 and $439million in the year 2014 (Ministry of Trade and Industry, 2015).

The literature on rice in Ghana is replete with studies that have largely focused on new varietal releases, production, cultural practices and the reduction of post-harvest losses (for example, Adu-Kwarteng et al., 2003), with others been devoted to the growth of rice consumption (e.g.Tomlins et al., 2005). The demand-driving side which serves as a basis for the government, producers and merchants to have knowledge on factors that influence consumer preference for local rice, the relationship between the two types of rice and exploring ways to improve the patronage of local rice has however, received little research attention thus the need to investigate this phenomenon.

1.3 Objectives of the Study

The general objective of the study was to analyze the demand for locally produced rice in Ghana. In order to achieve this objective, the following specific objectives were deduced:

1. Examine the demographic and socio-economic characteristics of consumers of local rice.
2. Determine the extent to which demographic and socio-economic variables affect consumer's demand for local rice.
3. Identify the factors that prevent individuals from consuming local rice.

4. Estimate the elasticities (own price and income elasticities) of the demand for locally produced rice.
5. Explore plausible ways to improve consumption of local rice.

1.4 Research Questions

To achieve the objectives enumerated, the following questions were asked;

1. What are the demographic and socio-economic characteristics of consumers of local rice?
2. To what extent do demographic and socio-economic variables affect the demand for locally produced rice?
3. What factors hinders individuals from consuming local rice?
4. What is the own price and income elasticities of the demand for locally produced rice?
5. What can be done about locally produced rice to improve its demand?

1.5 Hypothesis

In the light of the objectives and research questions as well as the review of extant literature, the following; prior research hypotheses were advanced:

1. There exist no relationship between demographic variables and the demand for local rice.
2. Attributes of rice (foreign materials, aroma, color, taste, time used in cooking) does not affect the demand for locally produced rice.
3. Economic variables (prices, price of substitutes, income, availability etc.) does not affect the consumption of local rice.

1.6 Significance of the Study

Given the problem identified, the objectives of the study if achieved would help policy makers design and implement appropriate strategies to help solve the challenges local rice consumers face which in the long run would reduce the importation of foreign rice and promote the patronage of locally produced rice in Ghana.

In addition, findings of the study would enable policy makers rightfully adopt the best technology in the production of domestic rice to meet the ever growing demand of rice in Ghana. Adopting appropriate technology would help improve the quality and other attributes of local rice to make it more attractive and be able to compete with imported rice.

The results of the study would also serve as useful information for the Ministry of Food and Agriculture and other international organizations such as the Food and Agriculture Organization to effectively allocate resources into the mass production and improvement of the domestic brands of rice produced in Ghana.

Lastly, the findings of the study when published would fill in the gap in the extant literature and may be of great use to researchers both in academia and in industry who might further want to build knowledge in this area.

1.7 Scope of the Study

The study broadly covers household consumers and food vendors in the Kumasi metropolis of the Ashanti Region of Ghana. The metropolis was chosen because of its cosmopolitan

nature in the Ashanti Region and as a major consuming area of rice in Ghana (MOFA, 2012). The metropolis is characterized by informal workers representing about 71 percent of the entire work force employed mostly in commence and service sectors constituted the study. The diversity of the study population made it relatively easier to obtain the sample size needed for the study. The study was also limited to the metropolis because of proximity, time constraint and convenience.

1.8 Organization of the Research Report

This study comprises of five chapters. Chapter one deals with a presentation of information on the background of the study, problem statement, study objectives, research questions, hypothesis and significance of the study and the organization of the study. Chapter two is dedicated to the review of literature which is sectioned under themes which relate to the theories of demand and empirical review of rice production domestically and abroad. Chapter three focuses on the methodological approach of the research which deals with the population of the study and research design. Chapter four is dedicated to the analysis of the data and interpretation of the study results. The last chapter, which is chapter five, deals with summary of major findings, conclusion, limitations and implication for future research and recommendation.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This study was designed to provide a detailed analysis of the demand for locally produced rice. This chapter of the thesis report deals with a thematic review of the literature regarding the variables which predict the demand for goods and services. The chapter begins with the origin and definition of rice and its relevance in an economy. This is followed by an overview of the Ghanaian rice industry which comprises of the demand and supply, production and the preferred types of rice varieties in the country. The chapter ends with the theoretical and empirical review of the related variables relevant to the study.

2.1 Origin and Definition of Rice

The production of rice originated in China and was later spread to countries such as Sri Lanka and India. Rice can be grown in both desert lands and wetlands. There are two main types of cultivated rice; Oryza sativa (Asian rice) and Oryzaglaberrima (African rice). Oryza sativa is the most commonly cultivated in most of the Asian provinces. Currently rice is cultivated in four distinct ecosystems; irrigated, rain fed lowland, upland and flood-prone agro ecological zones. As the main source of nourishments, rice is by far the most important staple commercial food crop consumed by over half the world's human population, especially Asia and emerging Africa. According to a report by the Food and Agriculture Organization, (STAT data 2012), rice was the third-highest yielded agricultural commodity in the world after sugarcane and maize.

2.2 Significance of rice in an economy

The importance of rice in an economy is undoubtedly vital in the growth of any economy. Through rice production, countries like Bangladesh, China, Thailand, Pakistan and Vietnam have had their economies nurtured by earning foreign exchange from rice exportation. Singh (1985), in his study affirmed that rice is the most important food of the developing world. With regard to nutrition and caloric intake, rice provides about fourfifth and one-third of the calories consumed by more than two billion people of Asia and nearly one billion people of Africa and Latin America respectively. Moreover, he noted that meeting a healthy consumption arises from producing own products rather than buying or importing.

In another related study by Francesco (1994) on self-sufficiency in the production of rice, he indicated that the increase in the Bangladeshi rice production and market development has yielded favorable outcomes like a moderate stable food grain price environment and the declining occurrence of poverty in the Bangladeshi economy.

According to Brown (1973), a major source of foreign exchange savings, conveying of wealth to a poor sector of the society and the reduction of rice shortage in the incident of regional or nutritional political crisis are some of the benefits the Malaysian economy has derived as result of expanding its rice industry.

The nutrition derived from rice cannot be overlooked; studies by (Francesco, 1994 and Vaughan et al. 2003) affirm this assertion.

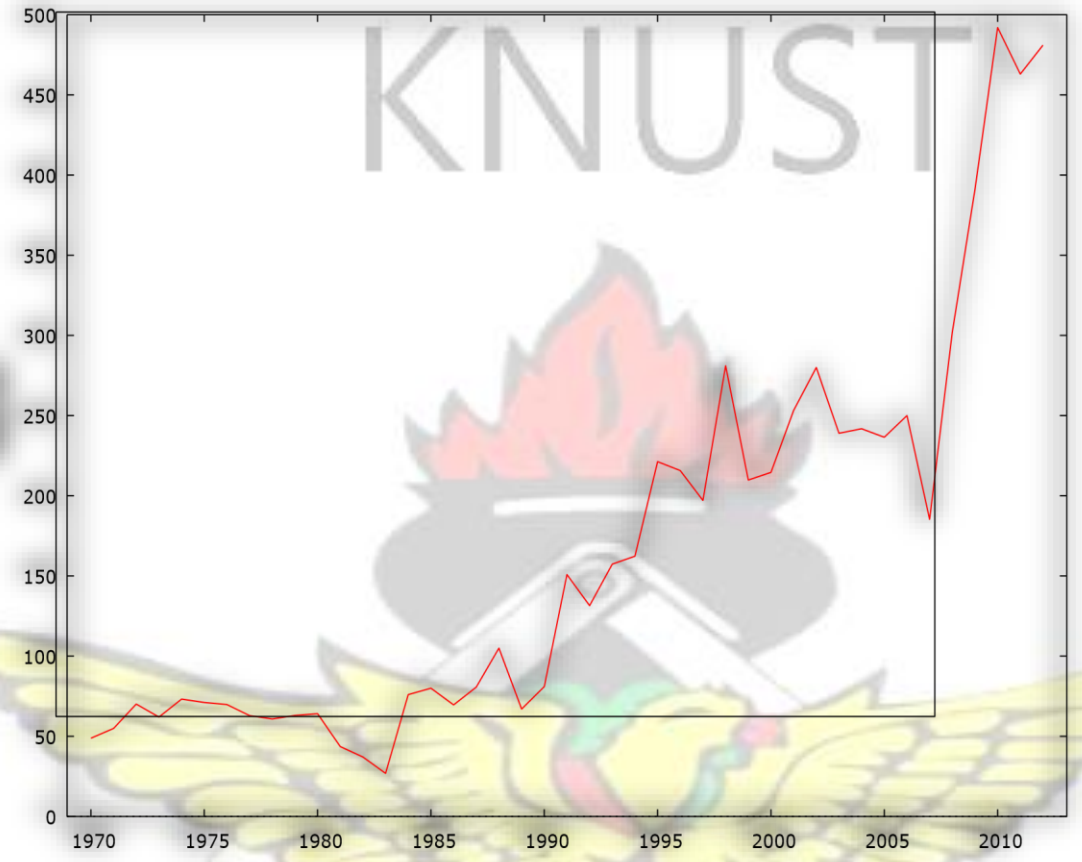
2.3 Overview of Ghana's Rice Production, Cultivation, Demand and Supply The chain in the rice industry in Ghana (i.e. from the production sector to the supplying sector and finally to the individual consumers) has played a remarkable role in the economic development of the Ghanaian Economy particularly the Agricultural sector since the country attained independence. However, statistics from the Ministry of Food and Agriculture reveals that the production of rice has been fluctuating since the early 1980s. This was due to the country adopting the Structural Adjustment Program (SAP) in the 1980s where trade was liberalized. This allowed high importation of rice into the country thus crowding out the production of locally produced rice over the years.

In most parts of Ghana, the ecosystem required for the production of rice is low lying zones inundated from rivers or streams. There are four main ecological areas in the country where the cultivation of rice strives most. They are; the rained upland and lowland in the Northern sector of Ghana; the inland swamp and valley in Central Ghana; and the irrigated Northern and Southern sectors of Ghana.

The irrigation facilities needed for the production of rice are just a handful. Considering the cultivation area, there are over six varieties of rice that are grown. The most common grown variety is Jasmine 85, an early maturing and high yielding rice with a high market price due to its fragrance. The average yield of rice is 2.6 tons/ha paddy (USDA, 2014).

The trends in rice production in thousand metric tons as well as the area of cultivation in thousand hectors of land over the periods 1970 to 2012 are shown in Fig 2.0 and 2.1 respectively.

Figure 2.1: Rice production in Ghana from 1970 to 2012

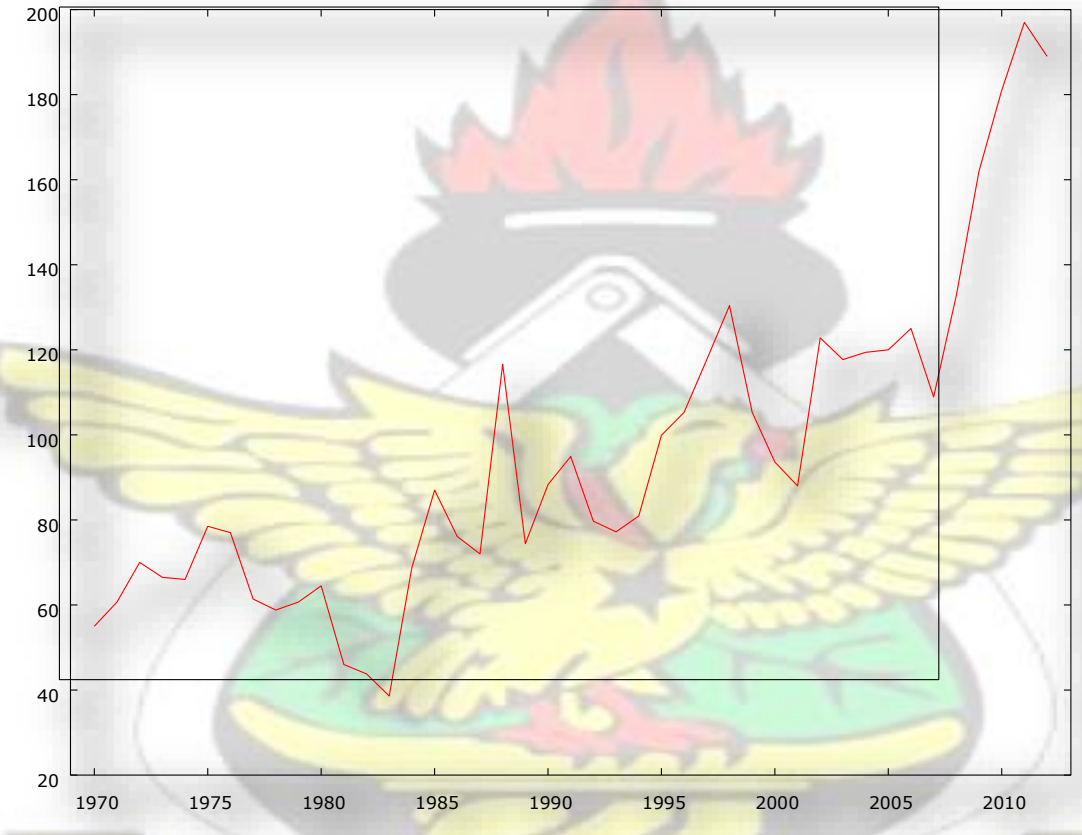


Source: SRID-MoFA, 2012

Figure 2.1 highlights the movements of rice production over the period of study (1970 to 2012). From the beginning of 1970-1982 stable rice production could be observed but this trended downwards in 1983 due to the economic disaster experienced in the country that year. Production then started increasing from 1985 and reached its peak in the year 2002. However, fluctuations in production could be observed in the preceding years with declines in production from 2003-2007, then increase in production from 2008-2010, a slight decline in 2011 and then an increase in production once again in 2012. Khor (2006) reported that the most important problem that local rice farmers encounter is the high cost

of production due to the high cost of inputs. Other studies (for example, Furuya and Sakurai., 2003; Adolph and Chancellor, 2006) reported that what mostly caused a decline in production included lack of access to credit, pests and rodents' destruction, inadequate water supply, diseases, unavailability of suitable varieties, poor quality of locally processed rice and inexpedient markets for inputs and produce.

Figure 2.2: Ghana's areas of rice cultivation from 1970 to 2012



Source: SRID-MoFA, 2012

Figure 2.2 highlights the movements of rice cultivation areas over the past four decades (1970 to 2012). At the beginning of the study period, there was a steady rise in the areas of rice cultivation up until 1983 where there was a sharp decline. This was due to the various economic recovery programs adopted by the country in the 1980s.This was then coupled

with series of fluctuations up until 2011 where there was a significant increase in the cultivation area and then decreased slightly in 2012.

Continues urbanization coupled with changing consumer preferences are the main factors accounting for the significant increase in per capita rice consumption. Statistics from (MOFA, 2012) report on rice consumption showed that just 20 percent of local rice was consumed in urban areas. The per capita consumption of rice has been increasing over the last decades; from 7-8kg in the early 1990s to 11.5kg in the late 1990s and to 27kg in the early 2000s. The per capita consumption of rice in 2012-2014 was estimated at 32kg35kg. A future projection of possible increase in the per capita consumption of rice is anticipated by the Ministry of Food and Agriculture. These projections are based on the combination of an overall increase in population, incomes, and urbanization. It is in light of this that the Government of Ghana wishes to upgrade food security and conserve foreign exchange by reducing the reliance on imported rice by investing more into the production of local rice.

Currently Ghana's supply of rice is dominated by rained rice, which contributes about 84% of the total rice produce, yielding an average of 1.0-2.4 metric tons of paddy rice per hectare. Rice yields from irrigation contribute only 16% with an average paddy yield of 4.5 metric tons per hectare (MOFA, 2014). The lack of adequate irrigation facilities has slowed the mass production of local rice to meet the increasing demand. Also, domestic rice supplies have not kept up with changing preference toward aromatic and long-grain white rice. It is in view of this that, rice imports from U.S., Thailand, India, Pakistan and Vietnam has increased rapidly to satisfy Ghana's demand and choices.

Aromatic long-grain white rice is preferred by most consumers and constitutes 20% of imports which includes varieties like 0-5% broken and aromatic 100% broken rice from Thailand. Most urban consumers also enjoy basmati 25% broken rice from India and Pakistan. “Togo Marshall” is a locally produced long-grain aromatic variety that is well suited to Ghanaian conditions. It has been found to compete with imported varieties in terms of taste; however it is not widely cultivated due to seed scarcity. Jasmine 85 is a new variety of long grain perfumed rice that also suits the Ghanaian condition. Most farmers prefer this variety because it matures early and the seeds used in production are available.

2.4 Theoretical Review

Literature on the demand for a commodity commenced in the late 1890s by the great economist Alfred Marshal in his book titled “The Principles of Economics”. However, a lot of theories have emerged afterwards and these theories have mainly focused on consumer behavior and utility maximization. Although, all such theories have made significant contribution to the field, there is no single universally accepted theory in this field of study. The essence of these theories depends on them maintaining certain in variance’s between different situations; thus if the quantities demanded by consumers showed little or no correlation between prices and incomes then the concept of a demand function would be a meaningless phenomenon. Some of the underlying theories include The Neo-classical Demand Theory, The Theory of Consumer Behavior and The Theory of Utility Maximization. The theory of consumer demand derived from the neoclassical microeconomic theory of consumer choice is one of the most important foundations of most economic reasoning. The theory of demand as received from Marshall, clarified by

Hicks and many others, such as Jevons, Edgeworth, Schultz, Pareto and later writers have built it into perhaps the most elaborate theoretical structure in the science. The theory aims at explaining the choices made by consumers, given the conditions of the market environment, incomes and prices they have to face. Weintrand (1928) argued that neoclassical economics rests on three assumptions. The first assumption is that consumers are assumed to make choices in a rational manner between identifiable outcomes associated with values; secondly the individuals aim is to maximize utility and the firm to maximize profit; and finally it is assumed that consumers act independently on the basis of full and relevant information.

On the basis of these assumptions explained above, the neo-classical economists have built a structure to understand the allocation of scarce resources among alternative ends.
They argue that, consumers' will is to purchase bundle of commodities that maximizes the utility they can achieve, subject to the budget available. A utility function is formulated to measure the level of satisfaction an individual derives as a result of consuming a particular bundle of goods and services. Early economists such as Jevons,
Walras, and Marshall (1920) postulated that the consumer was capable of assigning to each commodity or combination of commodities a number that represented in cardinal terms the amount of utility associated with that selection of goods. They further postulated that the consumer was aware of all possible alternatives and had assigned particular utilities to each of the alternatives; he would then select the combination which yielded him the highest utility. As indicated earlier on, it was also postulated that as additional units of the same commodity were consumed the utility derived from this extra consumption would diminish.

This is the famous principle of diminishing marginal utility, from these postulates it could be deduced that the consumer would increase his purchases of commodities, subject to his budget constraints, up to the point where there was no longer a net gain in utility. It was a brief step to deduce from these results that a fall in the price of a commodity would increase the quantity purchased, other things remaining constant. Thus the law of demand with its various properties had been successfully derived.

Current studies have replaced the cardinal utility assertion with an ordinal utility function. In this case it is postulated that the consumer can rank order the alternatives that are presented to him in terms of his preference. This new theories requires decisiveness in the selection of commodities that yields utility to the consumer. In this case the consumer cannot state how much he prefers A to B. However, before these preferences can be represented by a utility function three further postulates must be met. One, for all possible pairs of alternatives A and B the consumer must be able to say whether he prefers A to B, B to A, or whether he is indifferent to them. Secondly, the consumer must be decisive in all three outcomes specified in the first postulation, thus the consumer is left with only an option. The third postulate requires consistence in the part of the consumer in his allocation of preferences, if he prefers A to B and B to C, then he must prefer A to C. This condition of transitivity must apply to all possible pairs of alternatives. The theory of utility is designed to provide us with a foundation for the law of demand. The utility function is thus defined in terms of a consumer's purchase during a specific period of time. There is no unique time interval over which the utility function should be chosen but however a relevant time period need to be chosen such that the consumer has sufficient time to derive utility from purchasing a wide variety of commodities. Under the neo-classical utility

framework, the quantity demanded can be expressed as a function of price and income. Theoretically it is asserted that a demand equation can be generated by maximizing the utility function subject to the consumers' budget constraint. The utility framework includes the measurement of real income, division of goods into groups that are closely related and commodity taxation. In addition, the utility function generates the three major predictors of demand analysis; the demand equations are homogeneous meaning the degree of homogeneity is zero in price and income, this is based on the assumption that a proportional change in all prices and expenditure does not affect the quantities purchased; the substitution effects are symmetric meaning that the order of differentiation of the demand function with respect to any two arguments does not change the value of the derivatives(Chiang, 2005); and the substitution matrix is negative semi definite meaning compensated across-price effects of any two goods are equal. Symmetry restriction then guarantees consistency of consumer choice.

An extension to the theory of demand is the elasticity of wants as referred to as by Alfred Marshall. The concept of elasticities was basically propounded to serve as a guide for producers and governments in their pricing and taxation policies to maximize profit and revenue respectively. The nature and type of good produced was also identified as very important in revenue maximization. With respect to these assertions and many others economists' studies how external factors affect either demand or the production of a commodity.

Most economists' define elasticity as the degree of responsiveness of quantity demanded of a commodity to changes in either the commodities own price, price of related substitute

and income. Based on this definition elasticity of a product can be grouped into two; direct elasticity which constitutes prices and income elasticity and cross elasticity of demand.

2.4.1 Price, Cross and Income elasticities of demand

Alfred Marshall in his classical textbook on the principles of Economics postulated that, "elasticity (or responsiveness) of demand in a market is great or small according to the amount demanded. As the amount demanded increases much or little for a given fall in a price, diminishes much or little for a given rise in price". This definition by Marshall has however been criticized as not precise, but Marshall provided a more mathematical definition to further explain it. From this definition one may say that the elasticity of demand is one, if small fall in price causes an equal proportionate increase in the amount demanded: or as we may say roughly, a one per cent fall in price increase sales by one per cent.; that it is two or half, if a fall of one per cent in price makes an increase of two per cent respectively in the amount demanded; and so on (this statement is rough; because 98 does not bear exactly the same proportion to 100 that 100 does to 102).

Price elasticity of demand is defined as the degree of responsiveness of quantity demanded of a commodity to changes in the price of the commodity in question. Demand is absolutely inelastic if, (0 <ed>1), unitary (ed = 1) and elastic if (ed>1). If ed is elastic (i.e. ed>1), then any increase in price would lead to a greater proportionate fall in quantity demanded leading to a fall in total revenue.If ed is inelastic (i.e. if ed<1), any increase in price leads to a less proportionate change in quantity demanded thus an increase in revenue. If ed is unitary (i.eed=1), price changes has no impact on quantities demanded hence total revenue remains unchanged (Tomek & Robinson, 1972).

Cross elasticity of demand is defined as the degree of responsiveness of quantity demanded of one good as a result of changes in the price of a related commodity. If the two goods are positive then the two goods are said to be substitute and complementary if negative. If the elasticity coefficient is equal to zero then the two goods are said not to be related.

Income elasticity of a good is defined as the degree of responsiveness of demand for the good due to changes in income. Income elasticity reveals whether a commodity is normal (superior) or an inferior good. If the quantity demanded of a commodity falls whiles income increases then the good is said to be an inferior good and a normal (superior) good if demand increases in accordance with income. For price elasticity of demand, if the coefficient of elasticity is negative then the good is said to be a normal good and an inferior good if positive.

2.5 Determinants of the Demand for Rice

Theory of demand postulates four main factors that influence the demand for a commodity. These factors are the relative price of the commodity, income, population and price of substitute. Other unquantifiable variables that affect the demand for a commodity are taste and preferences, quality, etc. Quality is often defined as the distinctive characteristics of a commodity. It also refers to the perception consumers have about goods. The size of a family and customer base often classified as an external factor or variable because of its effect on available income per person. This section of the literature review outlines the impact of both micro and non-micro economic variables on the demand for a commodity.

2.5.1 Price effects

The theory of demand postulates a sensitive relationship between price and quantity demanded of a commodity. However, the quantity demanded of a commodity depends on the price differential with respect to conventional consumables than on absolute price.

Koster (2009) asserted that price has been widely studied by sensory, consumer and food scientist as an extrinsic indication in food choice experiment.

Busacca et al. (2005) revealed that price perception by consumers had been regarded in earlier studies as a one-dimensional construct according to which lower prices are considered as favorable conditions and higher prices otherwise. His findings confirm the principle of economic rationality of the consumer demanding more at a lower price and less at a higher price.

A study by (Sampson, 2013) on consumer willingness to pay for local rice revealed that among the seven attributes of rice considered in his study price was the fourth attribute consumers considered when purchasing rice.

2.5.2 Price effects of related substitutes

In accordance with economic theory, the quantity demanded of a good is positively related to the price of its substitute.

If there is a close substitution the cross price elasticities is expected to be positive, meaning a price increase in local rice would result in a fall in quantity demanded and more of its substitute foreign rice would be demanded.

Most consumers in Asia specifically Japan, North Korea, China and Tawian preferred to purchase local rice at lower prices. Demand for local rice in these countries far outweighed that of imported ones because of the price characteristics of the two brands. Higher prices were perceived as a factor that prevented consumers from purchasing certain types of rice that they preferred (Suwannaporn & Linnemann, 2008; Basorun, 2008).

2.5.3 Income

Economic theory postulates a positive and significant impact of income on the quantities demanded of a commodity. However, the relevance of income in the determination of who is likely to consume locally produced goods and services is in doubt. Since locally produced foods or commodities often cost more than orthodoxy-grown foods and commodities, one might anticipate a higher patronage by high income earners relative to low earners. Nevertheless, most empirical findings reveal that income is not able to differentiate between purchasers and non-purchasers of locally produced goods.

Diako et al., (2010), researched on consumer preference, knowledge and preference for aromatic rice type in Ghana. The result of the study revealed a general income effect on the demand for rice, however it failed to differentiate the income effect for a locally grown product and that of imported ones.

2.5.4 Household size a proxy for population

Economic theory postulates a correlation of the size of a household and the demand for a product. It is expected that the larger the household the more food required meeting the demand. Since locally produced goods are deemed to be expensive as compared to orthodox ones, it is anticipated that, the consumption of these products tends to fall (either absolutely, or as a share of food expenditures) as households' size increases. Studies by (Stewart et al., 2004) have suggested that household size and a large number of dependents partly influence food choices.

2.6 Nontraditional variables (Sensory variables)

When rice consumers compare locally grown rice with imported rice what sensory perception matters most? How do consumers compare the appearance, smell and taste of local rice with imported rice? How does sensory appeal and in what ways does it affect the demand for local rice? What influence does the freshness and qualities of local rice versus conventional rice have on purchasing decisions? These questions are answered in the subsections below.

2.6.1 Taste

Taste (meaning sensation of flavor, as contrasting to preference in general) is the most important attribute of rice that influences food purchasing decisions. (Danso et al., 2014; Sampson, 2013) discovered that consumers were willing to pay if the taste of local rice was improved.

2.6.2 Appearance

Theoretical investigations show that consumers have a great dislike to blemishes. There is an apparent link between the desire to accept behavior of blemishes and organic purchasing Goldman et al., 1991. Based on previous studies, there is a scanty negative effect on consumer demand of blemished produce (Goldman et al., 1991; Sparling et al., 1992; Estes et al., 1994). A prior examination of literature by Beharrell and MacFiem (1991) ascertained that people evaluate a food's quality by its appearance. As one grower states, "people shop with their eyes". There is an ambiguity to which blemishes cause people who would otherwise buy local rice be reluctant to, but it is vital that Environmentally Identified Products (EIPs) be made visually desiring as possible otherwise consumers are less likely to buy them.

2.7 Marketing and consumption barriers of locally produced goods

Labeling and dissemination of information to consumers about locally produced goods are important components of marketing. The local rice market is under-developed in this case. According to (Nielsen, 2003), failures to know the specific needs for a new product on the market can be costly, both financially and to the image of the company.

2.7.1The role of labeling

Labeling is defined as the displaying of information about a product on its container, packaging and on the product itself. It is perceived to be a perfect technology for imparting information. Some degree of government intervention is required for effective labeling. Studies by Cavard et al., (2003), indicated that consumers' expectations concern better

control of labeling and quality on the selling place with an indicator of consumed by date (expiry date).

2.7.2 Availability effects

Availability is regarded as the biggest hindrance to increasing market share for locally grown foods. Locally produced and grown foods are not widely available in stores. A consumer is less likely to engage in search for a product when the intention is to get a cheaper product. Studies by Galawat et al., (2010) and Akaeze (2010) revealed that consumers in Brunei purchased imported rice rather than local rice because of availability effects in the market.

2.8 Empirical Review

Numerous researchers have examined factors that affect the demand for rice either home grown or imported globally using a wide variety of approaches. However, findings from most of these studies are in contrast with one another. Nevertheless, there are few that are in consonance with each other. Added to this is the fact that little research on the demand for local rice has been conducted in Ghana, which was the basis of this study to analyze specifically the factors that influence local rice demand in Ghana. This section deals with a review of the extant literature on the factors which have been identified as determinants of rice, both foreign and local.

Demographic variables are mostly used in research as a proxy for taste and preference. However, empirical studies reveal that traditional demographic variables such as age and

education add little information to the general analysis of who is likely to purchase locally produced goods.

Kassali et al. (2010) used a logistic regression to identify demographic factors that influenced the household consumption. The study concluded that age and frequency of rice produced were the most important factors that determined household demand. Tomlins et al., (2005) in their study also found that consumers who lived in urban areas and of high standard of living were the most likely to purchase locally produced rice because of its high nutritional content. Research reports claim women to be the majority that purchase local products than men. This is attributed to the fact that, women primarily tend to be the shoppers for various households. Assibey (1998) further asserted that in a traditional Ghanaian household, women are responsible for purchasing and preparing of food.

Abdullahi et al. (2011) investigated the influence of socio-demographic factors and product attributes affecting purchase decision of special rice by Malaysian consumers. Primary data was used and it was analyzed using a binary logit model. The study revealed that, size of household, marital status, number of children, household income and gender of consumers are the main socio-demographic factors that significantly influence household choices of special rice for home consumption. Attributes of rice such as taste, availability, aroma, brand name and quality were also identified as factors that affected the demand for rice in Basmati. Price and ease of cooking were found not to be significant in influencing the frequent purchase of rice. This was due to the fact that consumers perceived higher prices for special rice and thus prepared to pay for it.

In a related study, Musa et al. (2011) conducted a research on the determinants of consumer purchasing behavior for rice in Malaysia. The purpose of the research was to identify the factors that influenced consumer purchasing behavior for rice Malaysia. A total of 100 respondents were used in the study. Head and household number, marital status, gender, age and occupational status were the demographic variables that affected the rice consumption. Attributes of rice such as flavor, taste of cooking, price and availability were also identified as factors that influenced rice demand. The student found that majority of the respondents reported that they preferred locally grown rice to that of foreign rice because the prices of locally grown rice were relatively cheaper than the imported rice. Though the results of this study was able to establish the relationship between income, household size, and the attributes of rice such as (flavor, taste of cooking etc.) and the demand for rice, it however failed to establish the degree of responsiveness between the variables using elasticities. The present study therefore seeks to establish the degree of responsiveness between the dependent variable (i.e. demand for local rice) and the demand factors (i.e. price, income, household size, price of substitute) using market prices of rice.

Using a sample of 14062 respondents, Batres-Marquez et al. (2009) conducted a study to provide information rice consumption in the United States and the diet of rice consumers. A logistic regression model was used to establish the relationship between the variables of interest. The results of Batres-Marquez study revealed that race, ethnicity, and educational status were the factors that determined the probability of consuming local rice. This study also failed to determine the elasticities. The present study therefore analyzes the demand for domestic produced rice using market values to establish the elasticities between the dependent variable (i.e. demand for local rice) and the determinants of rice.

In their study "Malaysia Paddy and Rice Industry, an application of supply chain management approach", Wong et al. (2010) found that rice ought to be made available in different forms; precooked, instant rice, easiness in cooking and in various forms of packages to meet the changing lifestyle of consumers. The study recommended that, since women mostly determined food demand and consumption in the household efforts should be made such that the ever changing lifestyle had no influence on demand.

Duwais (1983) investigated on the "Factors Affecting Rice Consumption in Saudi Arabia". The main objective of the study was to identify the robust factors that affected the consumption of rice. Annual data from the periods 1964 to 1980 totaling 17 years of observation was used in the study. The ordinary least square (OLS) method was used where demand for rice was regressed against variables like price, price of other substitute (wheat), income (GNP), population and price trend. The study revealed that the per capita rice consumption can be explained by the retail prices of rice, GNP per capita and the retail price of wheat (main substitute) and the trend variable. The coefficient of determination R^2 was very high indicating a good fit for the selected model. The selected models ability for forecasting was tested using the Theil's inequality. The V value of 0.03 implies a highly satisfactory ability of the model for forecasting. The present study analyses the demand for locally produced rice using primary data and also use elasticities to establish further studies.

Suwannaporn et al. (2008) researched on consumer preferences and buying criteria in rice: a study to identify market strategy for Thailand Jasmine rice. The study was aimed at

investigating consumer preferences and attitudes towards Jasmine rice among consumers, targeting rice exporting countries as a basis in identifying opportunities and strategic implications for their rice industry. Primary data was sort for the analysis and included a total of 1128 consumers. The study revealed that marketing activities, quality, price and country of origin were the key determinants in the consumption of Jasmine rice in Thailand. The study was able to achieve its objective; however it was skewed towards the consumption of one particular type of rice. Can this be said for all other types of rice in Thailand? The present study sort to analyse the demand for locally produced rice using structured questionnaires where rice consumers and food vendors would be sampled. Analysis based on elasticities will be used in sound policy recommendation.

Danso et al. (2014) investigated on the determinants of consumer preference of local rice in Tamale Metropolis in Ghana. A total of 120 respondents were sampled for the study. The study adopted the logistic regression model and the Kendell's coefficient of concordance in its model estimation. The study revealed that, key variables influencing consumers preference included age, household size, monthly expenditure on food and taste. Poor packaging of local rice was reported as the predominant factor that discouraged the consumption of local rice. The study therefore recommended that, investment be made to improve rice varieties.

In a related study by Sampson (2013) on consumer preferences and willingness to pay for locally produced rice in Kumasi Metropolis of Ghana. A survey on 400 rice consumers was conducted in Kumasi, Ghana to ascertain consumer preferences and willingness to pay for locally produced rice, as a basis for quality improvement of local rice. The specific

methodology employed in the study was Choice Experiment (CE) technique which is used to evaluate non-market goods. The findings suggested that most important attribute for rice was food safety, followed by aroma and length of grain. Consumers were willing to pay a premium prices for demand attributes. The study recommended that efforts to improve rice production in Ghana must be aimed at introducing the desirable attributes into breeding programs to make local rice attractive to consumers.

Danquah et al. (2014) researched on factors that influence household demand for locally produced brown rice in the Greater Accra and Volta Region's in Ghana. The aim of the study was to determine the factors that influence the demand for local brown rice. The study used primary data and a total of 300 respondents in the study. Data was analyzed using simple descriptive statistics, Tobit model and chi-square tests. The result of the study showed that, taste was the most important attribute that influenced people to consume brown rice. The result of the Tobit regression model showed that the attributes of brown rice and white rice (color, taste, nutritional value, and texture), socio economic characteristic particularly (income) explain the share of brown rice in total rice consumption. The study recommended that the media should be used more in the awareness creation of brown rice.

According to Diako et al. (2010) from a study carried out in Ghana on consumer perception, knowledge and preference for aromatic rice types. A total of 390 consumers were sampled and chi square analysis used in the data analysis. The study revealed that 94.9 percent of the entire consumers in the study were more familiar with imported rice as compared to 29

percent who were familiar with local rice. The reasons for low patronage of local rice were attributed to poor post harvesting, non-availability and generally perceived poor quality.

As much as the writer does not hold any qualm against any of the above works, it is the view of the author that it is high time we took any look into the factors that affect the demand for locally grown rice in Ghana.

All studies on Ghana were able to achieve its purpose; however most of these studies relied on the concept of willingness to pay which is closely tied to the issue of price. The willingness to pay concepts reports the maximum price a consumer is willing to pay for a particular commodity. This concept is estimated using self-reports obtained from the consumer rather than the actual market data hence generally viewed as less reliable. Also issues' relating to willingness to pay is not only centered on the consumer but also food vendors because they consume a greater portion of local rice. The present study therefore sort to establish the impact of the factors (i.e. price, income, price of substitute, household size, age, etc.) that affect the demand for local rice using a semi-logarithm multiple regression model and monthly market data. Also, the price and income elasticities of the demand for local rice would be established which would then be used in comprehensive policy recommendation. Finally, the inclusion of food vendors would add up to existing literature on the demand for locally grown rice.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

The pivot of any research largely depends on its methodological approach and integrity. The methodology chapter provides a description of the methods used in the study.

This chapter begins with a presentation on the area of study, study design and population. It is followed by a detailed account on sample size and sampling techniques, instrumentation, tests on the research instruments to reduce measurement error. The chapter also presents the process of data collection, management and data analysis. It ends with a presentation on ethical issues pertaining to the study, theoretical and empirical models, operational definition of variables and their expected a prior signs.

3.1 Study Area

The Ashanti Region was thought a better area for the study because it has the largest traditional market (Central Market) and other satellite markets within which rice and other food commodities are sold. According to (MOFA, 2012) only 20% of local rice is consumed in urban areas and since the Ashanti Region has one of the largest urban centers (Kumasi) it was selected among the ten (10) regions for the study.

The Kumasi Metropolis popularly known as the “Garden City” has the largest share of the Ashanti Region’s total population. The metropolis is a fast growing one with an annual growth rate of about 5.47 per cent per annum according to GSS (2012). It is the most complete urbanized district among all the districts in the Ashanti Region. The Kumasi

Metropolis has ten (10) sub metros namely, Nhyiaeso, Bantama, Tafo, Kwadaso, Suame, Manhyia, Asokwa, Subin, Asawase and Oforikrom. There are forty six (46) major settlements in the Kumasi Metropolis with Bantama being the most populous and popular settlement in the metropolis.

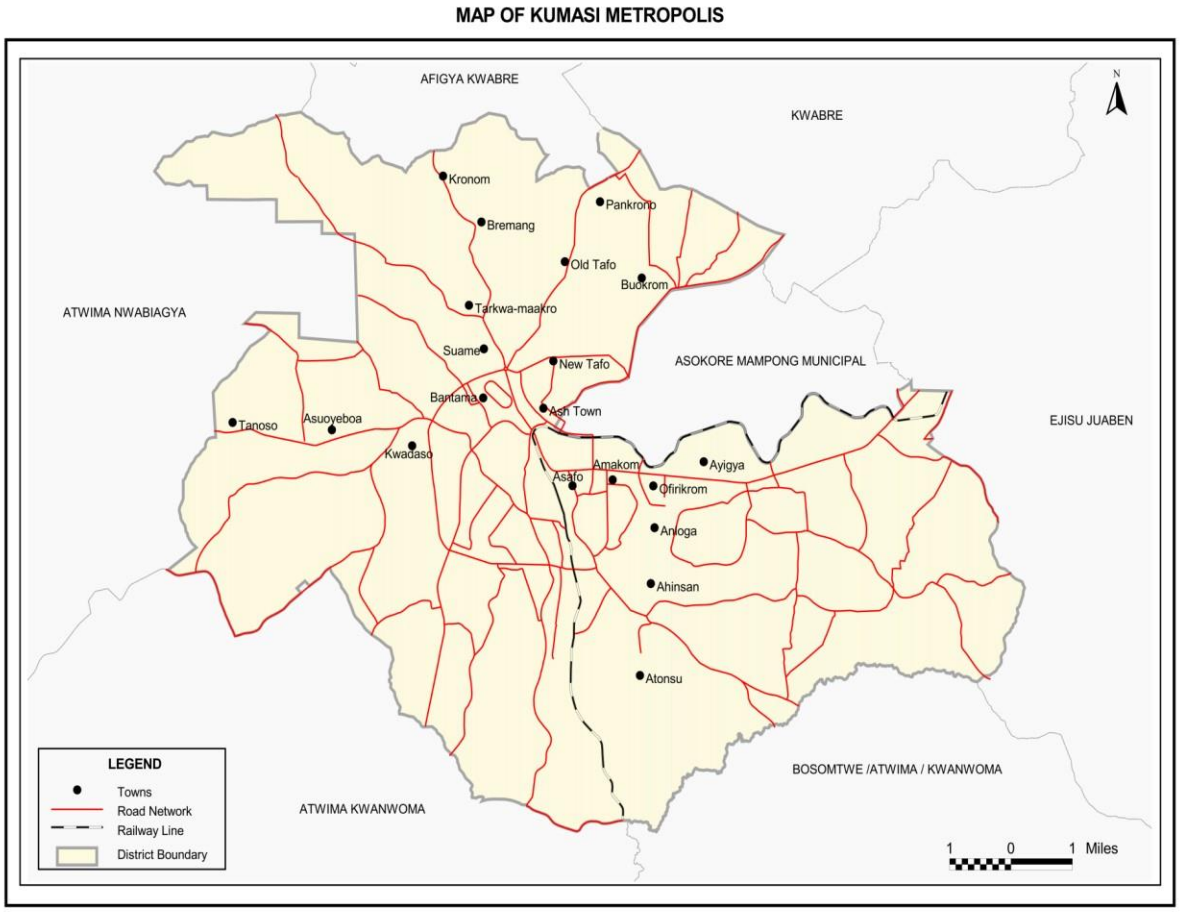
The Kumasi Metropolis is situated in the transitional forest zone and is about 270 km north of the nation's capital Accra. It falls approximately between latitude 6.35°N- 6.40°S and longitude 1.30°W- 1.35°E. The metropolis is approximately 250-300 meters above sea level with an area size of about 254 square kilometers. The Kumasi metropolis shares boundaries with Kwabre East District to the north, Atwima District to the west, Ejisu-Juaben Municipal to the east and Bosomtwe to the south (GSS, 2012).

The Kumasi Metropolis lies within the wet sub-equatorial region and has a minimum and maximum temperature of about 21.5°c and 30°c respectively. The favorable weather conditions foster the influx of people from various parts of the country and even beyond the country into the metropolis. Due to the double maxima rainfall regime of 214.3mm and 165.2mm in June and September respectively, the metropolis is able to produce crops all year round making the metropolis a major provider of agricultural outputs.

Statistics from the 2010 population and housing census (PHC) revealed that, the total population of the metropolis was 2,035,064; comprising of (972,258 males and 1,062,806 females). Commerce is the main economic activity in the Kumasi metropolis, employing

71 percent of the entire labor force. Closely following the commerce sector is the industrial sector with an employment level of 24 percent and finally the agricultural sector which employs just 5 percent of the labor force, (MOFA 2011). The dominance of the commence industry in the Metropolis establishes the fact that the indigenes in the metropolis are engaged mostly in commercial activities (wholesaling and retailing).The presence of both financial and non-banking financial institutions in the metropolis provides credible assistances to residents. A map of the Kumasi Metropolis showing the study areas is shown below;

Figure 3.1: Map of Kumasi Metropolis



Source: Ghana Statistical Service; District Analytical Report, (2012)

3.2 Study Design

The study was a cross-sectional non-experimental survey design which utilized a nonprobability, convenience sampling with a structured questionnaire for the collection of quantitative data involving multiple variables that were used to determine the impact of variables (age, education, household size, taste, availability, presence of foreign materials, income and price) on the demand for local rice.

3.3 Study Population

The target population of interest for this study was rice consumers in the Kumasi Metropolis, with specific emphasis on consumers who used local rice domestically classified as household consumers and food vendors defined as those who prepared local rice for sale in all forms of rice delicacies.

3.4 Sample Size and Sampling Technique

The multistage sampling technique was employed to obtain the required sample for the study. This sampling technique was done in three stages. This sampling technique makes it possible to combine the various probability sampling technique at each different stage. The first stage of sampling consisted of the selection of sub metros. The ten (10) sub metros within the Kumasi Metropolis were grouped into three clusters, that is, Clusters A, B and C. With the exception of cluster C which constituted four (4) sub metros, clusters A and B each constituted three (3) sub metros. Cluster A comprised of Nhyiaso, Bantama and Tafo. Cluster B constituted Kwadaso, Subin and Oforikrom. The final cluster which is

cluster ‘C’ constituted Asokwa, Suame, Asawase and Manhyia. The grouping of the 10 sub metros in the Kumasi Metropolis was based on the requirements of using the multistage sampling technique where the initial stage is the construction of clusters. One sub metro was then randomly sampled from each of the three clusters. In all, three sub metros, namely Bantama, Subin and Manhyia were sampled.

In the second stage of sampling, one (1) settlement or community within the various sub metros was randomly sampled. Communities within the three sub metros sampled comprised Bantama which happens to be the only settlement within the Bantama sub metro, Adum/Kejetia in the Subin sub metro and Ashanti Newton in the Manhyia sub metro. These communities were selected because of accessibility to the researcher, budget constraints and the limited time the researcher had in completing the research.

The final stage of the sampling was the random selection of domestic rice consumers’ and food vendors in the three (3) communities. Households in each of the selected community were sampled using the systematic random sampling technique; every eighth (8) residential address on a road was selected. This procedure ensured a representative sample in the absence of current census data. This same sampling technique was employed within households that had numerous households. If a household was sampled and they happen not to be consumers of rice that household was dropped and the next household was selected as an alternative. Food vendors were also sampled using the same sampling technique. Preference was given to users of local rice in all sampling cases. In all three hundred and seventy (370) respondents were purposively sampled for the study.

Out of which 160 respondents' (117 domestic consumers and 43 food vendors) were randomly and purposively sampled in Bantama. In Adum/Kejetia 120 respondents (88 domestic consumers and 32 food vendors) were also randomly and purposively sampled and finally in Ashanti Newton 90 respondents' (65 domestic consumers and 25 food vendors) were randomly and purposively sampled. The rational behind the multistage sampling technique was the study to be a fair representation of the Kumasi Metropolis. The sampling size and characteristics indicate several strengths of the study. For instance, the sample size (N=370) confirms to Edwards (1985) and Stevens (1996) recommendation to recruit a minimum of 15 participants for each predictor variable to be used in a multivariate analysis.

3.5 Instrumentation

Formulated research questions, objectives and study hypotheses basically informed the development of research items in addition to reference made to several instruments and scales used in other studies. Relevant items were reviewed and contextualized for the study. In addition, a thorough examination of theories that were relevant to the research questions was done in order to identify concepts that had bearing on the demand for a commodity. Questions were also drawn with the statistical analysis of data in mind, taking cognisance of the significant role each item, concept or variable measured would play in the final analysis. Data for the study was obtained through the use of a structured questionnaire appropriately and specifically designed for the study. The response categories of the various questionnaire items (variables) were mostly pre-coded. The response categories were grouped into two; background characteristics of the respondents and their behavior towards local rice demand.

3.5.1 Pre-test of Research Instrument

It was of importance that the researcher pre-tested the instrument crafted to ascertain its validity before the actual collection of data. The pre-test was conducted among 40 respondents in the Ashanti New Town community. The main essence of the pre-test, was to help in resolving any ambiguity and irrelevant items in the research questions and also to gauge the time for administering the research tool. After the pre-testing of the research instrument, questions or items such as occupational status and where rice was normally consumed were deleted from the research instrument with several additions made. Also, income which was initially captured in the research instrument was revised to monthly expenditure since majority of the respondents were self-employed and as such were not able to indicate what they earned in a month. The pre-test of the instrument played a vital role in identifying the most appropriate sampling units for the study. It was on this premise that more female respondents were sampled for the study.

3.6 Data Collection

Data was collected between the months of October and November 2015 after a pre-test of the research instrument had been conducted.

Issues of ethical concerns on voluntary participation, anonymity and confidentiality were discussed followed by reading (if the participant could not read) of the code of instructions on the research instrument to respondents. Before the administration of a questionnaire, participants were informed of the aim of the study and further asked if they had any questions or concerns on the study. Questions asked or concerns raised were satisfactorily

addressed by the researcher and assistants. The same data collection method was adopted throughout the selected communities in the Kumasi Metropolis. Two research assistants were trained by the researcher to assist with the collection of data. The training was done within four (4) hours and it involved how the sampling units were to be sampled, which groups of consumers were to be sampled and most importantly how to interpret the questionnaire to the respondents in cases where the respondent could neither read nor write. The training also involved how to convert certain variables specifically the quantities of local rice bought into kilograms, since local rice was mainly bought in cups, the research assistants were trained on the various converting rates (e.g. two (2) cups of local rice equals one (1) kilogram and one (1) "olunka" equals three (3) kilograms).

3.6.1 Data Management

To make meaning out of the data collected from the survey, the following data management processes were engaged in:

3.6.2 Data Coding

This process aimed at simplifying the data entry and analysis process. It basically involved the translation of words into numbers a scheme called coding. The first step in this process was to provide a coding frame, or the coding scheme. The scheme was then used to translate the responses in the questionnaire into numbers. Coding for this study was straight forward since the close ended type of questions with mutually exclusive responses was utilized.

3.6.3 Data Entry

Once the coding phase had been done the next data management process was to enter the coded responses into the Statistical Package for the Social Sciences (SPSS) Software (Version 20) by the researcher.

3.6.4 Data Cleaning

It was of importance that the researcher checked thoroughly for errors or mistakes after data had been inputted into the SPSS program. Data cleaning at this stage involved eliminating errors in coding. Since data processing errors are inevitable, the researcher paid particular attention to the entry of data and used all possible means for checking mistakes. The validation tool in the SPSS programme which gives information about missing values with their identification numbers and wrong entries made was also utilized to further confirm that the data was clean and error-free. There were no missing values in the data.

3.7 Data Analysis

The data after it had been entered and cleaned using the SPSS (v20) software programme was analyzed using the Gretl software.

Data analysis first involved the univariate level of statistical analysis. The univariate analysis involved running descriptive statistics (usually, frequency, percentages and means) on the background characteristics of respondents who took part in the survey, as well as ascertain the distribution of responses on the other primary variables of the study.

The determinants of the demand for locally produced rice was a model estimation of the determinants of local rice (price of local rice, income, price of foreign rice, household size,

age, taste, availability, foreign materials, cooking time, aroma, color etc.) which was established using the multivariate analysis technique: multiple regression (specifically the semi logarithm form). The semi logarithm regression model helps in establishing how well a set of predictor variables (logs and dummy predictive variables) predict or explains the log dependent variable. The model also gives an indication of the importance of each predictor variable or the interaction of several predictor variables in the model. Finally, the model summarizes the accurateness of the classification of cases based on the model, allowing the estimation of the sensitivity and specificity of the model as well as the positive and negative predictive values. The choice of this model allowed the researcher to log some of the variables. Variables such as the quantity demanded of local rice consumed in a month measured in kilograms and the unit prices of local rice and income were logged. As indicated in the model specification, dummy variables were also included in the model. Variables including taste, availability, cooking time and foreign materials constituted the dummies. The model was estimated using the heteroscedasticity corrected approach by Gretl w32 to solve the problem of heteroscedasticity. Since the dependent variable appears in the logarithm form the basic rule that regression coefficients postulates were employed in the analysis. The coefficients explained how much the dependent variable changes when an independent variable increases by one unit when everything else was held constant. In the case of the categorical independent variables (taste, foreign materials, availability and cooking time) their respective coefficients implied the amount that demand changed when the value of these variables increased from 0 to 1, when all factors are held constant. To be more precise about this interpretation, the dummy attributes of local rice all equals 1 for the presence of a good attribute and 0 if not. Hence, the coefficient explained how much

more is demanded when a variable is good versus when bad, while holding all other variables constant.

3.8 Ethical Issues

Ethical consideration perhaps is the most crucial assumption when it comes to conducting a primary research. In order to have access to the respondents, the researcher introduced himself as a postgraduate student from KNUST, Department of Economics and vividly explained the relevance of the study to the respondents and assured them that it was purely academic, to be used as a requirement for the award of an M.Phil degree in Economics. The respondents who voluntarily opted to be part of the study were briefed of their role in providing valuable information and the purpose for which the information was going to be used.

In ensuring anonymity of the respondents they were asked not to provide any form of personal identification. In order to also ensure the confidentiality of the information retrieved from participants of the study, the researcher and his academic supervisor were the only ones who had access to the data obtained from the study both in soft and hard copy.

3.9 Theoretical Model

The demand for a commodity specifically locally produced rice depends on several factors as clearly indicated in the theory of consumer demand. A mathematical representation of the demand equation was modeled as;

$Y = f(D, SE, AR)$ …….. (1)

Where Y= demand for locally produced rice, D= demographic factors, SE= socioeconomic factors, AR= attributes of rice.

3.10 Empirical Model

A semi logarithm model was used to identify the determinants of local rice as well as determine the effect of these factors on quantities demanded.

To find out the demand for local rice the study adapted the work of Banerjee et al. (2007), thus the semi logarithm model for the study with a little modification was specified as;

$$\ln Qty = \beta_{01} + \beta_1 X_1 + \beta_2 X_2 + \beta_3 D_{EDU} + \beta_4 D_T + \beta_5 D_{FM} + \beta_6 D_{AV} + \beta_7 \ln P_{LR} + \beta_8 \ln P_{FR} + \beta_9 \ln Y + \varepsilon_i$$

Where;

Table 3.1: Descriptions of Variables

Measure	Explanations
InQty	Natural logarithm of the quantities of local rice bought in a month in (kg)

X_1	Ages of the respondents
X_2	Household size and the customer base of the respondents
D_{EDU}	Dummy to indicate (D_{EDU}=1) or not (D_{EDU}=0) if a consumer is educated
D_T	Dummy to indicate (D_T=1) or not (D_T=0) if local rice is tasty
D_{FM}	dummy to indicate (D_{FM}=1) or not (D_{FM}=0) if foreign materials is present
D_{AV}	dummy to indicate (D_{AV}=1) or not (D_{AV}=0) if local rice is available
InP_{LR}	Natural logarithm of the unit price of local rice
InP_{FR}	Natural logarithm of the unit price of foreign rice
InY	Natural logarithm of monthly income
ε_i	stochastic error term
β_0 □ β_9	Coefficient or the elasticities of the model

3.11 Operational Definition of Variables

Price: in this study was defined as the price a consumer or food vendor incurs when purchasing or demanding local rice for household consumption or for further processing. Prices were measured on the continuous scale and the unit of measurement was the unit price per kilogram.

Income: monthly expenditure was used as a proxy for disposable income this was due to the fact that the study area is dominated by commerce and informal workers. Thus, income is defined as the monies used by consumers in meeting their day to day demands. Income was measured on the continuous scale and the unit of measurement was in Ghana cedis.

Taste: was defined to capture the sensation of flavor perceived in the mouth and throat when consuming local rice. Taste was measured as a categorical variable and coded as '1= very tasty, 2= tasty, 3= less tasty.' In the model estimations, codes (1 and 2) were recorded as '1= tasty and code three (3) recorded as 0= less tasty.'

Availability: this takes into consideration whether local rice is available or not available in the market. Easy access to local rice means less time spent in the market whiles more time spent in the market refers to the scarcity or the non-existence of local rice.

Availability was measured as a categorical variable and coded as '1= always available, 2=available, 3= not available.' In the model estimations, codes (1 and 2) were recorded as '1= available and code three (3) recorded as 0= not available.'

Attributes of rice: this included color, cooking time, foreign materials and aroma, are defined as features or components that affect local rice appeal or acceptance in the market. These attributes were measured as categorical variables where color, cooking time, presence of foreign materials, cooking time, aroma were measured and coded as '1= good, 0= not good.' These variables remained unchanged in the model estimations.

Demographic factors: included age, marital status, household size, number of customers and level of education of respondents that influence their demand for local rice. Age, household size and number of customers were measured as continuous variables. Marital status was measured as a categorical variable and coded as 1= single, 2= married. Finally, level of education of respondents was also measured as a categorical variable where and coded as '1= none, 2= basic, 3= secondary, 4= tertiary.' In the model estimations the codes (2, 3 and 4) were recoded as '1= an educated respondent and code one (1) recorded as 0= a none educated respondent.'

3.12 A Priori Expectation of Parameters

The relationship between ages (X_1), was unknown since it was not certain which age groups of consumers' and food vendors would purchase or not purchase local rice. Thus, the sign for β_1, as shown in the specified model could either be negative or positive.

It was expected that the larger the household size(X_2) the higher the consumption of various goods. The demand for local rice was expected to have a positive relationship with household size. Hence, the sign of β_2 was expected to be positive.

It was also expected that, higher levels of education attained corresponds with a person being more knowledgeable to know the importance and benefits of consuming local rice. However, this same knowledge acquired through education could lead to less consumption of local rice since many people believe foreign products to be of good quality than locally produced ones. Hence, the sign of β_3 could either positive or negative.

The theory of demand again postulates a positive relationship between taste **(D_4)** and availability **(D_6)** of a particular commodity. With this as a base, a positive relationship was expected for these variables. Hence, the sign for β_4 and β_6 were all expected to be positive. Attributes of rice which included the presence of foreign (unwanted) materials **(D_5)** is asserted to have a negative relationship with the dependent variable. Therefore the parameters β_5 was expected to be negatively related with the demand for local rice.

The relationship between prices (**$\ln P_{LR}$**) and the demand for local rice by the theory of demand is expected to be negative. The relationship between prices and demand for local rice was therefore expected to follow the law of demand, which states that all other things

being equal the higher the price the lower the quantity demanded. The parameter β_7 was expected to have a negative sign.

The relationship between prices (**lnP_{FR}**) and the demand for local rice by the theory of demand is expected to be positively or negatively related to the demand for local rice. A positive sign means the two goods are substitutes and a negative sign means the two goods are complements. Thus the parameter β_8 was expected to be negative or positive.

Monthly Income **(lnY)** was expected to have a positive relationship with the dependent variable **(lnQty)**. People with higher income have the resources or means to demand more of a good irrespective of the prices thus those with higher incomes are expected to consume more kilograms of rice than those with less income. Hence, the sign for β_9 was expected to be positive.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Introduction

This chapter presents the results of the study. It comprises of the presentation, interpretation and analysis of the responses of respondents sampled for the study. It also analyzes the

results of the study in relation to findings from the extant literature. The structure of the findings is related to the research objectives and is presented under the following headings: demographic and socio-economic characteristics of local rice consumers; factors that affect the demand for locally produced rice; the own price and income elasticities of the demand for locally produced rice and measures to improve local rice consumption.

4.1 Demographic and Socio-economic characteristics of local rice consumers

This section of the research report presents information on the distribution of the 220 respondents (out of the total 370) who patronized local rice only and both local and foreign rice in terms of their demographic and socio-economic characteristics. The variables (socio-demographic and economic) measured included: sex, age, marital status, education household size and income. Variables such as age, household size, number of customers as well as income were all measured on the continuous level but were categorized in table 4.1 for clear demographic analysis. The distribution of respondents with respect to these characteristics is presented in the Table 4.1.

Table 4.1: Demographic and socio-economic characteristics of local rice consumers (N=220)

Characteristics	**Only Local Rice N**	**Local and Foreign Rice N**	**Total n (%)**	
Sex				
Male	1	0	1 (0.5)	
Female	119	100	219 (99.5)	
Age ≤18				
	2	1	3 (1.4)	
19 – 28	28	27	55 (25.0)	
29 – 38	37	35	72 (32.7)	M=36
39 – 48	35	22	57 (25.9)	

49 – 58	18	13	31 (14.1)	
59+	0	2	2 (0.9)	
Marital status				
Single	47	42	89 (40.5)	
Married	73	58	131 (59.5)	
Educational attainment				
None	9	5	14 (6.4)	
Basic	54	49	103 (46.8)	
Secondary	33	29	62 (28.2)	
Tertiary +	24	17	41 (18.6)	
Household size				
1 – 4	38	44	82 (47.9)	
5 – 8	33	45	78 (45.6)	M =4.84
9 – 12	6	4	10 (5.9)	
13+	0	1	1 (0.6)	
Number of customers				
40 – 80	24	5	29 (59.2)	
81 – 120	10	1	11 (22.4)	M =91
121 – 160	6	0	5 (10.2)	
161 – 200	3	0	4 (8.2)	
Income ≤500				
	26	21	47 (21.4)	
501 – 1000	20	22	42 (19.1)	M =1121
1001 – 1500	54	42	96 (43.6)	
1501 – 2000	18	13	31 (14.1)	
2001+	2	2	4 (1.8)	

Source: Authors Field Survey, 2015

The Table 4.1 summarizes the demographic characteristics of local rice respondents, indicating the participants for each of the variable categories measured. The first variable in the table sex reports for males (n=1, 0.5%) which constituted only food vendors and for females (n=219, 99.5%) which constituted both food vendors and individual household consumers from the data set (N=220). The reason for the vast differences between the two was attributed to the fact that, a preliminary survey by the researcher revealed that male household heads had little knowledge about the happenings in the market hence their

omission from household responses, confirming a similar finding by Assibey-Mensah (1998) who asserted that, women in a traditional Ghanaian household were responsible for purchasing and preparing of food.

Rice consumers between the ages of 18 – 60 years constituted the study. The age distribution reported above indicates majority of the participants (n=72, 32.7%) being between the ages of 29 – 38. The average age of the group, 36 years, falls within the labor force implying that most of the respondents are likely to earn incomes to meet their monthly expenses.

In terms of marital status; there were more married respondents (n=131, 59.5%) than there were singles (n=89, 40.5%).

According to a report by FAO (1999), the attainment of education plays a key role in the consumption of locally grown foods. This is because; the higher an individual's educational attainment, the more knowledgeable they are concerning the advantages of consuming organic grown foods. In terms of education, it can be seen from the Table 4.1 that majority of the respondents representing (n=103, 46.8%) had attained basic education. The 2010 Population and Housing Census report for the Kumasi Metropolis confirm this finding.

Household size to a large extent determines the quantities of rice consumed in a month. Thus the higher the household size, the higher the quantities of local rice consumed. Households with a family size of 1-4 (n=82, 47.9% each) constituted the majority. The mean household size was approximately 5 persons. On the number of consumers who

patronized food prepared with local rice from vendors, the majority of vendors (n=29, 59.2%) had a customer base of 40 – 80 persons who bought local rice averagely in a month. The mean number of consumers who patronized food prepared with local rice was 91 persons. A study conducted by Stewart et al (2004) revealed that household size and a large number of dependents influenced the consumption of rice partly, hence an anticipated increase in local rice consumption when household size and number of consumers increases.

In relation to monthly income received, majority of the local rice consumers (n=96, 43.6%) earned incomes between the ranges of GH₵1001 – 1500 in a month. The average monthly income of consumers was GH₵ 1121 indicating that most of the respondents were probably in a more convenient financial position to buy local rice.

4.2 Purchasing behavior of local rice consumers

a. Marketing

Table 4.2 below indicates the marketing characteristics attributed with the demand for local rice. Economic theory postulates a positive relationship between the availability of a product and the quantities demanded. The majority of the respondents (89.1%) indicated that, local rice was always available, and few (10.9%) reported that they had difficulties in getting local rice to buy. Majority of the respondents (74.1%) indicated they bought local rice in the retail markets, 17.3% bought it from wholesalers or the millers, whiles 8.6% bought it from hawkers. The respondents who mostly bought it from the wholesalers

constituted the food vendors. In terms of price ratings, about 44% of the respondents which constituted the majority reported that the price of local rice was moderate. The second highest 39.5% indicated local rice was cheap, followed by 15.5% who noted that it was expensive. Majority of the respondents representing 79.1% further reported that local rice was very tasty followed by 15.0% who reported it to be tasty and
5.9% who reported that local rice was less tasty.

Table 4.2: Marketing of local rice (N=220)

Variables	**N**	**%**
Availability		
Always	196	89.1
Not Always Available	24	10.9
Purchasing Spot		
Retail Market	163	74.1
Wholesale Market	38	17.3
Hawkers	19	8.6
Price Ratings		
Very Cheap	1	0.5
Cheap	96	43.6
Moderate	87	39.5
Expensive	34	15.5
Very Expensive	2	0.9

Taste		
Very Tasty	174	79.1
Tasty	33	15.0
Less Tasty	13	5.9

Source: Authors field Survey, 2015

4.2.1 Consumption Challenges

Table 4.3 also shows the challenges that consumers' face in the consumption of local rice. Majority of the respondents who consumed local rice (n=168, 76.4%) reported that prices of foreign rice did not affect their demand for local rice, however a few indicated otherwise (n= 52, 23.6%). As income increases, quantities demanded of a commodity is also expected to increase or decrease depending on the nature of the commodity, an increase is expected for a normal good and a decrease for an inferior good. Approximately 59.1% of local rice consumers indicated demand was affected by their incomes whiles 40.9% reported it didn't. Majority of the respondents (60.5%) indicated they had no problems with cooking local rice whiles, 39.5% reported otherwise. Foreign materials in local rice such as grits, husks and weevils was declared by most consumers as a major challenge they faced in local rice demand, and this made known by majority of the respondents (n=178, 80.9%).The color and aroma of local rice consumed was positively rated by majority of the respondents; 90.5% for color and 90.0%for aroma.

Table 4.3: Challenges faced in the consumption of local rice (N=220)

Challenges	**N**	**(%)**
Price of foreign rice		
Yes	52	23.6
No	168	76.4
Income		
Yes	130	59.1

No	90	40.9
Cooking Time		
Good	133	60.5
Not Good	87	39.5
Foreign Materials		
Good	42	19.1
Not Good	178	80.9
Color		
Good	199	90.5
Not Good	21	9.5
Aroma		
Good	198	90.0
Not Good	22	10.0

Source: Authors Field Survey, 2015

4.3 Factors affecting the demand for locally produced rice

As indicated earlier in chapter three, a semi logarithm regression model was used to identify the factors that predict or affect the demand for locally produced rice. In the interpretation of the regression results, an estimated positive sign coefficient implies that, increases in that particular variable tend to increase the quantity demanded of the dependent variable in question and a negative coefficient predicts otherwise. The significance of a parameter estimate is determined by the p-value of that particular parameter. The p–value of 0.05 was applied. The overall test of significance for the model is based on Fisher's F-test whose p – value should also be 0.05 or below 0.05 for a particular model to be significant at 5% error level.

The semi logarithm model estimation **I** and **II** establishes the determinants of local rice demand and the determinants of both local and foreign rice demand, respectively.

4.3.1 Model Estimation I: Determinants of local rice demand

The results of the semi logarithm regression with the consumption of local rice in kilograms in a month as the dependent variable with demographic factors, socioeconomic factors and attributes of rice as the independent predictors are summarized in the Table 4.5. The variable sex was excluded from the model because the study was feminine biased. Also, variables such as age, household size and income as indicated earlier on were measured on the continuous scale and as such enter the model as continuous variables and not categorical variables as seen in table 4.1.

Table 4.4: Model estimation of the determinants of local rice demand (N= 120)

Variable	**Coefficient**	**Std. Error**	**t-ratio**	***p-value***
Const	0.40911	0.95826	0.4269	0.67026
Age	-0.00456	0.00696	-0.6557	0.51336
Household size	0.02909	0.00167	17.4059	0.00001***
Education	-0.00016	0.30236	-0.0005	0.99959
Taste	0.48622	0.20391	2.3845	0.01880**
Foreign Materials	-0.36070	0.13195	-2.7335	0.00729***
Availability	0.32651	0.20476	1.5946	0.11365
In Price	-0.68033	0.28767	-2.3649	0.01977**
In Income	0.25939	0.1235	2.1004	0.03796**
Adj R-squared	0.81246			
F(8, 111)	65.44175			

Source: Data Analysis from author's field survey $p<0.1$*: $p<0.05$**: $p<0.001$*** indicates the levels of significance of the variables

The model I above reports the determinants of local rice demand. In the model, age of respondents was negatively related to local rice demand. The negative relationship implies that, as one grows older there is a strong taste developed for foreign products specifically rice. Therefore for any additional years attained, the demand for local rice is expected to fall by 0.47%. A possible explanation of this result could be due to the effect of westernization and urbanization which has led many people into believing that consuming foreign products not only enhanced their social status, but also by the popular notion that foreign products are always the best when compared to local ones.

Education was found to be negatively related to local rice demand but was not significant at 5 percent error level. The negative relationship implies that, as one attains more years of education or schooling there is the tendency in believing that foreign products are quality as compared to local ones hence a possible switch to foreign products as one attains more years of schooling.

Household size was positively related and statistically significant at 5% level with the demand for local rice. This implied that as household size or number of consumers increases the demand for local rice also increases. Thus, a unit increase in household size would lead to a 2.9% increase in the demand for local rice. This finding agrees with studies by Kassali et al. (2010), Abdullai (2011) Musa et al. (2011); Sampson (2013), Danso et al. (2014) and Danquah et al. (2014) for rice consumers which showed that household size was a significant determinant in rice consumption.

The coefficient for taste was positive as expected and statistically significant at 5% error level. This implies that if all other factors are held constant, the difference between taste being good and not is 0.486. Thus, tasty local rice was predicted to increase demand of local rice by 48.6%. This result is consistent with the findings of Abdullai (2010), Musa et al. (2011), Danquah et al. (2014) and Sampson et al. (2014).

The coefficient for foreign materials was negative as expected and statistically significant at 5 percent error level. This implied that if all other factors are held constant, the difference between the presences of foreign materials and not is -0.307. Hence, any foreign material present in local rice is predicted to decrease demand by 30.7%.

The coefficient of availability was positive as expected, however it was not statistically significant at 5 percent error level.

Price was negatively related to the demand for local rice and also statistically significant at 5 percent error level. This implies that, as the price of local rice increases, the quantity demanded of it falls. Thus a percentage increase in price was expected to decrease the quantity demanded of local rice by 68%.

A key variable in this study income was also found to be significant at 5 percent error level. It was positively related with the demand for local rice which was in line with the a prior expectations. This implies that, for any percentage increase in income through a general raise in the standard of living would lead to a 25% increase in quantity demanded. This result is also consistent with the studies of Duwais (1983), Diako et al.

(2010), Kassali et al. (2011) Abdullai (2011), Danquah et al. (2014) and Sampson et al. (2014) which indicated that income was an important determinant in rice consumption.

The adjusted coefficient of determination (adj. R^2 = 0.81246) shows that about 81% variation in the demand for local rice is explained by the selected explanatory variables. The overall tests of significance of the variables in the model were statistically significant since the p-value of the model was 0.0000. The implication of F-value<0.05 was that, the variables collectively had a statistical significant impact on the quantities of local rice demanded at 0.05 level of significance although some were individually not statistically significant.

Overall, consistent patterns in the analyses of the results of the study tend to reflect the findings of (Kassali et al. (2010), Abdullai (2011) Musa et al. (2011); Sampson (2013), Danso et al. (2014) and Danquah et al. (2014)) on the factors that influence the demand for rice. A summary of the tested a prior hypotheses is presented in the Table 4.5 below

Table 4.5: Results indicating significance of tested a priori Hypotheses

Hypothesis (Null)	Variables	Significant	Not Significant
Demographic variables do not significantly influence the demand of local rice.	Age	—	0.4419
	Household size	0.0000	—
Attributes of local rice do not significantly affect the demand of local rice.	Taste	0.0269	—
	Foreign materials	0.0055	
	Availability	—	0.1631

Economic variables do not significantly influence the demand of local rice.	Price	0.0042	
	Income	0.0464	—
			—

Significance of a variable means the rejection of the null hypothesis indicating the significant impact of that variable on the demand for local rice

4.3.2 Models Estimation II: Determinants of local and foreign rice demand

The main essence of model II was to analyze the relationship between local and foreign rice demand. To empirically ascertain this phenomenon a separate regression model II was estimated for consumers who consumed both local and foreign rice. The variable sex was excluded from the model since the study was feminine biased. Also, variables such as age, household size and income as indicated earlier in the methods section were measured on the continuous scale and as such entered the model as continuous variables not categorical variables as seen in table 4.1.

The results of the model estimation, as depicted in the Table 4.6 revealed that household size and income were positively related to the demand for locally produced rice and were also significant at the 5 percent error level (p = 0.000). Price of local rice was negatively related to the demand of locally produced rice and was also significant (p< 0.05). Education was negatively related to the demand for locally produced rice and statistically significant at 5 percent error level.

Table 4.6: Model estimation of the relationship between local and foreign rice demand (N= 100)

Variable	Coefficient	Std. Error	t-ratio	*p-value*
Const	0.31375	0.71580	0.4383	0.66220
Age	0.00704	0.00752	0.9360	0.35178

Education	-0.41713	0.16179	-2.5781	0.01156**
House size	0.03869	0.00654	5.9159	0.00001***
Taste	0.42157	0.37098	1.1364	0.25882
Foreign materials	-0.01547	0.17134	-0.0903	0.92824
Availability	0.10635	0.13426	0.7921	0.43037
ln Price LR	-0.41511	0.15065	-2.7555	0.00709***
ln Price FR	-0.49642	0.04816	-10.3070	0.00001***
ln Income	0.35017	0.09003	3.8896	0.00019***
Adj R-squared	0.73681			
F(9, 90)	37.71892			

Source: Data Analysis from author's field survey

p<0.1*: *p*<0.05**: *p*<0.001*** indicates the levels of significance of the variables

The regression results also revealed that age, taste and availability were all positively related to the demand for local rice; however they were not statistically significant at 5% level. In terms of foreign materials, it was negatively related to the demand for local rice; however it was not statistically significant at 5% level.

The adjusted coefficient of determination (adj. R^2 = 0.73681) shows that about 73% variation in the demand for local rice is explained by the selected explanatory variables. The overall tests of significance of the variables in the model were statistically significant since the p-value of the model was 0.0000. The implication of F-value<0.05 was that, the variables collectively had a statistical significant impact on the quantities of local rice demanded at 0.05 level of significance although some were individually not statistically significant.

The cross elasticity between the two goods as indicated by the regression coefficient of the log of foreign price was -0.49642. Based on the negative sign it can be said that the two goods are complements, however not particularly complements because of the coefficient

being less than one. Other plausible reason for this relationship between the two types of rice was how they were used by consumers from reports gathered during the field study. Most consumers indicated they preferred local rice to foreign rice based on the types of dishes it was prepared with. Local dishes such braised rice locally known as “oil rice” and rice balls were all preferred to be prepared using local rice, whiles dishes such as fried rice and jollof rice were mostly prepared using foreign rice. They also indicated that, although foreign rice could be used in place of local rice to prepare these dishes it wouldn’t taste as good as how local rice would if it had been used instead. Some consumers also indicated they consumed both types of rice because of medical reasons. They reported that they mostly prepared local rice for their personal consumption and prepared foreign rice for the rest of the family.

4.4 Non consumption of local Rice

Out of the 370 rice consumers sampled in the Kumasi Metropolis 150 were non local rice consumers. Table 4.7 below shows the reasons for the non-consumption of local rice. From the table it can be seen that taste (cited by 62.7% of respondents) and the presence of foreign materials such as grit and husks (cited by 79.3% of respondents) were mostly indicated by respondents to account for their non-patronage of local rice. This confirms similar findings by Musa et al., (2011), Abdullahi et al., (2011) and Diako et al., (2010).

Table 4.7: Reasons for the non-consumption of local rice N= (150)

Factors	**N**	**(%)**
Prices of local rice		
Yes	19	12.7
No	131	87.3

Income		
Yes	3	2
No	147	98
Taste		
Yes	94	62.7
No	56	37.3
Availability		
Yes	37	24.7
No	113	75.3
Cooking Time		
Yes	52	34.7
No	98	65.3
Foreign Materials		
Yes	119	79.3
No	31	20.7
Color		
Yes	62	41.3
No	88	58.7
Aroma		
Yes	60	40.0
No	90	60.0

Source: Authors Field Survey, 2015

4.5 Own Price and income elasticities of the demand for locally produced rice

To achieve the fourth objective which was to establish the own price and income elasticities of the demand for local rice, Model I was estimated in the semi logarithm functional form hence, the coefficients of price and income are the elasticity coefficients.

Table 4.8: Price and Income elasticities of local rice

Type of elasticity	**Elasticity coefficient**
Price elasticity	-0.68033
Income elasticity	0.25939

Source: Authors Field Survey, 2015

Table 4.8 indicates the coefficients of price elasticity of demand and income elasticity of demand for local rice. It can be deduced from the table 4.8 above that that the price elasticity of local rice was negative and less than one in absolute terms. This means that demand for local rice was price inelastic; implying that a marginal increase in price had less than proportionate change on the quantities of local rice demanded. Since a slight increase in price has little impact on the demand for local rice, more revenue can be generated when prices are increased. The income elasticity of demand for local rice was positive, less than one, but greater than zero implying that local rice was a normal good in the study area.

4.6 Ways of improving local rice consumption

The fifth objective of the study was to identify factors to improve local rice demand as suggested by both consumers and non-consumers of local rice. Using the mean values from a 1 – 5 Likert Scale, the following factors were identified by consumers as what will entice them to increase their demand for local rice.

From the table 4.9 it can be seen that majority of the consumers indicated that local rice should be polished well so that it was free from any foreign materials like husks, grits, weevils, etc. This was closely followed by packaging with a mean of 4.32. Consumers were of the view that local rice should be packaged and branded well so that it could be recognized easily on the market. Proper advertisement of local rice on the various forms of social media was another significant factor identified by consumers. Availability and price reduction were the last two factors identified by the consumers.

Table 4.9: Measures to improve on local rice demand

Variables	Mean Rankings
Price Reduction	3.60
Availability	4.05
Advertisement	4.11
Packaging	4.32
Polishing	4.41

Source: Authors Field Survey, 2015

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This study was primarily carried out to find the main factors affecting the demand for locally produced rice. This chapter consists of a summary of the major findings from the study, conclusion, recommendations, limitations and implications for future research.

5.1 Summary of Major Findings

This study was dedicated to the goal of analyzing the demand for local rice. More specifically, this study examined the factors that influence the demand for local rice and determined the own price and income elasticities of the demand for local rice. A total of 370 respondents out of which 120 were only local rice consumers, 100 local and foreign

rice consumers and 150 non-local rice consumers constituted the study sample size. On the demographic variables, the study revealed that majority of the respondents' were females, clearly indicating that they are the decision makers when it comes to food preparation. Age of respondents varied between 18 and 60 years. The average age of 36 years implied that consumers sampled in the study were in the working class and as such needed rice as a major source of calories in their day to day activities for energy. Household size of the respondents varied between the range of between 5 and 14 people. Similarly for local rice vendors, their customer base varied between 40 people and 200 who averagely bought dishes prepared with local rice in a month. Majority of the respondents, who consumed local rice indicated that it was readily available, purchased mostly in the retailed market, very tasty and affordable. The study revealed that the presence of foreign materials in local rice to be the prominent challenge faced in the consumption of local rice. Most of the local rice consumers attested to the nutritional gains from local rice. For example one vendor indicated that, "Northerners in the country were much stronger because they consume more local rice than those in the South". On the other hand non-consumers of local rice identified the taste, foreign materials present in local rice and color (especially suggested by foreign food vendors) as what prevented them from consuming local rice. The results also showed that the demand for local rice was significantly determined by the combination of the demographic variable household size, socio economic variables comprising prices and income and finally attributes of rice which constituted taste and the presence of foreign materials. The study brought to light the own price and income elasticities of the demand for locally produced rice. Demand for local rice was found to be fairly inelastic and a normal good in the study area.

Finally, the study revealed that if local rice is well polished, well packaged, is readily made available on the market and the price is made affordable for all to purchase, its consumption will be improved.

5.2 Conclusions

Broadly, this study was dedicated to the goal of analyzing the demand for locally produced rice in Kumasi, Ghana. More specifically, this study examined the demographic characteristics of local rice consumers, determinants of local rice demand, reasons for the non-consumption of local rice, establish the own price and income elasticities of local rice and finally explore ways to improve local rice demand.

The descriptive analyzes revealed that, majority of the respondents were females, and this was because, in a traditional Ghanaian home women were mostly responsible for cooking. The average mean age of 36 implied that most of the respondents were within the working class and as such needed rice which serves as major source of energy. Education wise majority of the respondents indicated they had attained basic education. From the regression results being educated was negatively related to the demand for local rice, implying a decrease in quantity demanded of local rice as one attains higher levels of education. The mean household size and number of customers were 5 and 91 respectively. From the regression results an increase in a household size or customers was expected to increase the demand for local rice. Finally, majority of the respondents indicated that their monthly expenditure which income was used as a proxy for was between the GH₵1001 – 1500 range and could afford to purchase local rice, hence an increase in income would lead to an increase in the demand for local rice since local was found to be a normal good.

A standard multiple regression in the semi logarithm form was conducted such that variables that were significantly associated with the demand for locally produced rice among the 120 consumers who reported "they preferred only local rice" were made available for entry into the regression model. Gender was exempted from the model because it was feminine biased. The results from the model revealed that household size, taste, foreign materials, price and income were the factors that significantly affected the demand for local rice.

In terms of identifying the factors that prevented individuals from consuming local rice, the study revealed taste and the presence of foreign materials such as grits, husks and weevils as what accounted for the non-patronage of local rice.

Establishing the price and income elasticities in a demand analyses is vital mostly in the pricing and taxations policies of firms and the government. The multiple regression model I was estimated in the semi logarithm, thus the coefficients of price and income are the elasticities. The price elasticity value of -0.68033 in absolute terms and less than 1 meant that local rice was inelastic. Also, the income elasticity coefficient of 0.25939 implied that local rice was a normal good. These findings are novel in the Ghanaian context.

In consumer surveys it is essential that the needs or wants of the consumer is met. Exploring ways to improve local rice demand thus became key in the analyses. This was established using the mean values from a 1-5 point Likert Scale. The mean rankings in an ascending order revealed price reduction, availability, advertisement, packaging and polishing as the

prominent factors cited by consumers as what would entice them to increase their demand for local rice. These findings are novel in the Ghanaian context.

5.3 Recommendations

Considering the fact that, advertising the importance of local rice, better branding and packaging, availability, improved taste and better polishing of local rice were factors identified by consumers as what will entice them to increase their demand for local rice, the study recommends that the government through the Ministry of Food and Agriculture provides equipment such as modern rice de-stoners and rice grades to improve the polishing of locally produced rice. Also, the advertisement and branding of local rice should be improved so that local rice becomes attractive in the market.

Secondly, for local rice production since demand was found to be fairly inelastic, an increase in price would increase total revenue. Since this is a plus for the local rice industry more should be done in order to improve production. It is recommended that government provides farmers with the necessary farming inputs and credit facilities, to increase production.

Finally, the regulatory authorities should strengthen their monitoring arm to make sure foreign rice importation is minimized and also prevent the smuggling of foreign rice into the country in order for production and demand to increase in the local market. Due to the revelation that the demand for local rice is inelastic, government should rather look at the long term benefit they can derive from local rice production which includes increased revenue through taxation and the creation of massive employment in the country.

5.4 Limitations

The following are some limitations that characterized the study:

To start with, the present study was undertaken only in the Kumasi Metropolis due to time and budget constraints and as such cannot be generalized for the entire country. Future studies should be done in other metropolis across the entire country to determine a more comprehensive analysis on the demand for local rice.

The study failed to include the prestige attached to the consumption of rice, future studies can inculcate this variable. Other studies can also look at the impact of advertisement on local rice demand since it is most likely to influence the taste of local rice, hence the possibility of it affecting the coefficient of taste. Future studies can also look at the interaction of these variables and the effect they have on local rice demand.

5.5 Implications for Future Research

As with all works of original research, replication of this study would serve as a check on the reliability and generalizability of the present findings. Also, researchers may wish to extend this study by undertaking more detailed analysis of the predictors found to be important in affecting the demand for local rice.

In addition, unlike the cross-sectional design employed in this study, a longitudinal design would permit inferences regarding causation. That is following the same group of respondents over the span of several years would enable a researcher gather information regarding the relative onset of factors that affect local rice demand. Insight regarding the primacy of this phenomenon would be valuable both from a theoretical standpoint and for

institutions wishing to improve the local rice industry to curb the massive importation of foreign rice into the country.

REFERENCES

Abdullahi, F. A., Zainalabidin, M., & Ismail, A.L. (2011). The influence of sociodemographic factors and product attributes on attitudes toward purchasing special rice among Malaysian consumers. *International Food Research Journal*, 18(3):1135-1142.

Adolph, B., & Chancellor, T. (2006). Rice research in the DFID RNARRS programmes. Lessons learnt and Implications for future research. Natural Resources Institute, University of Greenwich, UK.

Adu-Kwarteng, E., Ellis, W.O., Oduro, I. and Manful, J.T. (2003). Rice grain quality: a comparison of local varieties with new varieties under study in Ghana. Food Control 14: 507 – 514.

Akaeze, Q. O. (2010). Consumer preference for imported rice in Nigeria – Perceived quality differences or habit persistence?Unpublished Master Thesis. Michigan State University

Asante, M. D., Asante, B. O., Acheampong, G. K., Wiredu, A. N., Offei, S. K., Gracen, V., Danquah, E. Y. (2013). Grain quality and determinants o f farmers ' preference for rice varietal traits in three districts of Ghana : Implications for research and policy. *Journal of Development and Agricultural Economics*, *5*(7), 284–294. http://doi.org/10.5897/JDAE2013.0473

Assibey-Mensah, G. O. (1998). Ghana's Women-in-Development program: Problems, issues, and prescription. *Journal of Black Studies*, 29: 277-295.

Azabagaoglu, M.O., & Gaytancioglu, O. (2009). Analyzing consumer preference to different rice varieties in Turkey..*AgriculturaTropicaEtSubtropica*, Vol 42 (3), 118 – 125.

Banerjee-Sarbani, R.P., & Amar K. P. (2007). "Computer use and wage differentials: US and foreign born male and female workers." *Applied Economics Letters* 14.6 (2007): 409-413.

Basorun, J.O. (2008). A bivariate analysis of factors affecting rice processing in IgbemoEkiti, Nigeria.*Agricultural Journal*, Vol 3 (6), 442-446.

Batres-Marquez, S.P., Jensen, H.H., & Upton, J. (2009). Rice consumption in the United States: recent evidence from food consumption surveys, Journal *of the American Dietetic Association*, Vol 109 (10), 1719-1727.

Beharrell, B., & MacFie, J.H. (1991). Consumer attitudes to organic foods. *British Food Journal*, Vol 93 (2), 25-30.

Brown, L. R. (1973). Rice price stabilization and support in Malaysia. A Research Report. International Food Policy Research Institute, Washington D. C.

Busacca, B., & Padula, G. (2005).Understanding the relationship between attribute performance and overall satisfaction: Theory, measurement and implications.*Marketing Intelligence & Planning*, Vol 23 (6), 543-561.

Buzby, J.C., & Skees, J.R. (1994). Consumers want reduced exposure to pesticides on food. *Food Review*.

Cavard, P., & Moreau Rio, M. A. (2003). Consumer behavior in purchasing fruit and vegetables: places of purchase/ selling patterns, Le-comportement du consommateurdanssesachats de fruits et legumes: lieuxd'achat/Modes-de-vente, *Barometre*-2002, 131 pp.

Danquah, I.B., & Egyir, I.S. (2014). Factors that influence household demand for locally produced brown rice in Ghana.*Journal of Economics and Sustainable Development*, Vol 5 (7), 14-24.

Danso, A.G., Armed, M., & Baidoo, F. (2014). Determinants of consumer preference for local rice in Tamale Metropolis, Ghana. International Journal of Education and Social Science, Vol 1 (2), 114-122.

Day, J.S., Gould, K.S., & Jameson, P.E. (1997).Vegetative architecture of Elaeocarpus Hookerianus.Transition from juvenile to adult.*Annals of botany*, Vol 79 (6), 617624.

Diako, C., Sakyi-Dawson, E., Bediako-Amoa, B., Saalia, F. K., &Manful, J. T. (2010). Consumer perceptions, knowledge and preferences for aromatic rice types in Ghana. Nature and Science, 8(12), 12 – 19.

Domie, S.P. (2013). Assessing the factors influencing consumer switch from local to imported products: A case study of Kasapreko Company Limited-Ghana.

Duwais, A.A.M. (1983). *Factors Affecting Rice Consumption In Saudi Arabia* (Doctoral dissertation, Michigan State University)

Edwards, A.L. (1967). Statistical Methods (2nd edn). New York: Holt.

Estes, E. A., José E. H., & Marjorie, B. (1994). Organic produce sales within North Carolina: A survey of buyer options. North Carolina State University Department of Agricultural and Resource Economics ARE Report

Food and Agriculture Organisation (1999). "The state of food insecurity in the World", Food and Nutrition Policy and Planning in English Speaking African Countries, Report on the FAO/DANIDA Seminar, Lusaka, Zambia, 1975. p10.

Food and Agriculture Organisation (2012). Briefs on Import Surges-Countries No.5 Ghana: rice, poultry and tomato paste.

Francesco, G. (1994). The changing public role in a rice economy approaching selfsufficiency: The case of Banglesh. Research Report 98. International Food Policy Research Institute, Washington D. C.

Furuya, J., & Sakurai, T. (2003). Interlinkage in the rice market of Ghana: money-lending millers enhance efficiency. JIRCAS Research Highlights 2003. Japan International Research Centre for Agricultural Sciences. Galawat, F., & Yabe, M. (2010). Assesing consumer's preference for local rice in Brunei: An appplication of choice model. *J. ISSAAS.* 16 (2):104 – 115.

Ghana Statistical Service (2012). Population and Housing Census. District Analytical Report Kumasi Metropolitan Assembly.

Goldman, B. J., & Katherine L. C. (1991).A Survey of organic produce purchases and related attitudes of food cooperative shoppers.*American Journal of Alternative Agriculture*, 6 (2), 89-95.

Jolly-Desmond A., Jagjit, D. (1989). Psychographic, demographic, and economic factors associated with organic poultry consumption. *Papers of the Western Region Home Management Family Economics Educators* Annual Conference, 2 (9), 57-60.

Kassali, R., Kareem, R.O., Oluwasola, O. and Ohaegbulam, O.M. (2010). Analysis of demand for Rice in Ile Ife, Osun State, Nigeria. *Journal of Sustainable Development in Africa, Vol. 12, No.2, 2010*

Khor, M. (2006). The impact of globalization and liberalisation on agriculture and small farmers in developing countries: The experience of Ghana. Third World Network, [Online] Available: http://www.twnside.org.sg/title 2/par/Ghana (Accessed January 2009)

Köster, E.P. (2009). Diversity in the determinants of food choice: A psychological perspective. *Food quality and preference*, Vol. 20 (2), 70-82.

Marshall, Al. (1920). "Principles of economics: an introductory volume."

Ministry of Trade and Industry (2015). An Impact Assessment of Importation of rice in Ghana, Accra, Ghana.

MOFA, (2010). Agriculture in Ghana: Facts and Figures. Statistics, Research and Information Directorate (SRID), Ministry of Food and Agriculture, Accra.

MOFA, (2011). Agriculture in Ghana: Facts and Figures. Statistics, Research and Information Directorate (SRID), Ministry of Food and Agriculture, Accra.

MOFA, (2012). Agriculture in Ghana: Facts and Figures. Statistics, Research and Information Directorate (SRID), Ministry of Food and Agriculture, Accra.

MOFA, (2014). Agriculture in Ghana: Facts and Figures. Statistics, Research and Information Directorate (SRID), Ministry of Food and Agriculture, Accra.

MOFA. (2009). Medium Term Agriculture Sector Investment Plan (METASIP) 20092015, Volume 1.

Musa, M., Othman, N., & Abdul-Fatah, F. (2011). Determinants of consumers purchasing behavior for rice in Malaysia. *American Journal of Contemporary Research*, Vol 1 (3), 159 – 167.

Nielsen, A.C. (2003). Testing for success in solving your marketing problems, http://www.acnielsen.com/services/custom/p05.htm

Park-Timothy A., & Luanne L. (1996). Supply and demand factors for organic produce, *American Journal of Agricultural Economics*. Vol. 7 (8), 647-655.

Reardon, T., Delgado, C., & Matlon, P. (1992). Determinants and effects of income diversification amongst farm households in Burkina Faso.*The Journal of Development Studies*, Vol. 28 (2), 264-296.

Salvatore, D., & Brooker, R.F. (1993).*Managerial economics in a global economy*. New York: McGraw-Hill.

Sampson, k. (2013).Consumer preferences and willingness to pay for locally produced rice in Kumasi Metropolis of Ghana (Doctoral Dissertation, Kwame Nkrumah University of Science and Technology).

Samuelson, Paul A. "Consumption theory in terms of revealed preference." *Economica* (1948): 243-253.

Singh, R. B. (1985). Rice paddy production in the Asian Pacific Region: Past performance and future prospects. *The International Rice Commission Newsletter*, 34 (2)

Sparling, Ed., Karen W., & McKenzie, J. (1992).Marketing fresh organic produce in Colorado supermarkets.Final Report to the Colorado Department of Agriculture and USDA Federal State Marketing Improvement Program.Fort Collins; CO. Colorado State University Department of Agricultural and Resource Economics. March 16.

SRID-MOFA, (2012). Agriculture in Ghana, Facts and Figures. Statistics, Research and Information Directorate (SRID), Ministry of Food and Agriculture, Ghana.

Stevens, J. (1996). Applied multivariate statistics for the social sciences (3rd edn). Mahwah, NJ: Lawrence Erlbaum.

Stewart, H., J.M., Haris & Guthrie, J. (2004). What determines the variety of a household‘s purchases? *Agricultural information Bulletin*, 792-3.United States department of agriculture.

Suwannaporn, P., & Linnemann, A. (2008). Consumer preferences and buying criteria in Rice: A study to indentify market strategy for Thailand jasmine rice export. *Journal of Sensory Studies*, 23: 1-13.

Tang, O., & Musa, S.N. (2011). Identifying risk issues and research advancements in supply chain risk management. *International Journal of Production Economics*, *133*(1), 25-3

Tomek, W.G., & Robinson, K.L. (1972). Agricultural Products Prices. 2nd edition Cornell University Press.*Ithaca, New York*, USA.

Tomlins, K., Manful, J. T., Larwer, P. & Hammond, L. (2005). "Urban consumer preferences and sensory evaluation of locally produced and import rice in West Africa." *Food quality and preference*, 16: 79-89

Tomlins, K., Manful, J., Gayin, J., Kudjawu, B., & Tamakloe, I. (2007).Study of sensory evaluation, consumer acceptability, affordability and market price of rice. *Journal of Science Food Agriculture*, 87: 1564– 1575.

United State Department of Agriculture. (2014). Foreign Agricultural Service. Grain and Feed Update Ghana.

USAID (2011).The global food security response West Africa rice value chain analysis: Ghana rice study. *Micro-report, USDA, 2011 Grain and Feed Annual Report*

Vanghan, D.A., Morishima, H., & Kadowaki, K. (2003).Diversity in the Oryza genus. *Current Opinion in Pl. Biol*, 6: 39-46.

Wong, L.C.Y., Emrus, S.A., Md Bashir, B., & Tey, J.Y.S. (2010). Malaysia padi and rice industry: Applications of supply chain management approach. National Rice Conference. Swiss Garden Golf Resort, Lumut

APPENDICES

QUESTIONNAIRE FOR CONSUMERS

I am Reynolds Akoto Addo, a Master of Philosophy (MPhil) student at the Economics Department of Kwame Nkrumah University of Science and Technology (KNUST).

This research looks into ***the Analysis of the Demand for Locally Produced Rice in Ghana***. It is purely an academic work and you are assured of maximum confidentiality and anonymity. There is no right or wrong answers. **No name is required.** Counting on your usual corporation. Many thanks.

INSTRUCTION

Please check the appropriate box with a tick and write where necessary. [√]

BACKGROUND/ DEMOGRAPHIC INFORMATION

1. Gender Male [ ] Female [ ]
2. Age Please specify……..
3. Marital Status Single [ ] Married [ ]
4. Level of Education None [ ] Basic [ ] Secondary [ ] Tertiary and above [ ]

5. What is the number of people who live in your household?

Please specify……..

6. Monthly expenditure?

Please specify……..

CONSUMERS PURCHASING BEHAVIOR FOR RICE

7. How often do you buy rice in a month?

Please specify ……

8. Which type of rice do you normally buy?

Local rice [ ] Foreign rice [ ] Both [ ]

9. Which type of brand do you like? Please specify in the table below.

LOCAL RICE	IMPORTED RICE

10. How available is it on the market (**Local**)?

Always [ ] Not Always [ ] Not Available [ ]

11. Where do you usually buy your preferred brand (**Local**)?

Retail market [ ] Wholesale market [ ] Supermarket [ ] Hawkers [ ]

12. What quantity of rice do you usually purchase in a month?

Local; A cup [ ] 5kg [ ] 10kg [ ] 25kg [ ] 50kg [ ]

Foreign; A cup [ ] 5kg [ ] 10kg [ ] 13. How much 25kg [ ] 50kg [ ] do you spend in purchasing rice?

Local; Please specify ……

Foreign; Please specify ……

14. How will you rate the price (**Local**)?

Very cheap [ ] Cheap [ ] Moderate [ ] Expensive [ ] Very expensive [ ]

15. How will you rate the taste of the brand you consume?

	Very tasty	Tasty	Less tasty
Local rice			
Imported rice			

CONSUMERS BEHAVIOR FOR LOCALLY PRODUCED RICE

16. Do you consume any brand of local rice? If No please skip to **Question 17**

Yes [ ] No [ ]

(a) What exact type do you consume?

i. Brown rice [ ]
ii. Red rice [ ] iii. No idea [ ] iv. Others please specify……..

(b) Determinants of local rice demand?

i. Price of foreign rice; Yes[ ] No[ ] ii. Income; Yes [ ] No [ ]

iii. Cooking time; Longer[ ] Shorter[ ] iv. Foreign materials; Good [ ] Not Good [ ] v. Color; Good [ ] Not Good [ ] vi. Aroma; Good [ ] Not Good [ ] vii. Others please specify……

17. If No, which of the following factors prevent you from consuming local rice?

i. Prices of local rice; Yes[ ] No [ ] ii. Income; Yes [ ] No [ ] iii. Taste; Yes [ ] No [ ] iv. Availability; Yes [ ] No [ ] v. Cooking time; Yes [ ] No [ ] vi. Foreign materials; Yes [ ] No [ ] vii. Color; Yes [ ] No [ ] viii. Aroma; Yes [ ] No [ ] ix. Others please specify……

18. In your own view what can be done in order for you to consume it?

Factors	**Responses**				
	Strongly Disagree	**Disagree**	**Neutral/ Undecided**	**Agree**	**Strongly Agree**
Advertising					
Packaging					

Availability					
Polishing					
Cheaper prices					

Others please specify……..

QUESTIONNAIRE FOR FOOD VENDORS

I am Reynolds Akoto Addo, a Master of Philosophy (MPhil) student at the Economics Department of Kwame Nkrumah University of Science and Technology (KNUST).

This research looks into ***the Analysis of the Demand for Locally Produced Rice in Ghana***. It is purely an academic work and you are assured of maximum confidentiality and anonymity. There is no right or wrong answers. **No name is required.** Counting on your usual corporation. Many thanks.

INSTRUCTION

Please check the appropriate box with a tick and write where necessary. [√]

FOOD VENDORS PURCHASING BEHAVIOR FOR RICE

1. Gender Male [ ] Female [ ]
2. Age Please specify…….
3. Marital Status Single [ ] Married [ ]
4. Level of Education None [ ] Basic [ ] Secondary [ ] Tertiary and above [ ]
5. What type of delicacy do you cook with rice?
   i. Jollof Yes [ ] No [ ] ii.
   Waakye Yes [ ] No [ ] iii.
   Plain Rice Yes [ ] No [ ] iv.
   Rice balls Yes [ ] No [ ] v.
   Fried Rice Yes [ ] No [ ] vi.
   Rice porridge Yes [ ] No [ ]

Others please specify……
……
…..

6. Which brand do you usually use in cooking that delicacy? Local rice [ ] Foreign rice [ ] Both [ ]
7. Which type of brand do you like? Please specify in the table below.

LOCAL RICE	IMPORTED RICE

8. How available is it on the market (**Local**)?

Always [ ] Not Always [ ] Not Available [ ]

9. What quantity do you usually use in a day?

Local; A cup [ ] 5kg [ ] 10kg [ ] 25kg [ ] 50kg [ ]

Others please specify……

Foreign; A cup [ ] 5kg [ ] 10kg [ ] 25kg [ ] 50kg [ ]

Others please specify……..

10. How many times do you cook rice in a week and how many consumers purchase it in a day?

Please specify……..

11. How much do you spend in purchasing rice?

Local; Please specify ……

Foreign; Please specify …….

12. How will you rate the price (**Local**)?

Very cheap [ ] Cheap [ ] Moderate [ ] Expensive [ ] Very expensive [ ]

13. What factors account for the use of that particular brand of rice?

i. Price Yes [ ] No [ ]

ii. Income Yes [ ] No [ ]

iii. Taste Yes [ ]

No [ ] iv. Cooking time Yes [ ]

No [ ] v. Color Yes [ ]

No [ ] vi. Aroma Yes [ ]

No [ ] vii. Foreign materials Yes [ ]

No [ ] viii. Availability Yes [ ]

No [ ]

Others please specify…….

……

14. How does consumer's rate the taste of the rice you prepare for sale?

	Very tasty	**Tasty**	**Less tasty**
Local rice			
Imported rice			

FOOD VENDORS BEHAVIOR TOWARDS LOCAL RICE

15. Do you use local rice in preparing food for sale? If No please skip to **Question 16.**

Yes [ ] No [ ] 16. Which types of food do use it in cooking?

i. Jollof Yes [ ] No [ ] ii.

Waakye Yes [ ] No [ ] iii.

Plain Rice Yes [ ] No [ ] iv.

Rice balls Yes [ ] No [ ] v.

Fried Rice Yes [ ] No [ ] vi.

Rice porridge Yes [ ] No [ ]

Others please

specify……

……

…..

17. What is consumers' attitude towards it? Is the demand;

Low [ ] High [ ]

a. Determinants of local rice demand.

i. Price of foreign rice;	Yes[ ]	No[ ]
ii. Income;	Yes [ ]	No [ ]
iii. Cooking time;	Good [ ]	Not Good [ ]
iv. Foreign materials;	Good [ ]	Not Good [ ]
v. Color;	Good [ ]	Not Good [ ]
vi. Aroma;	Good [ ]	Not Good [ ]
vii. Others please specify……		

18. Why don't you use local rice in preparing food for consumers'?

i. Price	Yes [ ]	No [ ] ii.
Income	Yes [ ]	No [ ] iii.
Taste	Yes [ ]	No [ ] iv.
Cooking time	Yes [ ]	No [ ] v.
Color	Yes [ ]	No [ ] vi.
Aroma	Yes [ ]	No [ ] vii.
Foreign materials	Yes [ ]	No [ ] viii.
Availability	Yes [ ]	No [ ]

Others please specify……

……

19. What do you suggest should be done to increase or make you demand local rice?

	Responses

Factors	Strongly Disagree	Disagree	Neutral/ Undecided	Agree	Strongly Agree
Advertising					
Packaging					
Availability					
Polishing					
Cheaper prices					

Others please specify……

MODEL ESTIMATIONS

Model 1: Heteroskedasticity-corrected, using observations 1-120
Dependent variable: l_QtyLRkg

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
Const	0.409113	0.958275	0.4269	0.67026	
Education	-0.000155405	0.302359	-0.0005	0.99959	
Age	-0.00456678	0.00696451	-0.6557	0.51336	
Household size	0.0290955	0.00167158	17.4059	<0.00001	***
l_Income	0.259395	0.1235	2.1004	0.03796	**
l_UnitPx	-0.680329	0.287674	-2.3649	0.01977	**
Availabilty	0.326509	0.20476	1.5946	0.11365	
Foreign material	-0.360702	0.131955	-2.7335	0.00729	***
Taste	0.486218	0.203909	2.3845	0.01880	**

Statistics based on the weighted data:

Sum squared resid	387.0570	S.E. of regression	1.867351
R-squared	0.825068	Adjusted R-squared	0.812461
F(8, 111)	65.44175	P-value(F)	1.72e-38
Log-likelihood	-240.5374	Akaike criterion	499.0749
Schwarz criterion	524.1623	Hannan-Quinn	509.2630

Statistics based on the original data:

Mean dependent var	2.863598	S.D. dependent var	1.620492
Sum squared resid	74.88669	S.E. of regression	0.821374

Test for normality of residual -
Null hypothesis: error is normally distributed
Test statistic: Chi-square(2) = 4.69506 with
p-value = 0.0956049

Variance Inflation Factors

Minimum possible value = 1.0
Values > 10.0 may indicate a collinearity problem

Age	1.024
House size	1.219
Education	1.102
Taste	1.102
Foreign materials	1.073
Availability	1.027
ln Price LR	1.285
ln Income	1.026

VIF(j) = 1/(1 - R(j)^2), where R(j) is the multiple correlation coefficient between variable j and the other independent variables

Model 2: OLS, using observations 1-100
Dependent variable: l_QtyLRkg
Heteroskedasticity-robust standard errors, variant HC1

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.313755	0.715804	0.4383	0.66220	
Age	0.00704093	0.00752245	0.9360	0.35178	
Education	-0.417133	0.161798	-2.5781	0.01156	**
Household size	0.0386963	0.00654111	5.9159	<0.00001	***
Taste	0.421567	0.370978	1.1364	0.25882	
Foreign materials	-0.0154742	0.171345	-0.0903	0.92824	
Availability	0.106354	0.134264	0.7921	0.43037	
l_Income	0.350167	0.0900263	3.8896	0.00019	***
l_UnitPx	-0.415107	0.150645	-2.7555	0.00709	***
l_UnitPriceFR	-0.496424	0.0481636	-10.3070	<0.00001	***

Mean dependent var	1.806962	S.D. dependent var	1.179586
Sum squared resid	32.95899	S.E. of regression	0.605154

R-squared	0.760735	Adjusted R-squared	0.736808
F(9, 90)	37.71892	P-value(F)	8.03e-27
Log-likelihood	-86.39854	Akaike criterion	192.7971
Schwarz criterion	218.8488	Hannan-Quinn	203.3407

Test for normality of residual -
Null hypothesis: error is normally distributed
Test statistic: Chi-square(2) = 3.75615 with
p-value = 0.152884

Variance Inflation Factors

Minimum possible value = 1.0
Values > 10.0 may indicate a collinearity problem

Age	1.155
House size	1.092
Taste	1.049
Foreign materials	1.040
Availability	1.069
ln Price LR	1.057
ln PriceFR	1.069
ln Income	1.218

VIF(j) = 1/(1 - R(j)^2), where R(j) is the multiple correlation coefficient between variable j and the other independent variables