

UNIVERSITY FOR DEVELOPMENT STUDIES, TAMALE

**LOCAL RICE INDUSTRIES' READINESS TO MEET LOCAL RICE DEMAND
AND CONSUMERS WILLINGNESS TO PAY FOR LOCALLY PRODUCED
RICE IN THE NORTHERN REGION, GHANA**

BY

DOGBEY JOYCE

**THIS THESIS IS SUBMITTED TO THE UNIVERSITY FOR DEVELOPMENT
STUDIES, NYANKPALA IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE AWARD OF MASTER OF PHILOSOPHY IN
INNOVATION COMMUNICATION DEGREE**

**FACULTY OF AGRICULTURE, FOOD AND CONSUMER SCIENCES,
DEPARTMENT OF AGRICULTURAL INNOVATION COMMUNICATION**

JULY, 2023

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(BSc. SOCIAL CHANGE COMMUNICATION)

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JULY, 2023

DECLARATION

Student

I hereby declare that, except for references to other people's work, which have been duly acknowledged, this thesis is the result of my own research work carried out in the department of agricultural innovation communication under the supervision of Prof. Hudu Zakaria. It is further declared that this thesis has never been presented either in whole or in part for the award of any degree in this University or elsewhere.

Sign..... Date.....

Dogbey Joyce

(Student)

Supervisor

I hereby declare that the preparation and presentation of the thesis were supervised following the guidelines on supervision of thesis laid down by the University for Development Studies.

Sign..... Date.....

Prof. Hudu Zakaria

(Supervisor)

DEDICATION

I dedicate this thesis to my family and love once.

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ABSTRACT

The study assesses the preparedness of local industries in meeting the demands of consumers of locally processed rice in the Northern Region. High importation of rice into the country places a significant strain on the country's foreign reserves and exchange rate, affecting the government's budget. Thus, increasing local rice production and consumption requires local industries to meeting local rice demand and consumers' willingness to consume locally produced rice. Theory of plan behaviour was the theory underpinning this study. The study adopted a descriptive survey design with a mixed research approach to achieve the study objective. A sample size of 140 was used for this study. Three (3) districts in the Northern Region were selected. These districts are Sagnarigu Municipal, Tamale Metro, Tolon District. Where a proportional sampling procedure was used to distribute the total sample size across the selected districts as Tamale Metropolitan (40.0%), Sagnarigu Municipal (35.0%), and Tolon District (25.0%). A questionnaire with personal and key informant interviews was employed in gathering data for the study. Descriptive statistics such as percentage, frequency distribution, Kendall's Coefficient of Concordance, logistic regression model and content analysis were employed in analysing the data. While the results were presented using tables and graphs. The study revealed that the majority (67.9%) of the respondents preferred imported rice, whiles 18.6% of the respondents preferred local rice and 13.6% preferred both imported and local rice. Also, the study found that local rice farmers and processors were fully prepared to meet the local processors and consumers' demands respectively. The rice producers acknowledged that whenever there is a bumper harvest, it is a loss for them since the cost of production is very high. Also, the study, therefore, recommends that investors should take advantage of

the ready market for improved local rice, by investing in efficient processing facilities in upscaling the production of improved local rice compared with imported rice commodities.

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ABBREVIATION AND ACRONYM

DFID	Department for International Development
GDP	Gross Domestic Product
GSS	Ghana Statistical Services
MOFA	Ministry of Food and Agriculture
NGO	Non-Governmental Organization
SPSS	Statistical Package for Social Sciences
USAID	United States Agency for International Development

CHAPTER ONE

INTRODUCTION

1.0 INTRODUCTION

Rice (*Oryza Sativa*, L; *Oryzaglaberrima*, Steudel) is a major food crop and a staple food for a large portion of the world's population, particularly in India, China, Asia, and Africa (Carney, 2020). A large portion of the world's population consumes rice (Dash, Debnath & Behera, 2020). It is the world's number one food crop (Schneider & Asch, 2020). Rice is a strategic commodity for Africa, and it has become the fastest growing food source for both rich and poor households (Savary et al., 2020). Rice is an important food for urban consumers in Ghana and most of West Africa, according to Jarh et al. (2020). Although rice has been grown in Ghana for many years, it has only recently become a major staple. It is an important food source for both rural and urban residents, gradually replacing traditional crops such as root and cereal crops. Rice is Ghana's second most consumed cereal after maize (Chauvin, Mulangu & Porto, 2012).

Rice consumption in Ghana has increased dramatically over the years, owing primarily to increased urbanization, population development, industrialization, income growth, a relatively simple cooking process, and changes in consumer preference (Acheampong et al., 2019). Between 2000 and 2015, per capita rice consumption in Ghana increased from 17.5 kg to 35 kg per year (Hagan & Awunyo-Vitor, 2020; MOFA, 2017). Because of rapid population growth and development, it is expected that per capita rice consumption will reach 68 kg/year by 2022. (Durand-Morat, Chavez & Wailes, 2019). Rice consumption in Ghana has increased as it has become part of the primary diet in many Ghanaian homes

due to the ease of preparation and suitability for preferred dishes (Asuming, Brempong & Osei-Asare, 2007).

Furthermore, as the number of fast-food outlets in Ghana's major cities has grown, so has the demand for rice. According to reports, rice has become a major competitor for staple foods in Ghana (Naab, Dinye & Kasanga, 2013). However, rising rice demand (in both quantity and quality) far outstrips local supply. In 2017, Ghana produced 721,610 tons of rice, but demand, at 1.3 million tons, far outstripped supply, leaving a 580,300-tonne deficit. According to Ministry of Food and Agriculture figures, the rice deficit has been increasing since 2011, from 354,762 tons in 2011 to 503,875 tons in 2013, to a peak of 608,602 tons in 2015, before falling to 577,977 tons in 2016. (MoFA). Domestic rice production increased from 44% of total consumption in 2016 to 47% of total consumption in 2017, easing the import burden slightly. While total domestic rice production increased by 27% between 2013 and 2017, the national rice deficit increased from 569,500 tons in 2013 to 721,610 tons in 2017. (MoFA, 2018).

The need to increase production and improve the quality of locally grown rice in order to compete with imported rice cannot be overstated. The rice sector should not be overlooked due to self-sufficiency concerns. Furthermore, it has the potential to create job opportunities, particularly in rural areas, reducing urban socioeconomic strain. The government has successfully implemented a number of programs and plans to increase rice production (FAO, 2006).

The PFJ, a four-year, GHS3.3bn (\$713.1m) nationwide program designed to improve the performance and size of Ghana's agriculture sector, boost food security, and create jobs, was launched in 2017 by President Nana Akufo-governent. Addo's. The cereals

(including rice), legumes, and vegetables program has five pillars: seed access and development, fertilizer access and system development, agriculture extension services, market development, and e-agriculture. Rice was chosen for inclusion in the PFJ program because it is an increasingly popular food with a short gestation period, allowing farmers to generate a meaningful return on investment in a relatively short period of time (OFORI-ATTA, 2018).

In 2017, the government provided 1699 tons of rice seed to farmers under the PFJ's seed pillar at a 50% subsidy. The rice seed distributed accounted for 39% of the total seed stock distributed through the program in 2017. (OFORI-ATTA, 2018). High-quality seed stock was obtained from certified seed companies. In addition to providing farmers with higher-quality seed at subsidized prices, the government has committed to increasing research and development of higher-yielding rice strains with the goal of increasing yields in a sustainable and environmentally friendly manner.

1.2 Problem Statement

Despite the government's efforts to increase rice production in Ghana, consumer willingness plays a dominant role in the localization and adoption of rice varieties. The number of Ghanaians willing to eat rice and pay premium prices is growing by the day (Ogunleke, 2020). As a result, the future of local rice will be heavily reliant on customer willingness and motivation to pay a premium for locally grown rice. This will allow local producers to raise the quality of locally produced rice to international standards. It is also critical to understand consumer preferences for locally produced rice and to develop strategies to increase consumption. Over the years, rice breeders have focused on improving yield and resistance characteristics such as pests and diseases, drought, and salinity (Serba et al., 2020; JIKA, 2007), without taking taste and consumer quality into account.

It is undeniable that customer preferences and the ability to pay a high premium will play a significant role in the country. Since most farmers and producers recognize that customers' preferences influence their willingness to pay. As a result, consumer surveys are required in order for producers and the government to develop an appropriate marketing, certification, and export strategy for local rice varieties. As a result, assessing consumers' attitudes and willingness to pay for multiple local rice attributes is critical for this study. Rice has become an increasingly popular food in Ghana because it is tasty and simple to prepare. However, the majority of rice consumed in the country is imported. Because large-scale local rice production has been slow, and urban consumers have grown accustomed to the grain and sensory characteristics of imported rice in particular, locally grown rice has struggled to compete with imports (Tomlins et al., 2007). As a result, one

of Ghana's major challenges is determining how to produce adequate and affordable rice that meets the preferences of its rapidly growing and increasingly urbanized population (MOFA, 2017). Because of the high preference for imported rice, with domestic production exceeding consumption and importing 66% of rice consumed. The economic costs of relying on imported rice are high and rising. Between 2007 and 2015, the amount spent on imported rice increased from \$151 million to \$1.2 billion, with domestic consumption supplemented primarily by imports from Thailand, Vietnam, and India (Donkor, Matthews & Ogundeji, 2018).

The high level of foreign rice importation places a significant strain on the country's foreign reserves and exchange rate, affecting the government's budget. As a result, Ghana's governments hope to eliminate rice imports by 2022 by increasing local rice production and strengthening local capacities (World Bank., 2020; Donkor, 2019, Ministry of Finance, 2019; Ofori-Atta, 2018). This information was further supported by Mr. Kennedy Osei Nyarko, the formal deputy Minister of Food and Agriculture, who stated that the government intends to ban rice importation by 2020 by assisting local rice farmers in gaining access to credit and markets for their produce (www.graphic.com.gh, 2019). However, the goal of banning rice imports by 2022 will be impossible to achieve if consumers are unwilling to pay the appropriate premium and local producers are unwilling to produce high-quality rice that meets international standards and tastes. As a result, the purpose of this study is to assess consumers' willingness to pay for the right premium and local industries' readiness to meet local demand in Ghana's Northern Region.

1.3 Research Question

1.3.1 Main Research Question

Are local industries prepared to meet the demands of local rice and are consumers willing to patronize locally produced rice in the Northern Region of Ghana?

1.3.2 Specific Research Questions

1. What is the preparedness of local industries in meeting the demands of consumers of locally manufactured rice in Northern Region?
2. What attributes do consumers in Northern Region consider when buying locally produced rice?
3. What premium are consumers willing to pay for the attributes of the varieties of locally produced rice in Northern Ghana?
4. What factors determine consumers' willingness to patronize locally produced rice in Northern Region?
5. What are the constraints consumers are likely to face in buying locally produced rice in Northern Region?

1.4 Research Objective

1.4.1 Main Research Objective

To assess local rice industries' readiness to meet demand for local rice and consumers' willingness to pay for locally produced rice in the Northern Region of Ghana.

1.4.2 Specific Research Objectives

1. To assess the preparedness of local industries in meeting the demands of consumers of locally processed rice in Northern Region.
2. To examine the attributes consumers in Northern Region, consider when buying locally processed rice.
3. To ascertain the premium consumers in Northern Ghana are willing to pay for the characteristics of locally processed rice.
4. To examine the factors that determine consumers' willingness to patronize locally processed rice in Northern Region.
5. To examine the constraints consumers are likely to face in buying locally produced rice in Northern Region.

1.5 Study Justification

If the study's objectives are met, it is expected that the key market players will be identified and the system will be better understood. The research will broaden our understanding of the market organization of locally produced rice in the Northern region. It will also contribute to ongoing policy discussions and planned initiatives aimed at the rice industry. In-depth knowledge of the participants and their respective functions allows policymakers to determine which group to target for effective intervention implementation.

Finally, the study adds to the body of knowledge on consumers' willingness to pay for locally produced rice in the Northern Region of Ghana and throughout the country. This study's findings are expected to serve as a baseline for other similar studies in the Northern Region.

1.6 Study Organization

This dissertation is divided into five chapters. The first chapter deals with the study's introduction, which focuses on the study's background, the research's problem statement, the study's objectives and questions, the study's justification, and the definition of key terms. The second chapter reviews and discusses relevant literature on the topic in order to establish a theoretical approach for the research. The third chapter discusses the methodology of the research study, including the instruments used to collect the necessary information for the study, the research design, the sampling procedure, data collection, and data analysis. The fourth chapter presents the research findings and a discussion of them in the context of the study objectives. Chapter five contains a summary, conclusions, and recommendations based on the research findings.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

This chapter reviews related research which are relevant to this study. The chapter is divided into two parts. In the first part, the theoretical concepts that guide the study is discussed. Then in the second part of the chapter, related studies are reviewed. While, the last part presents the conceptual framework.

2.1 Theory of Planned Behavior (TPB)

The TPB expands the boundary conditions of TRA to more goal-directed actions. Attitude toward Behaviour is defined as “a person’s general feeling of favorableness or unfavorableness for that behavior” (Ajzen and Fishbein, 1980).

Subjective Norm is defined as an individual’s perception that most people who are important to a person think the individual should or should not perform the behavior in question, (Ajzen and Fishbein, 1980). Attitude toward behavior is a function of the product of one’s salient beliefs that performing the behavior will lead to certain outcomes, and an evaluation of the outcomes, that is, ranking of the desirability of the outcome.

TPB asserts that it is possible to measure Perceived Behavioral Control “people’s perception of the ease or difficulty in performing the behavior of interest” (Ajzen, 1991).

Perceived Behavioral Control is a function of control beliefs and perceived facilitation. Control belief is the perception of the presence or absence of necessary resources and opportunities desired to carry out the behavior. Perceived facilitation is one’s assessment of the importance of the resources required to an achieved the outcomes (Ajzen and

Madden, 1986). Perceived Behavioral Control is included as an external variable that has both a direct effect on actual behavior and an indirect effect on actual behavior through intentions. The indirect effect is based on the assumption that Perceived Behavioral Control has motivational implications for behavioral intentions.

When people believe that they have little control over performing the behavior because of lack of required resources and opportunities, then their intentions to perform the behavior may be low even if they have favorable attitudes or the subjective norms concerning performance of the behaviour. Bandura (1977), has provided empirical evidence that people's behavior is strongly influenced by the confidence they have in their ability to perform the behavior.

The structural link from Perceived Behavioral Control to Behaviour Intention reflects the motivational influence of control on actual behavior through intentions. The direct path from Perceived Behavioral Control to actual behavior is assumed to reflect the actual control an individual has over performing the behavior. Ajzen (1985), offers the following rationale for this direct path. First, if intention is held constant, the effort needed to perform the behavior is likely to increase with Perceived Behavioral Control.

For example, if two people have equally strong intentions to consume locally produced rice, and if both try to do so, the person who is confident that consumption of locally produced rice is good for his or her health, stands the chance of consuming locally produced rice than the one negative perception about local rice consumption.

Second, Perceived Behavioral Control often serves as a substitute for actual control, and in so far as perceived control is a realistic estimate of actual control, Perceived Behavioral Control should help to predict actual behavior. As with TRA, the relative importance of

behavioral intention predictors varies with the behavioral domain. In some instance, it may be found that only Attitude toward performing the behavior has a significant impact on behavioral intention; in others, attitude toward performing the Behavior and Perceived Behavioral Control will be significant; in still others, Attitude toward performing the Behavior, Subjective Norm, and Perceived Behavioral Control will contribute to the prediction of behavioral Intention (Ajzen, 1985).

Equally, the ability of Perceived Behavioral Control and behavioral intention to predict actual behavior also will vary across behaviors and situations. Both behavioral intention and Perceived Behavioral Control can make significant contributions to the prediction of goal-directed actions.

2.2 Brief History of Rice

Rice is a grain crop. The rice plant (*Oryza* species) has a place with the grass family (Gramineae). There are both wild and developed rice. There are two developed types of rice (Khush, 1997). They are the *Oryza sativa* the Asian rice which is filled in many regions of the planet and *Oryza glaberrima* which is filled in certain pieces of West Africa (Gurdev, 1997). The *O. sativa* species contains two significant sub-species: japonica and indica. These sub-species happened because of hybridization-separation determination cycles. Ranchers likewise conveyed the *O. sativa* specie to various eco-geological locales. The japonica sub-specie is adjusted to both calm and tropical upland districts while the indica sub-specie is adjusted to the jungles (Lanna et al., 2020). Rice is wealthy in hereditary variety. There are in excess of 117,000 kinds of rice, including current and conventional assortments, and wild family members of rice held by the Global Rice Quality bank.

There are numerous vulnerabilities about the specific overall setting where the primary improvement of the tamed species happened. Nonetheless, there is sufficient archeological proof to show that the taming system happened in Thailand and China. In Thailand, the archeological proof shows potsherds with engraving of both grain and husks of *O. sativa* on them in the space called Non Nok Tha in Korat. Likewise, plant remains were found in Soul Cavern on the Thailand-Myanmar line. In China, the proof shows that the center Yangtze and upper Huai Waterways are the two earliest places of *O. sativa* development. Likewise, endlessly rice cultivating executes tracing all the way back to no less than 8,000 years have been tracked down here (Lanna et al., 2020).

The technique for development of the yield contrasted based on what was polished in China and what was drilled in different pieces of Southeast Asia. In China, the dirt was puddled transforming it into mud and prior to relocating seedlings onto it. Contrasted with different pieces of Southeast Asia, the development of rice was through direct cultivating under dry land condition in the uplands and this strategy was like the way that the wild rice developed (Gathala et al., 2011). The records show that the main presentation of rice on the European landmass might have been in Greece and the adjoining region of the Mediterranean by returning individuals from Alexander the Incomparable endeavor to India around 344-324 B.C. From Greece and Sicily, rice spread steadily all through southern Europe and to a couple of areas in northern Africa.

After its spread in Europe, the Portuguese conveyed it to Brazil and the Spanish conveyed it to Focal and South America. The records show that rice was first developed on the seaside swamps of South Carolina around 1685. The idea is that the harvest might well have been

brought to South Carolina coast by slaves brought from Africa. In the eighteenth 100 years, rice spread to Louisiana and not until the twentieth century was it delivered in California's Sacramento Valley. The presentation into California compared precisely with the planning of the principal effective yield in Australia's New South Ribs (Gathala et al., 2011). The general setting of the main taming of the *O. glaberrima* is likewise blurred in vulnerability. One hypothesis proposes that *O. glaberrima* was first produced in the Inland Delta of the Upper Niger Stream (Mali).

The species then, at that point, spread to two auxiliary habitats of expansion one on the bank of Gambia and Guinea Bissau and the other in Guinea backwoods between Sierra Leone and Cote d'Ivoire. Another hypothesis recommends that *O. glaberrima* was chosen for at a few distinct areas with the backwoods and savannah regions, where the wild predecessor species *O. barthii* developed and was collected by antiquated hunting-gathering human populaces. What is obvious from these two hypotheses is that the African rice species was being developed numerous hundreds of years before the appearance of the primary Europeans on the West African coast (Li and Olsen, 2016).

2.3 Rice Production Worldwide

Rice is delivered in many conditions and under various climatic and geographic circumstances from the wettest regions on the planet to the driest deserts. Rice is developed in more than hundred nations on the planet. Rice is the main significant cereal harvest that is consumed solely by people contrasted with different cereals like wheat which albeit additionally developed in enormous extents is basically utilized as creature feed (Van

Nguyen and Ferrero, 2006). Rice is a main harvest, alongside wheat and corn, comprising a significant food staple for half of the total populace. In certain districts, monetary development, political soundness, as well as food security, generally rely upon it: it's an essential ware.

Around 500 million tons of processed rice have been created worldwide during the 2019/2020 cultivating season. Creation is amassed in Asia; China and South-East Asia specifically. China is the biggest maker, representing 30% of the creation, trailed by India (24%), Bangladesh (7%), Indonesia (7%), Vietnam (5%) and Thailand (4%) (Basu & Miroshnik, 2021).

2.4 Rice Production in African

Eight nations in Sub-Saharan Africa (SSA) represent 80% of its rice production: Nigeria, Madagascar, Côte d'Ivoire, Tanzania, Mali, Guinea, Sierra Leone, and Senegal. The two biggest creating nations, Nigeria and Madagascar, represent around 33% of Sub-Saharan Africa's (SSA) rice creation. In general, rice is developed on around 1.9 million hectares of rainfed marshes addressing 34% of the all-out rice region and 36.4% of territorial creation. The typical yield across the rainfed marshes is 2.0 t/ha.

In 2016, the complete rice region reaped in Sub-Saharan Africa (SSA) was around 11.2 million hectares. The region reaped developed at a typical pace of 4.2 percent in 2007-16, yet it is projected to grow just around 1.8 percent each year for the following 10 years, arriving at 13.7 million hectares by 2026. Côte d'Ivoire, with a 16-percent yearly region gathered development rate, had perhaps of the biggest extension, going from less than 400,000 hectares in 2007 to 1.0 million hectares in 2016. Sub-Saharan Africa (SSA) rice

creation stretched around 15.3 million tons in 2016, with in excess of 60% of the creation in West Africa. Be that as it may, the absolute records for only 3% of worldwide rice creation. Throughout the past 10 years, SSA rice creation has found the middle value of near 6% yearly development, essentially on the extended established region and slight yield development. In Africa, the advancement of the New Rice for Africa (NERICA) rice assortments is quite possibly of the main development that have happened to the rice area in Africa.

The NERICA rice assortments structure a gathering of genotypes created from the fruitful intersection of the Asian *O. sativa* and the West African *O. glaberrima* to create an offspring (interspecifics). These descendants consolidate the high return potential and grain quality properties of the *O. sativa* with the dry spell obstruction and unforgiving conditions of the *O. glaberrima*. The NERICA rice assortments are not hereditarily changed rice since they are created through the ordinary crossbreeding of yields. The NERICA rice assortments were created at the Africa Rice Center in Cote d'Ivoire by a group of reproducers drove by Dr. Monty Patrick Jones. The main arrangement of seven assortments (NERICA 1-7) was delivered to ranchers in 2000. The second arrangement of eleven new assortments (NERICA 8-18) was delivered in 2005. After these 18 beginning assortments, a few hundred more have been created and in this manner expanding the biodiversity of rice.

These 18 assortments are upland rice assortments that impeccably adjust to the downpour took care of upland nature in Sub-Saharan Africa (SSA). This is vital on the grounds that ranchers in this locale are generally smallholder ranchers who come up short on means to flood or apply compound manures or pesticides. The upland environment addresses around 40% of the all out region under rice development in West and Focal Africa and utilizes

70% of the locale's rice ranchers. Nearby ranchers through the ranchers' Participatory Varietal Choice (PVS) framework have been effectively associated with the assessment of the yield. This assessment cycle has occurred in excess of 30 Sub-Saharan African nations. Likewise, people group-based seed creation frameworks were laid out in these networks to upgrade the accessibility and admittance to seeds by ranchers. There are around 60 new assortments that are been assessed in preliminary habitats across sub-Saharan Africa that are for marsh watered regions. Benefits of NERICA rice assortments over the *O. glaberrima* are early developing (80-100 days), high yielding (as much as 6 tons for every hectare under ideal circumstances), weed cutthroat, impervious to significant bugs and infections (impact, stem drills, termites), higher protein content, dry spell open minded and lenient to soil acidity and iron harmfulness. The NERICA seeds offer desire to a huge number of unfortunate rice ranchers who can anticipate higher efficiency from their yields (Africa Rice, 2012).

2.5 Rice Production in Ghana

Rice is one of the main food staples in Ghana and its utilization continues to increment because of populace development, urbanization and change in buyer propensities. It is a work serious yield and is developed both as a food and money crop. Among 2008 and 2017, paddy creation was in the scope of 302,000 and 722,000 MT (181,000 to 469,000 MT of processed rice) with enormous yearly changes (MOFA, 2017). The all-out rice utilization in 2008 added up to around 500,000 MT (JICA, 2008), which is identical to a for every capita utilization of 26kg per annum. The yearly creation changes are to a great extent because of the area (ha) under rice development, with negligible yield varieties

(t/ha). Ghana relies generally upon imported rice to supply compensate for the deficiency in homegrown rice. Government strategy systems and missions throughout the long term, as caught in FASDEP I, GPRS I and II, MTADP, AAGDS, IFJ and PFJ strategy records, have tried to elevate rice creation to address food security, destitution decrease and import replacement. Notwithstanding, the rice area in Ghana is truly compelled by farming framework shortage and unfortunate admittance to proper rural hardware and gear that persistently decreases effectiveness and efficiency. Key foundation shortfall of the area incorporates the shortage of effective water system plans, motorable streets, current business sectors, created agrarian terrains, proficient capacity and distribution center offices. The area is generally portrayed by customary cultivating practices, for example, reliance on downpour and the utilization of essential cultivating apparatuses like cutlass, cultivator and sickle. The reliance on inconsistent precipitation for horticultural exercises effectively aggravates what is happening, in the event that ideal land arrangement exercises are not understood.

2.6 Types of rice varieties

The type of rice can be classified based on various characteristics (Gross, Skare & Olsen, 2009).

Rice classified based on form can be either:

Rough rice, also known as paddy rice, is rice that has not been milled and thus still has the hull and bran layer attached to the kernel. Brown rice is rice that has had the hull removed but still has the bran layer attached to the kernel.

Milled rice: rice that has had both the hull and the bran layer removed. The greater the degree of milling, the more the bran layer is removed and the grain becomes more polished.

When rice is classified based on eco-geographical regions, rice can be either:

Indica rice is a type of rice that is typically grown in tropical and subtropical areas. In nature, it is long grain, and when cooked, the grains do not stick together and remain light and fluffy.

Rice can be aromatic (fragrant) or nonaromatic (non-fragrant) when classified according to aroma.

Aromatic rice emits a scented odor when cooked, whereas non-aromatic rice does not. Thai jasmine and basmati (which means "queen of fragrance") from India and Pakistan are two well-known traded aromatic varieties. Both jasmine and basmati rice are long grains from the indica rice family. One difference is that when cooked, the jasmine variety cooks moist and expands in width, whereas the basmati variety, which has a slender shape, elongates.

2.7 Consumer preferences for product attribute of food items

Estimates of willingness to pay have frequently been included in the study in order to provide more straightforward suggestions on the value placed on product features (Hanley, Wright & Alvarez-Farizo, 2007). Consumers' purchasing habits for fruits and vegetables. It first assessed purchasing frequency, with weekly purchases being the most common (Vukasovi, 2016). Supermarkets were first in terms of purchase locations, followed closely by open markets. In terms of purchasing modes, self-service with assisted weighing was the preferred choice. Martinez et al. (2018) used data from 15 consumers to conduct a study on means-end chain analysis of the food sector and investigate the extent to which the

findings can be used to inform the retail positioning strategy of food retailers in the UK. The study used laddering methodology to identify the linkages between food retail store attributes and personal values, with means-end theory as the theoretical underpinning. The study's findings presented a more personally relevant representation of consumers' perceptual orientations toward the image of a food retail store. "Good quality products," "good reputation," "store has additional services," and "value for money" were the most desired attributes. These were linked to the outcomes "feel good" and "save time". Overall, the findings back up previous value-driven research, which concluded that "happiness" and "quality of life" were the most sought-after personal values. With an increase in income, households seek variety and exoticism in their food products, which they will most likely find in supermarkets rather than local stores. In their study, Ricci et al. (2019) proposed that awareness and attitude toward the product had a strong influence on purchasing behavior of instant food products. The most important source of information was said to be commercial advertisements on television, followed by displays in retail outlets. Consumers form opinions about a brand based on various product features, which play an important role in the decision-making process. A large number of respondents emphasized quality and believed that price was an important factor, while others emphasized the manufacturer's image (Veloutsou, 2015).

2.8 Consumer willingness to pay for local products

In recent years, an increasing number of consumers have expressed an interest in locally produced food products (Paciarotti & Torregiani, 2021; Feldmann & Hamm, 2015). One possible explanation for this increased interest in local foods is the industrialization and

globalization of agriculture, as well as the associated food safety, food security, and environmental issues. As a result, consumers are becoming more concerned about where and how food is produced. Local products were defined by Fernández-Fernn et al. (2018) as food products grown, produced, and sold within a single region, whereas Bimbo et al. (2020) defined local food products as those produced and sold within a 30-50-mile radius of a consumer's home. As a result, the definition of local food clearly refers to the area from which a locality derives its food supply, extending beyond geographic boundaries where consumers are concerned with how and to whom the food is produced, distributed, and marketed (Ding, Liu & Ravenscroft, 2018). According to studies, consumers' preferences for local foods are influenced not only by preferences for product quality, freshness, or taste, but also by a desire for public benefits such as job and income generation in the community and environmental improvement (Muça, Pomianek, & Peneva, 2022; Kumar et al., 2021; Massaglia et al., 2019; Sahu & Mishra, 2018). Furthermore, moral and health concerns are the primary reasons why some consumers choose local food, whereas taste and freshness are regarded as less important (Schifferstein, de Boer & Lemke, 2021). They also discovered that about 25% of urban and 30% of rural respondents are willing to pay up to 5% and 10% premiums for local foods, respectively. Furthermore, a study of consumer behavior toward local and regional foods discovered that freshness and sustainability are the primary reasons why people buy local and regional foods, followed by high quality and taste (Scalvedi & Saba, 2018). In the developed world, consumers' perceptions of local food revealed that locally produced food was perceived as fresher than conventional food (Ditlevsen et al., 2020). Similarly, Jensen et al. (2019) discovered that

consumers were enthusiastic about local foods and perceived them to be of higher quality than imported foods.

The concept of assisting local farmers and the national economy. According to Zhang, Grunert, and Zhou (2020), 60% of Chinese consumers are very likely to consume locally produced food products. In their study, the remaining 40% of Chinese consumers were either neutral or somewhat likely to purchase locally produced food products. Local potatoes command a higher price premium than organic or GMO-free potatoes. (2019, Chakrabarti, Campbell, and Shonkwiler).

However, Wann, Kao, and Yang (2018) found that most consumers were unwilling to pay a premium for locally grown food products if the quality was comparable to other products. Local products have a lower preference in developing countries. For example, in a Tanzanian study conducted by Florent, Kalimang'asi, and Majula (2014), the results revealed that products from developed countries were viewed more positively by developing-country nationals than those produced locally. Aschemann-Witzel, Giménez, and Ares (2019) investigated the influence of country-of-origin effects and consumer attitudes toward purchasing local campaign initiatives. In general, consumer attitudes toward buying locally made campaigns in these studies can be classified as protectionist, nationalistic, and self-interested. Galawat and Yabe (2010) discovered that consumers in Brunei prefer imported rice to local rice due to market availability when assessing hiring preferences among organizations in one developing country. Furthermore, their research looked into consumers' preferences and willingness to pay for native rice in Brunei. Their findings revealed that urban consumers prefer rice with long grains and are willing to pay for this rice feature. According to Akaeze (2010), Nigerian consumers prefer imported rice

to locally produced rice. He discovered that imported rice became popular among Nigerians due to its cleanliness, swelling capacity, taste, availability, and grain shape. These qualities of imported rice are also preferred by restaurants and fast-food industries for use in their operations.

In Ghana, Asante et al. (2013) studied consumer preferences and acceptability of domestic and imported rice. He discovered that consumers prefer imported raw and parboiled rice to domestic rice. According to the preceding empirical evidence, consumers in developing economies prefer products from developed countries over products from their own country. The literature reviewed here supports Hu et al. (2012)'s argument that the premiums consumers are willing to pay for locally branded products differ by state and product. Given the scarcity of data on consumer preferences and willingness to pay for locally grown rice products in Ghana, the primary goal of this study is to assess Ghanaians' willingness to pay for locally grown characteristics in rice products.

2.9 Consumer preferences for rice attributes

Rice consumption differs from country to country. When making a purchase, most consumers are concerned with the commodity's quality and price (Griliches, 2013). Rice that is associated with specific cooking types and menus, as well as processing characteristics, was preferred by consumers. In contrast to Europeans, who prefer long grain rice with no scent, the Middle East prefers long grain and well-milled rice with a strong aroma (Ferdous, 2018). Local rice was in high demand in these countries because it was less expensive than imported rice. The high price of rice will deter consumers from purchasing their preferred brand of rice (Demont, 2013). Imported rice, on the other hand,

has become a popular consumer choice in Nigeria due to its cleanliness and swelling capacity, taste, availability, and long grain (Gbigbi, 2019). The qualities of imported rice are also preferred by restaurants and fast-food industries for use in their operations (Omari & Frimpong, 2016). A number of studies have also highlighted the dominance of demographic factors. Consumers who live in cities and have a high standard of living, income, and education are more likely to purchase high-quality rice (Rondoni, Asioli & Millan, 2020). According to Valaskova, Durana, and Adamko (2021), income, consumer age, and frequency of purchase are important factors that influence household food consumption. Consumers prefer to buy rice from retailers near their homes because it is more convenient for them, and they will buy any rice brand that is available on the market (Huang, 2021). Consumers in Brunei prefer imported rice to local rice because it is more readily available in the market and because consumers have been using imported rice since childhood (Galawat and Yabe, 2010). The effects of marketing factors such as branding, advertising, and promotions were discussed in Bilgin's studies (2018).

Ghanaians prefer to buy imported rice brands rather than local ones (Ragasa et al., 2020). Rice consumers in Japan and other countries, according to Klunklin and Savage (2018), were demanding a wide range of added values for rice. Food texture (stickiness and hardness), rice nutrients and constituents (protein, amylase allergens), and aroma, color, size, and shape of the rice kernel are among these characteristics. Prameela and Husain (2007) demonstrated that product characteristics such as taste and freshness influenced consumer choice, whereas Anang et al. (2011) demonstrated that consumer behavior was influenced by taste, price, convenience, variety, and quality. According to Hossain et al. (2015), in order to meet future demand and changing lifestyle and consumer preferences,

rice should be available in a variety of forms, including pre-cooked or instant rice, easy-to-cook and ready meals, and various packaging. Furthermore, it was reported that changes in women's lifestyles and time constraints would influence their purchasing behavior for rice brands on the market.

Some may prefer to eat out rather than cook at home (Jones et al., 2014). Understanding what consumers want, how they want to buy, prepare, and consume food, what features are important to them, and what features they are willing to pay for, can provide valuable insights into meeting consumer expectations and growing a food business.

2.10 Factors that determine consumers' willingness to consumer locally produced rice

Several studies have assessed factors that influence customers' consumption and demand for rice either imported globally or locally produce rice using different variety of methods. However, the outcomes from majority of these researches are different. Nonetheless, there are some that have their findings agreeing with others.

Generally, demographic variables are frequently adopted in research to serve as proxy for preference and taste. Nevertheless, empirical studies show that the traditional demographic variables including education and age add some information to the overall analysis about who is probably to purchase goods locally produced. Kassali, Kareem, Oluwasola and Ohaegbulam (2010), employed logistic regression analysis to find out demographic factors or variables that affected household consumption. The conclusion of their findings was that both age and the frequency of rice produced remain the most essential factors that affect household demand.

Eltholth et al. (2015), also undertook research and discovered that people who reside in urban places and also of high living standard were more likely to buy locally cultivated rice due to its good nutritional content. Their study further claimed women are the majority who purchase locally produced products than their men counterparts. This is accredited to the reason that women predominantly are the shoppers and buyers for most households. Williams-Forson (2010), further emphasized that in most Ghanaian traditional household, female is liable for buying and preparing meals for their households.

Abdullahi, Zainalabidin and Ismail (2011), examined the effects of socio-demographic variables and product features influencing consumers' decision to purchase special rice. Binary logit model of analysis was used and data collected with questionnaires. The study showed that, marital status, number of children, size of the household, household income and consumers' gender are the fundamental socio-demographic variables that affect household preferences of specially made rice for household consumption. Features of rice including taste, aroma, brand name, quality and availability were also seen as the factors that influenced consumers' demand for rice (Custodio et al., 2019). The easiness of cooking and price were discovered to be less significant in determining the frequency of rice demand. This was mainly because consumers considered higher prices charged for special rice thus ready to pay (Omari, Ampadu-Ameyaw & Essegbey, 2018).

Similarly, Kwakwa (2013), studied the preferences of consumers and their readiness to buy locally cultivated rice. A survey was conducted on 300 consumers of rice in Kumasi, Ghana in order to determine consumer willingness to buy rice produced locally, as a justification for ensuring quality enhancement of locally cultivated rice. The main methodology that was adopted by the researcher was the Choice Experiment (CE) technique. This

methodology was employed to examine non-market products. The results proved that the most relevant qualities for rice were food safety, aroma, as well as the length of grain influenced consumers' decision to purchase local produced rice. Furthermore, individuals were ready to offer premium prices for the demand features.

The study concluded that efforts must be made to enhance rice production and cultivation in Ghana. It was noted that such efforts must be directed at introducing the required attributes and features into breeding programs as a way of making local rice more attractive and pleasing to consumers. Ghimire et al. (2015) also studied the factors that affect household purchases of locally cultivated rice in developed countries. The study's overall objective was to identify the main factors that determine rice demand. Primary data was collected with a total respondent of 300 for the study. Simple descriptive statistics and chi-square tests were used to analyze the data. The study findings indicated that the taste is the number one important quality that affected an individual's consumption of brown rice. The chi-square tests indicated that the qualities of white rice and brown rice (colour, nutritional value, texture, and taste) socio-economic feature mostly (income) explain brown rice's share in overall rice consumption. The study recommended that the media should be used more in the awareness creation of brown rice.

Also, Diako et al. (2010), studied consumer knowledge, perception, as well as preference for aromatic rice, varies. 390 consumers were randomly sampled and the Chi-square analysis conducted to analyze the data. The study showed 94.9% of the overall consumers were more conversant with rice imported relative to 29% who were acquainted with rice locally produced. The basis for poor local rice patronage were due to non-availability, improper post harvesting and overall perceived poor quality. The demand theory argues

that a sensitive link exists between quantity demanded and price of a product. Nevertheless, the quantity of a product demanded is dependent on price differential relative to absolute price but not conventional consumables.

Wang et al. (2019), argue that price effects have been extensively researched by consumer and food scientists as an extrinsic indicator in food preference experiment. Similarly, Dastane, Goi and Rabbanee (2020), discovered that consumers perception about price have been noted in previous studies to be a one-dimensional paradigm in accordance to which lower prices are chosen as favorable and higher prices indicating otherwise. Their findings affirmed economic rationality principle of consumers demanding more a product at lower prices and less at higher prices.

Research by Kwakwa (2013), about the willingness of consumers to pay for rice locally produced showed that among those seven attributes or features of rice highlighted in their study price was considered the fourth characteristic consumers look at when buying rice.

In relation to economic theory, the quantity consumers' demand of a product is related positively to the prices of its substitutes. Thus, if there exist a close substitution then the positive cross price elasticity is anticipated, meaning an increase in local rice price would lead to a fall in the quantity consumers demand resulting in more of the substitute (foreign rice) being highly demanded. Majority of rice consumers living in Asia precisely North Korea, Japan, Taiwan and China choose to buy locally produced rice at lesser prices. The demand for locally produce rice in such countries far exceed that of the imported rice due to the price characteristics of those two brands. Those with higher prices were considered as an element that prohibited most consumers from buying certain preferred varieties of rice (Lii, 2017).

Economic theory states a significant and positive effect of income on the quantity demanded of a product. However, the importance of income in determining who is probably to consume or purchase locally manufactured goods and products is still in doubt. Because locally produced commodities or foods usually cost more relative to orthodoxly-produced commodities and foods, one is likely to expect more patronage by individuals with high income earnings compared to individuals with low-income earners. Nonetheless, majority of empirical findings show that income cannot differentiate between non-purchasers and purchasers of goods that are locally produce. Also, taste (meaning sensation of flavor, as contrasting to preference in general) is the most important attribute of rice that influences food purchasing decisions (Hoek et al., 2017). According to Opong (2020), discovered that consumers were willing to pay if the taste of local rice was improved. Furthermore, appearance of food is to the eye plays a key role in influencing its demand of local rice. Consumers do not prefer rice with blemishes. There exists an apparent correlation between the desire to accept behavior of blemishes and organic purchasing (Dabija, Bejan & Grant, 2018).

2.11 Concept of willingness to pay

Willingness to pay (WTP) examines or investigates the most money a person is willing to pay to obtain a specific good or service. The maximum amount of money that a person is willing to offer in exchange for receiving a benefit is referred to as willingness to pay (Schmidt & Bijmolt, 2020). It reflects the amount of benefit or utility that a person receives from the goods or services. WTP's theoretical foundation is equivalent to the Compensating Variation (CV) measure. CV is a measure of how much a consumer's income must increase or decrease in order to maintain utility in the event of a price change, a change in product

quality, or the introduction of new products (Moulton, 2018). This can also be interpreted as the benefit received from purchasing the goods being equal to the benefit given up in money, thereby maintaining the benefit in balance. The respondents' stated utility is based on his or her preferences and thus varies between individuals. According to Hille, Weber, and Brosch (2019), this can be done even before production and supply or during the marketing period. Consumers are introduced to the value of a specific type of local rice. There are numerous approaches to this, but it is economically prudent to allow economic agents to value the goods at stake. The estimation of the value of local rice provides evidence of consumers' willingness to pay for the introduction of such products (Ragasa et al., 2020). As in the case of local rice, this may result in a valid and reliable estimation of an individual's strength of preference for the proposed commodity.

2.12 Contingent Valuation Method (CVM)

The Contingent Valuation Method (CVM) was used in the study because it is more adaptable for measuring the value of goods by simulating a hypothetical market situation and does not impose restrictive assumptions on an individual's preference. CV enables direct estimation of WTP via the direct elicitation technique. Consumers demonstrate their WTP for a hypothetical product without actually purchasing it.

There are numerous methods for understanding consumer choices in a specific market situation. Revealed Preference Methods is one of these methods, which depicts actual consumer choices in the market scene. Carson (2012) mentioned two of them: contingent valuation method (CVM) and contingent choice method (CCM) (CCM). CVM asks respondents directly about their WTP or WTA (Willingness to Accept) for a clearly defined

good or service. In an assumed market condition, interviewees are asked how much they would be willing to pay for locally produced rice, as well as a suggested or bid amount. The method is useful when there is no real market or actual consumer expenditure to use for valuation because respondents can express their preferences on the hypothetical market. The hypothetical market must be as close to a real market as possible, so pictures, photos, and other media can be used to supplement the description of the goods/services (Dahan et al., 2011).

Different types of elicitation formats were used to obtain respondents' WTP via CVM. The open-ended question, bidding game, payment card, and dichotomous choice approach were among them. The open-ended question format used in early CVM studies simply asked respondents how much they would be willing to pay for the goods or services. However, this format had a number of issues, including a high rate of nonresponse and valuations that were either excessively high or excessively low (Carson) (2012).

A range of potential bid amounts was prepared in the payment card format, and respondents were asked to select the value that was closest to their WTP. This approach still experienced starting bias, though it was discovered that the bias was not as strong as it was in the bidding game (Carson) (2012). A respondent was asked in the bidding game format if he or she would be willing to pay a specific bid amount of money for the goods/services. If the respondent said yes," he or she was asked the same question for a higher bid amount, and higher bid amounts were asked until the respondent said no. Similarly, if the initial bid amount was answered "no," decreasing bid amounts were asked until the respondent said yes. Starting point bias was a problem with this format because the estimated WTP tended to correlate with the initial value (Smith, 2000).

The dichotomous choice approach, which included single-bounded and multiple-bounded choices, was developed to overcome the limitations of early CVM elicitation formats (Carson) (2012). A randomly selected single amount of bid was offered to a respondent in the single-bounded dichotomous choice approach, and the respondent responded with a "yes" or "no" answer. The respondents' "yes" or "no" answers were converted to variables, and WTP is estimated using statistical models based on the probability of "yes" or "no," the bid amount, and other socioeconomic variables. The method was thought to be less biased because it was simple enough that respondents had no incentive to strategically bias their responses toward the desired outcome (Carson, 2012).

2.13 Conceptual framework for the study

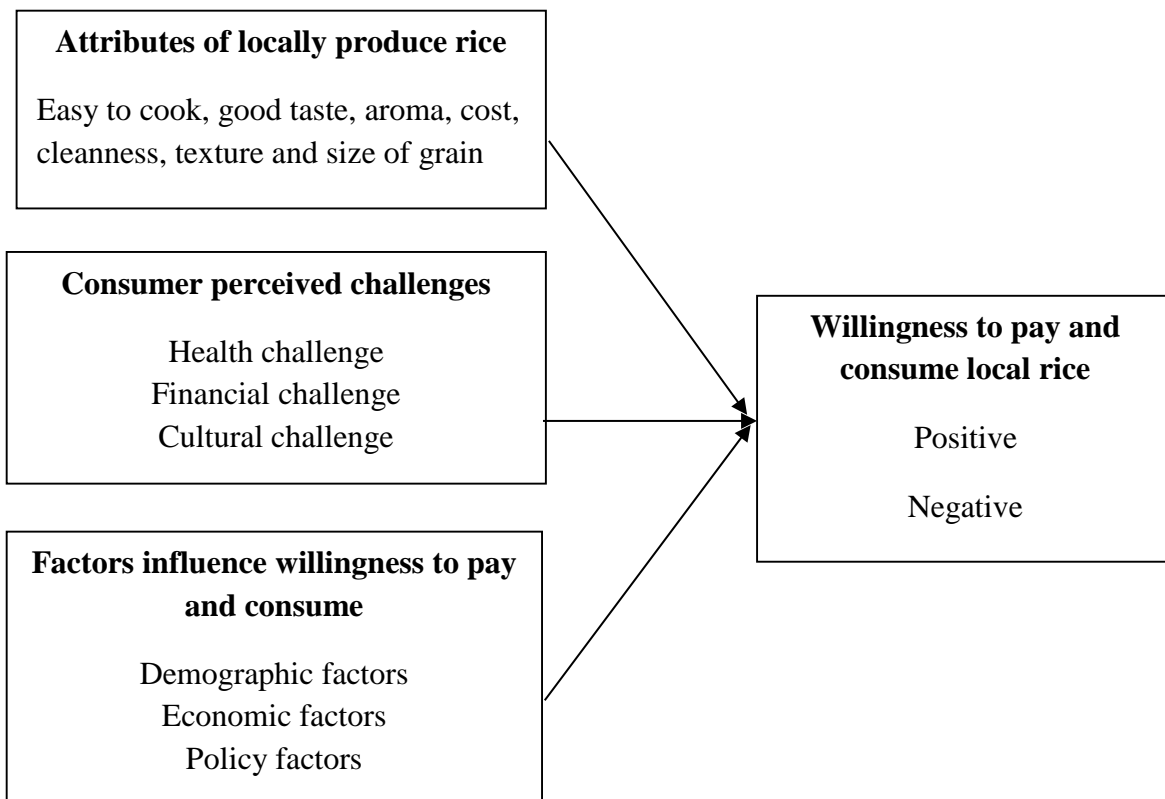
The conceptual framework shows the relationship between improvement in locally produced rice and consumers' willingness to pay and consume. The willingness to pay (WP) is a common method used to determine the amount consumers would pay for improvement in locally produced rice. This method is very important when the attributes is not known.

The amount consumers are willing to pay locally produce rice depends on the easy to cook, good taste, aroma, cost, cleanness, texture and size of grain. Therefore, the WTP consumers show toward the perceived challenges associated with consumption of locally produced rice.

These perceived challenges are health challenge, financial challenge and cultural challenge. It is expected that when these challenges are over or address, consumers will be willing to pay a premium for locally produce rice.

However, consumption of locally produce rice are influenced by demographic factors (sex, age, household size and educational status), economic factors (price) and policy factors (taxies, bands on importation of foreign rice).

Finally, these factors generally determine whether individuals would be willing to a premium on locally produce rice and consume it. The willingness can be either positive or negative depending on how consumer feel towards locally produced rice as shown in the figure below.



Conceptual Frameworks 2.1: Consumers' willingness to pay

Source: Authors' own construct (2021)

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter describes the study's methodology. It also discussed the study area and the theoretical concept used. The chapter also discusses the data sources and techniques used in the study's data collection. The sampling and sample size section describes the process of selecting respondents for the study.

3.2 The Study Area

The Northern Region is one of the sixteen regions of Ghana located in the north of the country. It is the largest region covering an area of 70,384 square kilometers. The region is divided into 14 districts and the capital is Tamale. It is bordered on the north by the North East region, on the east by the eastern Ghana-Togo international border, on the south by the Oti region, and on the west by the Savannah Region. The region is much drier than southern areas of Ghana due to its proximity to the Sahel, and the Sahara. The vegetation consists predominantly of grassland, especially savanna with clusters of drought-resistant trees such as baobabs or acacias. The wet season is between about July and December with an average annual rainfall of 750 to 1050 mm (30 to 40 inches). The Northern Region has a low population density, and more than 75% of the economically active population is agricultural. The official language of the region is English and most of the inhabitants speak a language of the Oti–Volta subfamily in the Niger-Congo go language family such as Dagbani, Mamprusi or Konkomba. The Dagbon Kingdom, of the Dagomba people, is

located in the region. The Northern Region is known for its rich culture and history, with the Dagomba people being the dominant ethnic group. The region is also home to several important historical sites, including the Larabanga mosque, the oldest mosque in Ghana, and the Naa Gbewaa Palace, the palace of the first Ashanti king.

Agriculture is the mainstay of the economy, with crops such as millet, sorghum, and groundnuts being the most important. The region is also known for its livestock production, especially cattle, sheep, and goats. The region also has a growing tourism industry, with visitors coming to see its natural beauty, historical sites, and cultural heritage.

The Northern Region is also home to several universities and polytechnics, including the University for Development Studies, the Tamale Technical University and Tamale Polytechnic. The region also has a number of health facilities, including several hospitals and health centers. Overall, the Northern Region of Ghana is a unique and diverse area that offers a wide range of natural and cultural attractions, making it an important destination for both tourists and locals.



Figure 3.1: Northern Regional Map

Source: GSS, (2016)

3.3 Research Approach

This study used both qualitative and quantitative research approach in addressing the study objective. Qualitative research is known for its inductive, interpretive, and naturalistic approach, which aims to gain a deeper understanding of particular situations. It concentrates on processes and meanings rather than quantifiable measures (Mertens, 2014). However, it may be criticized for being subjective, difficult to replicate, and not suitable for generalization or prediction. On the other hand, quantitative research is mainly used when collecting numerical data to represent measurable quantities or parameters of entities such as age, household size, and price. This study intends to assess local rice industries' readiness to meet demand for local rice and consumers' willingness to pay for locally produced rice in the Northern Region of Ghana. This approach is used to overcome the limitations that come with using only one method, as the qualitative method allows for in-depth analysis and personal interviews to understand the complexity of the subject matter, while the quantitative method allows for generalization of the findings.

3.4 Research design

The research design serves as a blueprint for conducting research by determining which questions to answer, which data to collect, what data to collect, and how to analyze the results (Lemon & Hayes, 2020). The research design outlines the procedure for carrying out the study, such as when and from whom data was obtained and under what conditions. The goal of the research design is to provide as many valid and accurate answers to research questions as possible (Alipour et al., 2020). This research design gives researchers complete control over the study and is the most important determinant of research success

(Ghauri, Grnhaug, & Strange, 2020). In order to carry out this study, a descriptive survey design was used. Descriptive research is a fundamental type of inquiry that aims to observe (gather information on) specific phenomena, often at a single point in time, using a cross-sectional survey to examine a situation by describing important factors such as demographic and socioeconomic, attitudes, experiences, behaviors, and knowledge (Mohajan, 2020). This study design contributed to a better understanding of consumers' willingness to pay for locally produced rice.

3.5 Population

Population is defined as a group of people or a collection of items being studied (Duplaga, 2017). The term "population" refers to any individual or group of individuals who may be included in the study. Because almost every household consumes rice, the target population for this study is everyone within the selected study area.

3.6 Sampling Procedure and Sample Size

Snyder (2019) believes that selecting an appropriate sample size is dependent on the type of data analysis the researcher intends to use. According to Klar and Leeper (2019), a sampling technique is primarily concerned with how a researcher selects sample size, type, and representativeness. This entails selecting units of interest in order to make a fair generalization of the population from which the sample was drawn (Coppock, 2019). As a result, observations, measurements of these units, and conclusions about the total population can be made.

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$$n = (z)^2 p (1 - p) / d^2$$

Where;

n = sample size for infinite population

Z denotes the level of confidence based on the standard normal distribution. (For a 95% level of confidence, z = 1.96).

p = estimated proportion of the rice consumers (unknown population p = 0.1)

d = tolerated margin of error at 5% (0.05)

The sample size will be;

$$n = \frac{(1.96)^2 \cdot 0.5 \times 0.9}{(0.05)^2}$$

$$n = 138 = 140$$

Hence a sample size of 140 was used for this study within some selected districts of the Northern Region.

A simple random sampling technique was used in selecting three (3) districts in the Northern Region for the study. These districts are Sagnarigu Municipal, Tamale Metro, Tolon District. Also, three (3) communities were selected from each district were randomly selected. For Sagnarigu Municipal (Sagnarigu Kuku, Kasaligu and Gumani), Tamale Metro (Kuku, Lamshegu and Sabongida) and Tolon District (Nyankpala, Tali and Tolon). These communities were randomly selected. From each district, proportion sampling procedures were used to allocate the total sample size per district with Tamale Metro (40.0%), Sagnarigu District (35.0%), and Tolon District (25.0%) (see Table 3.1).

From each selected community, the lottery method of sample randomly was used to select respondents for the study. In all, one hundred and forty (140) respondents were selected for the study as shown in Table 3.1.

Table 3.1: Sample respondents for the study

District	Sample allocation	Community	Number of Respondents
Sagnarigu District	49 (35.0%)	Sagnarigu Kuku	17
		Kasaligu	16
		Gumani	16
Tamale Metro	56 (40.0%)	Kuku	18
		Lamshegu	18
		Sabongida	20
Tolon	35 (25.0%)	Nyankpala	13

		Tali	11
		Tolon	11
Total			140

3.7 Data Collection Types, Sources, and Methods

This section of the chapter discusses the different types of data used in the study, the sources of the data, and the various methods used to collect the data.

3.7.1 Source of Data and Data Types

Data is any information that is gathered, observed, or generated to support the original. While data collection is the process of gathering information from all appropriate sources in order to obtain answers to research questions (Mitchell, 2018). There are two types of data in general: primary data and secondary data, both of which were used in this study. Primary data are data collected for the first time and are unique; these are data collected by the researcher firsthand for a specific purpose, whereas secondary data are data collected by someone other than the researcher and have already been statistically processed (Kothari, 2004). These have appeared in books, journals, magazines, and online publications. This study drew on both qualitative and quantitative data from primary and secondary sources for its findings. Responses from rice consumers and rice processors in the Northern Region provided primary data.

3.8 Data Collection Methods

Data can be collected using measurement methods, extensive interviews, and observations, according to Abildgaard, Saksvik, and Nielsen (2016). A variety of data collection tools

were used to collect qualitative and quantitative data from survey respondents. These included distributing a structured and semi-structured questionnaire to respondents in order to collect primary data.

3.8.1 Use of Questionnaire

A questionnaire was used to interview one hundred and forty (140) people. The rice consumer questionnaire includes a mix of common rice taste, price, and challenges questions. The structured questionnaire included multiple-choice questions in which the researcher provided a list of options and respondents were asked to choose one or more of them, as well as dichotomous questions with only two response options, yes or no. Questionnaires were created for the study's sampled respondents, and they were written in simple terms that minimize rather subjective judgment, rather than in broad quality terms. The questionnaire was designed to be as short as possible while covering the necessary range of subject matter for the study.

3.8.2 Use of Key Informant Interview

Key informant interviews are a qualitative data collection process. Key informants are respondents in the sample who are perceived to have more in-depth information and knowledge about the phenomenon under investigation (Moser & Korstjens, 2018). The goal of qualitative data collection techniques is to collect in-depth data based on personal experience and stories to supplement quantitative data gathered by the researcher. Five (5) rice processors were purposively selected for the key informants from the Tolon and Nyankpala.

3.8.3 Personal In-depth Interview

An in-depth interview is a qualitative research method that entails conducting in-depth interviews with a small group of participants in order to obtain detailed information on a specific subject (Morris, 2015). As a result, an in-depth interview with the operation manager of AVANESH Ghana was conducted.

3.9 Pretesting of Questionnaires

It is widely assumed that no matter how much developmental and pre-pretesting work is done on a questionnaire, the instrument must still be tested under field conditions. Field testing generally means administering a questionnaire to respondents selected from the target population using the procedures that are planned for the main study. Respondents can be selected by probability or convenience sampling and the number of completed interviews is usually between 20 and 70. For this study, 30 respondents were randomly selected within Savelugu Township. A field questionnaire was administered to respondents on their willingness to consumed locally produced rice. After the pre-testing, the internal consistency of the research instrument was tested using Cronbach's coefficient. According to Hair et al. (2006), for construct measures to be accepted as reliable, its Cronbach's Alpha must exceed 0.6. However, the Cronbach's coefficient value was 0.7, since the Cronbach's Alpha exceed 0.6, the research instrument is considered appropriate for the study.

3.10 Analysis of Data

Data analysis is the stage in which the researcher makes critical observations and examines the research data collected using both qualitative and quantitative methods, which aids in the interpretation of the results and drawing conclusions (Alhojailan, 2012). The collected

data was subjected to various data analysis techniques. The data was processed using the Statistical Package for the Social Sciences version 20.0 (SPSS V.20.0) in the study. The descriptive statistics used in this study were mean, percentage, standard deviation, and frequency. Kendall's Coefficient of Concordance and the Logit models were also used. While the outcome was presented in the form of tables and graphs.

3.10.1 Analysis of preparedness of local industries in meeting the demands of consumers needs

Preparedness of local industries in meeting the demands of consumers needs was achieved using descriptive statistics thus percentage and frequency. Also, content analysis was use. Content analysis is the process whereby verbal OR audio, data is transcript and summarized into themes and sub-themes. The data that was obtained from the in-depth interviews was focused on core concept of local rice industries preparedness. The tape recordings and notes taken during interviews were transcript and through open coding the narrative data was summarized into themes and sub-themes.

3.10.2 Analysis of attributes that consumers in Northern Region consider when buying locally produced rice

Descriptive statistics is a generic term for statistics that can be used to describe the variables (Thabane & Akhtar-Danesh, 2008). Thus, analysis of attributes that consumers in Northern Region consider when buying locally produced rice was achieved using descriptive statistics particularly percentage and frequency. Here, result was given a set of attributes to select from with 1 = yes and 0 = No.

3.10.3 Analysis of premium consumers are willing to pay for the attributes of the varieties of locally produced rice

Analysis of premium consumers are willing to pay for the attributes of the varieties of locally produced rice was achieved using descriptive statistics thus percentage and frequency. Here, respondents were given a five-point Likert scale (1=Very High, 2= High, 3= Moderate, 4= Low and 5= Very Low).

3.10.4 Analysis of factors influencing consumers' willingness to patronized for locally produced rice

In this study the binary logistic regression model was used for analysing the factors that influence WTP.

Following Long (1997), the structural equation of the logistic regression model can be expressed as:

$$Y_i^* = X_i \beta + \epsilon_i \dots \dots \dots (6)$$

$$Y_i = Y_i^* \text{ if } Y_i^* > 0$$

$$Y_i = 0 \text{ if } Y_i^* \leq 0$$

Where;

Y_i = Observed dependent variable (maximum WTP)

Latent variable (not observable)

X_i = Vector of factor affecting WTP

β_i =Vector of unknown parameters to be estimated

i =Residuals that are independently and normally distributed with mean zero and constant variance δ^2

The model parameters can be estimated by maximizing the log likelihood function of the following form (Maddala, 1997);

$$L = \prod_{Y_i > 0} \frac{1}{\delta} f\left(\frac{Y_i - \beta_1 X_i}{\delta}\right) \prod_{Y_i \leq 0} F\left(\frac{-\beta_1 X_i}{\delta}\right) \dots \dots \dots (7)$$

Where f and F are density function and cumulative distribution function respectively. $\prod_{Y_i > 0}$, means the product over those i for which $Y_i > 0$, and $\prod_{Y_i \leq 0}$, means the product over those i for which $Y_i \leq 0$. Maddala (1997) proposed the following techniques to decompose the effects of explanatory variables into the decision to pay and intensity effects. Thus, a change in X (explanatory variables) has two effects. It influences the conditional mean of Y_i in the positive part of the distribution, as well as the likelihood that the observation falls in that part of the distribution. As a result, this method was used for this study.

The marginal effect of an explanatory variable on the dependent variable's expected value is:

$$\frac{\partial E(Y_i)}{\partial X_i} = F(z)\beta_1 \dots \dots \dots (8)$$

Where; $\beta_1 X_i / \delta$ is denoted by z , and F is cumulative distribution

The probability of willingness to pay changes as the independent variable X_i changes:

$$\frac{\partial F(z)}{\partial X_1} = f(z) \beta / \delta \dots\dots\dots (9)$$

Changes in the amount of money respondents are willing to pay in relation to a unit change in an explanatory variable among those who are willing to pay are reported:

$$\frac{\partial E\left(\frac{Y_i}{Y_i^*} > 0\right)}{\partial X_1} = \beta_1 \left[1 - Z \frac{f(z)}{F(z)} - \left(\frac{f(z)}{F(z)} \right)^2 \right] \dots\dots\dots (10)$$

Where;

F (z) = the cumulative normal distribution of z, f (z) = the value of the normal curve's derivative at a given point (unit normal density), and z = the z score for the area under the normal curve,

δ = is the standard error of the error term.

Individual respondent is then given an initial bid value in the logit model of single bounded dichotomous format, which he or she may accept or reject. The dependent variable in the logit model is a dummy variable yes/no. The Logit model is used to calculate the mean WTP. The Logit model is expressed as follows in Gujarati (1999):

$$(P(x)) = \beta_0 + \beta_i X_i + i \dots\dots\dots (11)$$

Where (P(x) is the probability that a given respondent is WTP, ° is the constant term, I is the estimated regression coefficient or logit parameter, Xi is the initial bid value, and ire-presents the error term.

The coefficients in the logistic regression model cannot be directly interpreted as the direct effects of the respective explanatory variables on the probability of selecting each specific

rice option. Rather, these are the direct effects of each explanatory variable on the (unobservable) utility function, from which the mean WTP for each attribute can be calculated. In other words, each WTP estimate is calculated as the ratio of the coefficient associated with the Price coefficient attribute. As a result, the study estimates the corresponding ratios in order to calculate the marginal WTP for each rice attribute.

$$= \frac{-B \text{ attributes}}{B \text{ price coefficient}}$$

Each of these ratios is defined as a price change related to a unit increase in a specific attribute.

3.10.5.1 Description of Explanatory Variables and Hypothesis

Sex: It is assumed that women would prefer improved local rice and would be more willing to patronize than men because women are frequently in the kitchen cooking. With a positive expected sign, a dummy variable for sex was specified as 1 for female and 0 for male.

Educational level: Respondents with higher educational levels are expected to be more aware of the various benefits that could be gained from improved local rice, implying a positive relationship. For formal education (primary, secondary, and tertiary), a dummy variable 1 is specified, and 0 otherwise.

Age: This is a continuous variable with a minus sign expected. This is because older people are more accustomed to older varieties of rice than the younger generation and are less likely to seek out improved local rice.

Employment status: This is a dummy variable that takes 1 if the respondent is employed and 0 if not.

Average Monthly Income: This continuous variable is the sum of the head's income and the income of other family members. According to the available literature, there is a positive relationship between income and improved food quality. As a result, the income variables are expected to show a positive trend.

Marital Status: This is a dummy variable that takes 1 if the respondent is married and 0 if not. This variable is expected to be positive because married people are more concerned about the health and other risks associated with poor local rice varieties.

Family size: There are two schools of thought on the effect of family size on willingness to patronize. According to one study, as the size of a family grows, so does the willingness to pay for better food quality. The rationale given is that as the number of members in a given household increases, households become more aware of the risk associated with poor food. In the second case, a negative relationship is expected.

Good Taste of local rice. Those who have a preference for local rice are more likely to patronize in order to continue enjoying their tasty local rice. As a result, a positive relationship is anticipated.

3.10.5 Analysis of constraints consumers are likely to face in buying locally produced rice

Kendall's coefficient of concordance analysis was used to determine whether the respondents' rankings agreed (consumers). Kendall's coefficient of concordance (W) measures the degree of agreement among several (P) judges evaluating a given set of n

objects (Legendre, 2005). W is a metric that compares the observed variance of the sum of ranks to the maximum possible variance of the ranks.

The Kendall's concordance coefficient (W) is therefore given by the relation:

$$W = \frac{12S}{n^3 - n} - pT \dots \dots \dots 1$$

W denotes the Kendall's Concordance Coefficient, P the number of constraints, n the number of respondents (sample size), T the correlation factor for tied ranks, and S the sum of square statistic. W has a value between 0 and 1, with 1 indicating perfect concordance or agreement and 0 indicating perfect disagreement among the ranking rankers. A square statistic (S) sum is given as:

$$S = \sum_{i=1}^n (R_i - \bar{R})^2 \dots \dots \dots 2$$

Where: R_i = row sum of ranks, \bar{R} = the mean of R_i

The correlation factor for tied ranks (T) is also given as:

$$T = \sum_{k=1}^m (t_k^3 - t_k) \dots \dots \dots 3$$

Where: t_k = the number of ranks in each (k) of m groups of ties.

The chi-square (X^2) statistic, which is computed using the formula, was used to test the significance of the Kendall's concordance;

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Introduction

This chapter presents the findings and discussion of a study conducted to assess local rice industries' readiness to meet local rice demand, as well as consumers' willingness to patronize and consume locally produced rice in Ghana's Northern Region. The chapter is divided into six sections. The first section presents findings and discussions on the respondents' socio-demographic characteristics, while the second section dealt with local industries' readiness to meet the demands of consumers of locally manufactured rice. The third section presents results and discussion of the attributes consumers consider when buying locally produced rice, while the fourth presents discussion on the premium consumers are willing to pay for the attributes of the varieties locally produced rice. The fifth section presents factors that determine consumers' willingness to patronize locally produced rice and the sixth section presents the constraints consumers are likely to face in buying locally produced rice.

4.1 Demographics Characteristics of Respondents

This section presents findings and discussions of the demographic characteristics of respondents.

4.1.1 Sex of Respondents

According to Table 4.1, the majority (55.7%) of respondents were female, while the remaining (44.3%) were male. This finding could be related to the high female participation in household work in a traditional African household.

However, in terms of gender roles, female consumers dominate rice purchases. Women (females) are responsible for purchasing and preparing food in a traditional Ghanaian household (Nchanji & Bellwood-Howard, 2016). According to reports, women take center stage in household food consumption; it is the women's responsibility in most African households to make decisions on the types of food that are made available and the forms in which they are prepared for consumption by household members (Lentz, 2018).

Table 4.1: Frequency Distribution of Sex of Respondents

Sex of respondents	Frequency	Percentage (%)
Female	78	55.7
Male	62	44.3
Total	140	100.0

Source: Field Survey Data, 2022

4.1.2 Age of Respondents

According to the study's findings (Table 4.2), a similar (34.3%) of respondents were under 30 years old and between 30-45 years old. Furthermore, 27.1 percent of them were between the ages of 46 and 60. However, respondents over the age of 60 accounted for only 4.3 percent of the total. According to the age distribution of respondents, the majority of respondents are of working age (between 30-45 years) and are likely to have some disposable income for household expenditure. This also indicates that consumers are active, and that energy-giving foods like rice are required to meet their daily energy requirements. This is consistent with the findings of Gazeley and Newell (2015), who claimed that milled rice is required to meet the daily carbohydrate and protein needs of working adults.

Table 4.2: Frequency distribution of respondents

Age of respondents	Frequency	Percentage (%)
Below 30	48	34.3
30-45	48	34.3
46-60	38	27.1
Above 60	6	4.3
Total	140	100.0

Source: Field Survey Data, 2022

4.1.3 Marital Status of Respondents

As shown in Figure 4.1, the marital status of respondents was investigated for this study, and the results show that the majority of the respondents (53.6%) interviewed are married, while (32.9%) are single (never married), and 8.6% and 5.0% are divorcees and widows, respectively.

Cooking is generally the sole responsibility of married women, and rice is the preferred food in the majority of Ghanaian households (Ham, 2017). Rice availability and prevalence have become major determinants of African consumers' well-being, particularly during festive seasons (Andriamparany, Hänke, & Schlecht, 2021).

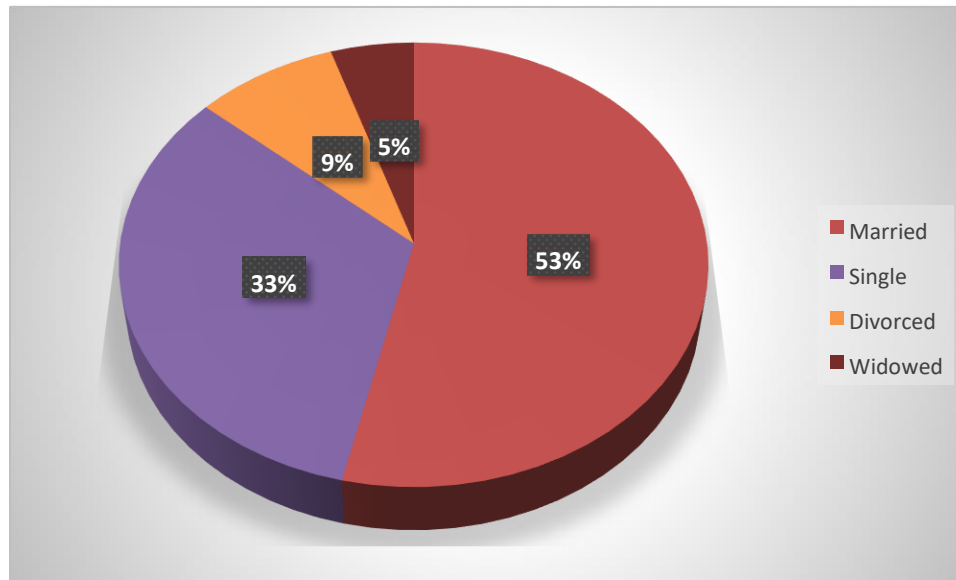


Figure 4.1: Marital status of respondents

Source: Field Survey Data, 2022

4.1.4 Educational Level of Respondents

The education level of respondents was classified as none/never attended school, elementary/JHS, secondary school, and tertiary. When answering questionnaires, respondents stated their highest level of education. According to Figure 4.2, approximately (45.0%) of the respondents had no formal education. In addition, 32.1 percent of respondents attended junior high school, 18.6 percent attended secondary/vocational institutes, and 4.3 percent attended primary school. The average number of years of education among respondents was 7.21, which is higher than the average Ghanaian schooling years of 5.16 (GLSS, 2014), indicating that the majority of the consumers captured in this study are educated to some extent. Consumers with a high level of education (number of years spent in school) are expected to be more accepting of and willing to purchase improved local rice varieties.

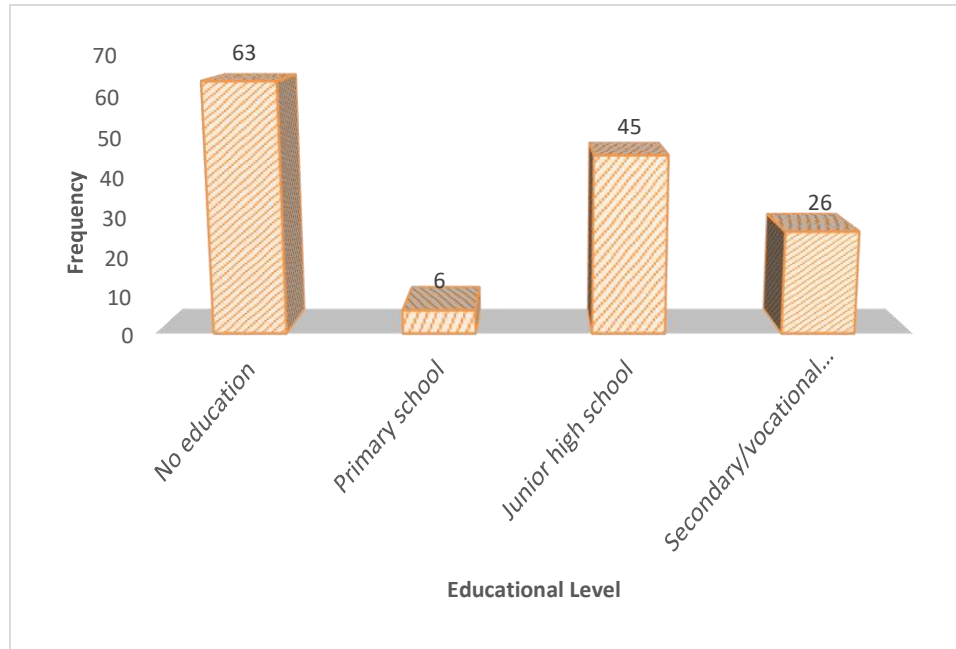


Figure 4.2: Bar Chart illustrating the educational level of respondents

Source: Field Survey Data, 2022

4.1.5 Respondents' Religious affiliation

The religious affiliation of respondents was investigated for this study, as shown in Table 4.3, and the results show that the majority of the respondents (70.0%) interviewed practice Islamic religion, while (20.7%) are Christians, and only (9.3%) practice traditional religion. Religious affiliation generally, depends on the types of festivals to celebrate. Because, in Ghanaian society, rice is mostly consumed during Christmas and Eid celebrations (Addae et al., 2021). This result suggests that most of the respondents will be willing to consume improved local rice if made available.

Table 4.3: Frequency distribution of respondent's religious affiliation

Religious affiliation	Frequency	Percentage (%)
Christianity	29	20.7
Islam	98	70.0
Traditional	13	9.3
Total	140	100.0

Source: Field Survey Data, 2022

4.1.6 Respondents' ethnic groups

In terms of ethnicity, 64.3% were Dagomba, 11.4% Gonjas, 9.3% Akan, 7.9% Konkomba, and 7.1% Frafra, respectively (see Table 4.4). This is not surprising given that the study was conducted in the Akan-dominated Northern region. Though the TZ is the most common food in Ghana's Northern region, rice is the preferred choice for special occasions such as weddings and naming ceremonies (Issahaku, 2016).

Table 4.4: Frequency distribution of respondent's Ethnic group

Ethnic group	Frequency	Percentage (%)
Akan	13	9.3
Dagomba	90	64.3
Frafra	10	7.1
Konkomba	11	7.9
Gonja	16	11.4
Total	140	100.0

Source: Field Survey Data, 2022

4.1.7 Respondents' employment status

The categories of employment for respondents were divided into four categories. There were four categories: public-sector work, private-sector work, self-employment, and unemployed. According to the findings in Table 4.5, the majority of respondents (56.4%) were self-employed. In addition, 17.1% worked in the private sector, while 11.4% worked in the public sector. The remaining 15.0%, however, were unemployed. The average monthly income of the survey consumers was GH 896.55, with a minimum monthly income of GH 900.00 and a maximum monthly income of GH 5253.00 shown in the table. According to the findings, the majority of respondents, who are likely self-employed and have relatively good average monthly incomes, are in a better financial position to purchase improved locally produced rice. This inference is based on the assumption that higher incomes and self-employment status may translate to greater purchasing power and financial capability (Cabral, Gemmell & Alinaghi, 2021)

Table 4.5: Frequency distribution of respondent's employment status

Employment status	Frequency	Percentage (%)
Public sector work	16	11.4
Private sector work	24	17.1
Self-employed	79	56.4
Unemployed	21	15.0
Total	140	100.0
Income: Average = 896.55, Minimum = 900.00 and Maximum = 5253.00		

Source: Field Survey Data, 2022

4.2 Local industries preparedness in meeting the demands of consumers of locally produced rice

Objective one presents a piece of qualitative information regarding local industries' preparedness in meeting the demands of consumers of locally produced rice. The researcher considered all the major stakeholder's rice producers and processors within the selected study districts.

In Ghana, rice is cultivated as both food and cash crop serving as a strategic economic crop for the country. Over the years rice consumption continues to increase because of the population a high demand for rice among households. According to available data, rice production increased from 302,000 metric tons to 987,000 metric tons between 2008 and 2020, with mill rice increasing from 181,000 to 622,000 MT (MoFA, 2021).

However, in the year 2020, the total rice consumption was an estimated at 1,450,000 metric tons which are equivalent to a per capita consumption of about 45.0kg per annum. Unfortunately, most of the rice consumption in Ghana is largely dependent on imports to meet the deficit in domestic rice supply (Nyarko & Kassai, 2017). Is against this high demand for rice locally, which requires local industries and rice producers need to increase and sustain domestic quality rice production. It is worth knowing that the government's intention of boasting domestic rice production has instituted the Special Rice Initiative which sought to bring improved rice seeds to farmers at the district level with the ultimate aim of achieving self-sufficiency by 2024.

To achieve the study's goal in accordance with the government's goal of achieving self-sufficiency in domestic rice production by 2024. This study attempted to understand how

local rice processors and producers are preparing to meet self-sufficiency in domestic rice production by 2024. However, this study revealed an interesting mixed trend among processors and producers of local rice in the study.

From interaction with one of the biggest rice processors in the study area, it was evident that local rice processors are fully prepared to meet the local consumers' demand. According to the operation manager of rice processor “A”, who decided to remain anonymous because of the sensitive nature of policies and the government’s ability to fulfil his promise of achieving self-sufficiency by 2024. He further stressed that their factory has been prepared for over three years now. However, the government's initial commitment to purchasing processed rice for free senior high school programmes has not been fulfilled. This claim by the key informant is further support by a new item by Kwaku Asante (2021), who reported that government is on course to make Ghana rice sufficient by 2023/2024 (My joy online).

Also, their factory faces great challenges with imported rice in the Ghanaian market. The main issues revolve around the competition posed by imported rice, which is significantly cheaper. This price difference is attributed to the high operating costs and utility bills incurred by the factory in Ghana. As a result, consumers tend to prefer the cheaper option, impacting the market demand for locally produced rice. Moreover, the unavailability of paddy rice throughout the year poses a significant hurdle for the factory. Paddy rice is the raw material required for processing, and its scarcity affects the factory's continuous operation. When there is a lack of raw material, the production capacity of the factory is hindered, making it challenging for them to meet consumer demands promptly. Thus, the combination of these challenges leads to reduced competitiveness for locally processed rice

in the Ghanaian market. With imported rice being cheaper and readily available, consumers may opt for the imported option, affecting the local rice industry's growth and profitability.

Furthermore, the study had an interaction with five (5) small processors scattered across the study area. Based on data obtained from the field, it was revealed that most of these small processors receive paddy rice from local farmers within their operation areas.

However, the ability to get paddy rice throughout the year was a major challenge expressed by almost all the small rice processors in the study area. According to a rice plant operator in Nyankpala, he stated that non-availability of paddy during the off-season was hindering their operation. He further noted that high electricity cost was another challenge preventing them from meeting the demands of consumers of locally produced rice. Though, he was optimistic about the local industry's preparedness of meeting the demands of consumers for locally produced rice, if only the government support them through special electricity meters without charging them service charges, would go a long way in improving their productivity.

On the part of rice producers, they were fully prepared in producing the required quantity and quality for the Ghanaian consumers and processors. The rice producers acknowledged that whenever there is a bumper harvest, it is a loss for them since the cost of production is very high. Hence, rice producers proposed that a pricing mechanism for fixing the price of rice at harvesting time would enable them to produce the quantities and qualities.

This expression was made by a rice farmer in Yong-Tamale

“My interest in increasing my rice farm has become very low, because last year, I had over 150 bags. However, there was no market for my rice. I was forced to sell

it at a very low price to market women” (Ky informant interview; Yong-Tamale Metropolis; Northern Region; Ghana; May, 2022).

This qualitative result revealed a significant challenge faced by the rice farmer in Yong-Tamale. Despite, farmers in the community having a successful harvest with over 150 bags of rice, they were forced to sell it at a very low price to market women. This experience has resulted in a decrease in their interest to increase their rice farm. The situation described by the rice farmer showcases the importance of having a stable and reliable market for agricultural produce. Without a market to sell their rice at a fair price, farmers are left with little incentive to invest more in their farms and increase production. This potentially leads to stagnation in the agricultural sector, hindering economic growth and food security in the region. Furthermore, the reliance on market women as the main buyers of the rice raises concerns about market access and distribution channels. If market women are the primary buyers, it might limit access to larger markets or more lucrative buyers, resulting in lower prices for the farmers.

Thus, the lack of a ready market for harvested rice is a major challenge for rice producers in supplying the required quantity of rice for local industries to fully operate at maximum capacity throughout the year. Another rice farmer expressed that besides the high cost of rice cultivation, profits from farming rice on large scale are sustainable due to the high cost of fertilizer and ploughing (Field Survey Data, 2022). Generally, local rice processors and producers are fully prepared with meeting the demand for locally produced rice. From the study, it is evident that rice producers are skeptical because an increase in rice output usually results in low rice prices. On the other hand, rice processors acknowledged the capacity of supplying consumers with the required quality of rice they need, however, the

non-availability of paddy rice is the reason for their ability to fully supply rice to the general public. This result suggests that rice processors have the ability to supply consumers with the quality of rice they need. They are capable of meeting the demand for rice in the market. However, they are facing a constraint in their supply chain - the non-availability of paddy rice. The fact that paddy rice is not readily available to rice processors is hindering their ability to fully supply rice to the general public. Here, the finding implies that the demand for rice is there, and the processors are willing and able to meet it, but the supply bottleneck is preventing them from doing so.

4.3 Attributes consumers in Northern Region, consider when buying locally processed rice

The objective two presents' attributes consumers in Northern Region, consider when buying both imported and locally produced or processed rice.

4.3.1 Rice consumption behaviour

According to the study's findings, the majority of respondents are regular rice consumers (Table 4.6). The results showed that the majority of respondents (67.9%) preferred imported rice, while 18.6% preferred local rice and 13.6% preferred both imported and local rice. An earlier study in Ghana confirmed a high preference for imported rice over locally produced rice, which was attributed to factors such as variations in physical characteristics, nutritional quality, cooking and pasting behaviors (Diako et al., 2010).

Furthermore, 45.0% of respondents consumed rice 2 to 4 times per week, while 16.4% consumed rice every day, according to the study. In addition, 22.1% of respondents consumed rice once a month, while 16.4% consumed rice once a week. This suggests that rice is gaining popularity as a human food in many parts of the world where other coarse cereals such as maize, sorghum, and millet, or tubers and roots such as potatoes, yams, and cassava have traditionally dominated (Mattei et al., 2015). However, many factors influence rice consumption at any given time, including milling quality, cooking, eating, and processing quality, nutritive quality, and specific standards for cleanliness, soundness, and purity (Sapkota & Phuyal, 2016). This suggests that the quality difference between domestic and imported rice appears to be an important factor in the decision-making process (Noltze, Schwarze & Qaim, 2012). The inability of local rice to compete with imported rice is the major constraint to the development of Ghana's rice sector. As a result

of the study's findings, there is a need to improve the quality of local rice in order to attract the attention of consumers.

Table 4.6: Consumers rice consuming behaviour

Attributes	Frequency	Percentage
Prefer type of rice:		
Local rice	26	18.6
Imported rice	19	67.9
Both local and imported rice	95	13.6
Total	140	100.0
Frequency of rice consumption:		
Once a week	23	16.4
2 to 4 times a week	63	45.0
Once a month	23	16.4
Rarely	31	22.1
Total	140	100.0

Source: Field Survey Data, 2022

4.3.2 Rice attributes consumers consider when purchasing rice in general

Consumers who bought rice were asked to list the attributes they look for when buying rice, and the results are shown in table 4.7.

The study result in Table 4.7, revealed that all (140) of the respondents' indicated that price, taste, food safety and cleanliness (absence of bran) were the most important attributes they consider when buying rice in general. Furthermore, over 70.0% of respondents indicated that texture, aroma and size of grain were the attributes they consider when buying rice in general. Finally, over 60.0% of respondents indicated that colour, packaging, shape of rice, sticky in nature and swelling capacity. Based on the ranking of the rice attributes that consumers consider when buying rice are price, taste, cleanliness (absence of bran) and food safety (hygienic/purity) were the highest ranked attributes consumer considered when buying rice in general. Generally, it is alleged that, Ghanaian rice consumers prefer cheaper rice with good taste and this is not surprising that taste and price were most considered attributes.

Table 4.7: Attributes consumers consider when buying rice in general (N=140)

Attributes of rice	Frequency		Percentage		Mean
	Yes	No	Yes	No	Ranking
Price	140	0	100.0	0.0	1.00
Colour	97	43	69.3	30.7	.69
Texture	100	40	71.4	28.6	.71
Taste	140	0	100.0	0.0	1.00
Packaging	88	52	62.9	37.1	.63

Aroma	106	34	75.7	24.3	.76
Food safety (hygienic/purity)	140	0	100.0	0.0	1.00
Size of grain	98	42	70.0	30.0	.70
Cleanliness (absence of bran)	140	0	100.0	0.0	1.00
Whiteness	100	40	71.4	28.6	.71
Shape of rice	76	64	54.3	45.7	.54
Sticky in nature	96	44	68.6	31.4	.69
Swelling capacity	80	60	57.1	42.9	.57
Ease of cooking	125	15	89.3	10.7	.89

Source: Field Survey Data, 2022

4.3.3 Rice attributes consumers consider when purchasing local rice

Consumers who bought rice were asked to select the attributes they look for when buying local rice using a multiple-choice questionnaire. According to the study results in Table 4.8, all (140) respondents indicated that food safety and cleanliness (absence of bran) are the factors they consider when purchasing local rice. This attribute suggests that Ghanaian rice consumers are conscious of the quality and safety of the rice they purchase. They prefer rice that meets hygienic standards and is free from impurities, ensuring that it is safe for consumption. This concern for food safety is essential as it directly affects the health and well-being of the consumers. Also, the absence of bran implies consumers seem to prefer

rice without bran, which might be due to factors such as ease of cooking and a perception of higher quality.

Furthermore, over 80.0% of respondents indicated that price and taste were the attributes they consider when buying local rice. Additionally, over 60.0% of respondents indicated that colour, texture, packaging, aroma and size of grain were the attributes they consider when buying local rice. Furthermore, only 50.0% of the respondents indicated that whiteness and swelling capacity were the attributes they consider when buying local rice. Based on the ranking of the rice attributes that consumers consider when buying local rice are food safety (hygienic/purity) and cleanliness (absence of bran) were the highest ranked attributes consumer considered when buying rice in local. Generally, Ghanaian rice consumers usually prefer local rice with good quality such as food safety (hygienic/purity) and cleanliness (absence of bran). Furthermore, this result has broader implications for the rice industry in Ghana. If consumers strongly prefer local rice with specific attributes, it influences agricultural practices and production strategies. While, farmers are encouraged to adopt better hygiene practices during cultivation, harvesting, and post-harvest handling to meet the demands of safety-conscious consumers.

Table 4.8: Attributes consumers consider when buying local rice

Attributes of rice	Frequency		Percentage		Mean
	Yes	No	Yes	No	Ranking
Price	118	22	84.3	15.7	.84
Colour	91	49	65.0	35.0	.65
Texture	96	44	68.6	31.4	.69

Taste	120	20	85.7	14.3	.86
Packaging	96	44	68.6	31.4	.69
Aroma	92	48	65.7	34.3	.66
Food safety (hygienic/purity)	140	0	100.0	0.0	1.00
Size of grain	84	56	60.0	40.0	.60
Cleanliness (absence of bran)	140	0	100.0	0.0	1.00
Whiteness	80	60	57.1	42.9	.57
Shape of rice	62	78	44.3	55.7	.44
Sticky in nature	100	40	71.4	28.6	.71
Swelling capacity	73	67	52.1	47.9	.52
Ease of cooking	100	40	71.4	28.6	.71

Source: Field Survey Data, 2022

4.3.3 Rice attributes consumers consider purchasing imported rice

Consumers who bought rice were asked to select the attributes they look for when buying imported rice. Table 4.9 shows that all (140) respondents mentioned price, taste, food safety, and cleanliness (absence of bran). The study suggests that consumers attach significant importance to the price of imported rice. This is not surprising, as price is a fundamental consideration for most purchasing decisions (Harahap & Amanah, 2020). Generally, consumers tend to compare prices between different brands or types of rice to

find the best value for their money. However, consumers may not heavily consider price due to the perceived high quality associated with imported rice. This implies that some consumers are willing to pay a premium for imported rice because they believe it to be of superior quality than local rice. Also, taste is another critical factor influencing consumers' choices when it comes to buying rice. Consumers want rice that is flavorful and enjoyable to eat. Different types of rice have distinct tastes, and consumers have preferences for certain varieties as the study finding revealed that taste is a significant driver of consumer behavior in the imported rice market.

Furthermore, over 70.0% of the respondents indicated that texture, aroma, size of the grain, sticky in nature and ease of cooking were the attributes they consider when buying imported rice. While, over 50.0% of the respondents indicated that colour, packaging and whiteness were the attributes they consider when buying imported rice. Finally, less than 30.0% of respondents said the shape of rice and swelling capacity are the factors they consider when purchasing imported rice. Based on the ranking of the rice attributes that consumers consider when buying imported rice are price, taste and food safety (hygienic/purity) were the highest ranked attributes consumer considered when buying imported rice. Consumers do not consider price when buying imported rice because of the perceived high quality attached to imported rice.

Table 4.9: Attributes consumers consider when buying imported rice

Attributes of rice	Frequency		Percentage		Mean
	Yes	No	Yes	No	Ranking
Price	140	0	100.0	0.0	1.00
Colour	78	62	55.7	44.3	.56
Texture	104	36	74.3	25.7	.74
Taste	140	0	100.0	0.0	1.00
Packaging	74	66	52.9	47.1	.53
Aroma	122	18	87.1	12.9	.87
Food safety (hygienic/purity)	140	0	100.0	0.0	1.00
Size of grain	105	35	75.0	25.0	.75
Cleanliness (absence of bran)	140	0	100.0	0.0	1.00
Whiteness	78	62	55.7	44.3	.56
Shape of rice	54	86	38.6	61.4	.39
Sticky in nature	114	26	81.4	18.6	.81
Swelling capacity	55	85	39.3	60.7	.39
Ease of cooking	125	15	89.3	10.7	.89

Source: Field Survey Data, 2022

4.4 Premium consumers are willing to pay for the characteristics of locally produced rice varieties.

Objective two present the premium consumers are willing to pay for the benefits of locally produced rice varieties.

4.4.1 Consumers' level of satisfaction with the quality of locally produced rice

The study first examined consumers' perceived level of satisfaction with the quality of locally produced rice in order to determine the premium they are willing to pay for the attributes of the varieties of locally produced rice.

The study's findings (shown in Figure 4.3) revealed that (48.6%) of respondents were satisfied with the quality of locally produced rice. This indicates that almost half of the respondents are content with the rice's quality, which is considered a positive sign for the local rice industry. Furthermore, (22.1%) and (6.4%) of respondents were moderately and not satisfied with the quality of locally produced rice, respectively. This implies the rice quality need to be improve to meet the expectations of these consumers. However, some (14.3%) of respondents reported being very satisfied with the quality of locally produced rice. This indicates that a significant minority of consumers are highly impressed with the rice's quality, which is another positive aspect for the local rice industry. Generally, majority of respondents were skeptical of the quality of local rice in comparison to imported rice. As a result, local rice producers should work to improve the quality of their product.

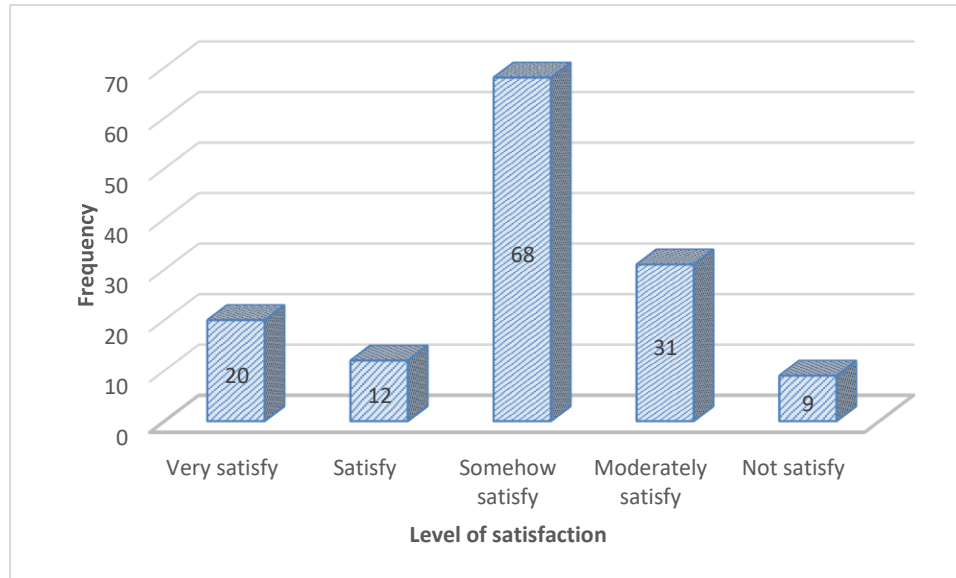


Figure 4.3: Consumer’s level of satisfaction with the quality of locally produced rice

Source: Field Survey Data, 2022

4.4.2 Consumers’ reasons for buying locally produced rice

For consumers to accept and pay for a product, it must have the attributes that are most important and appealing to them. According to Migliore et al. (2015), product quality attributes serve as the foundation for consumer preferences for a product.

According to the results in Table 4.10, all (140) respondents indicated that nutritional value is the most important factor they consider when purchasing imported rice. Also, the majority (77.9%) and (73.6%) of the respondents indicated that easy-to-consume (convenience) and delicious respectively were the major reason they consider when buying imported rice. Additionally, (74.3%) of the respondents indicated that being easy to cook was the major reason they consider when buying imported rice. Finally, about (60.0%) of the respondents indicated that easy to buy (available) and cheaper prices respectively were

the major reason they consider when buying imported rice. Based on the ranking of the rice attributes that consumers consider most important when buying imported rice is the nutritious value attached to imported rice. While, the least ranked attribute considered when buying rice is easy to buy (available). It is alleged that; the nutritional value of imported rice makes it the preferred rice for the rich and well-to-do in the society (Barker, Herdt & Rose, 2014).

Table 4.10: Attributes consumers consider when buying imported rice

Attributes of rice	Frequency		Percentage		Mean
	Yes	No	Yes	No	Ranking
Easy to consume (Convenience)	109	31	77.9	22.1	.78
Easy to buy (Available)	89	51	63.6	36.4	.64
Delicious	103	37	73.6	26.4	.74
Nutritious	140	0	100.0	0.0	1.00
Cheaper price	93	47	66.4	33.6	.66
Easy to cook	104	36	74.3	25.7	.74

Source: Field Survey Data, 2022

4.4.2 Consumers' reasons for not buying locally produced rice

From the result in Table 4.10, all of the respondents indicated that inferior taste, expensive, poor appearance, and difficulty cooking were the major reason they consider when buying local rice. This indicates that the taste of local rice is perceived to be of lower quality compared to other types of rice. Also, cost is a significant factor for consumers when deciding to purchase local rice (Amfo, Abankwah, & Tanko, 2022). It suggests that local rice might be priced higher than other alternatives. While, the visual appeal of local rice might be considered unsatisfactory compared to other rice types, which could affect consumer choices. However, a significant majority (86%) of the respondents believe that local rice has lower nutritional value compared to other types of rice. This perception is influenced by marketing, cultural beliefs, or general awareness about the nutritional content of different rice varieties. A smaller portion (35%) of the respondents indicated that the reason they consider when buying local rice is its limited availability. This implies that local rice might not be as easily accessible in the market as other varieties, which impact its consumption.

Table 4.0: Attributes consumers consider when buying imported rice

Attributes of rice	Frequency		Percentage		Mean
	Yes	No	Yes	No	Ranking
Inferior Taste	140	0	100.0	0.0	1.00
Expensive	140	0	100.0	0.0	1.00
Poor appearance	140	0	100.0	0.0	1.00
Low nutrition	54	86	38.6	61.4	.61

Less availability compared to the imported rice	105	35	75.0	25.0	.75
Difficulty to cook	140	0	100.0	0.0	1.00

Source: Field Survey Data, 2022

4.4.3 Consumers' perceptions of improved locally produced rice

Respondents were asked to rate the importance of the following rice attributes in their decision to purchase improved local rice. Each attribute was evaluated using a four-point Likert scale ranging from (very important to important). The fourth value was the most important. Positive scores ranged from 0.5 to 1, with 1 being very important, -1 being not important, and -0.5 being somewhat important. Rice characteristics include grain size, texture, aroma, color of rice, taste, cleanliness (absence of bran), whiteness, shape of rice, price, packaging convenience, sticky nature, swelling capacity, and ease of cooking.

According to the results in Table 4.11, the study revealed that (55.0 percent) of respondents agreed that grain size was not an important factor to consider in their purchasing decision, while 22.1 percent agreed that grain size was a very important factor to consider in their purchasing decision. The grain size attribute received an average score of 1.80. Furthermore, (49.3%) agreed that texture was a somewhat important factor to consider in their purchasing decision, while (34.3%) agreed that texture was an important attribute to consider in their decision, with the average score for the texture attribute being 2.67.

Most respondents (62.9%) agreed that aroma was a very important factor to consider in their purchasing decision, while 21.4 percent agreed that aroma was an important factor to consider in their purchasing decision. The aroma attribute received an average score of 3.47. The majority of respondents (54.3%) agreed that the color of rice was not an important factor to consider in their purchasing decision, while 26.4 percent agreed that the color of rice was an important factor to consider in their purchasing decision. The average score for the rice color attribute was 1.98.

Furthermore, the majority (75.0%) of respondents agreed that taste was a very important factor to consider in their purchasing decision. The average taste attribute score was 3.75. However, the majority of respondents (60.7%) agreed that cleanliness (absence of bran) was an important factor to consider when making a purchasing decision. The cleanliness (absence of bran) attribute received a 3.26 average score. Furthermore, the majority of respondents (58.6%) agreed that the shape of rice was not an important factor in their purchasing decision. The average score for the attribute of rice shape was 1.64. Rice's overall production attributes are 2.61.

Furthermore, the majority (62.1%) of respondents agreed that price was an important factor in their purchasing decision. The price attribute received an average score of 3.08. However, the majority of respondents (64.3%) agreed that the convenience of packaging was an important factor to consider when making a purchasing decision. The average score for the packaging convenience attribute was 3.53. Rice's overall marketing attributes are 3.30.

Furthermore, the majority (61.4%) of respondents agreed that sticky was an important factor to consider in their purchasing decision. The average score for the attribute sticky-

in-nature was 3.44. Furthermore, the majority of respondents (59.3%) agreed that swelling capacity was an important factor to consider in their purchasing decision. The swelling capacity attribute received an average score of 2.20. Rice has an overall cooking value of 2.84.

Table 4.11: Consumers' perceptions on improved locally produced rice

Attributes	Not Important (-1)	Somewhat Important (-0.5)	Important (0.5)	Very Important (1)	Mean Score
Product Attributes:					
Size of grain	77 (55.0)	23 (16.4)	31 (22.1)	9 (6.4)	1.80
Texture	0 (0.0)	69 (49.3)	48 (34.3)	23 (16.4)	2.67
Aroma	0 (0.0)	22 (15.7)	30 (21.4)	88 (62.9)	3.47
Colour of rice	76 (54.3)	9 (6.4)	37 (26.4)	18 (12.9)	1.98
Taste	0 (0.0)	0 (0.0)	35 (25.0)	105(75.0)	3.75
Cleanliness (absence of bran)	0 (0.0)	9 (6.4)	85 (60.7)	46 (32.9)	3.26
Whiteness					
Shape of rice	24 (17.1)	68 (48.6)	28 (20.0)	20 (14.3)	2.31
PA Mean Index	82 (58.6)	35 (25.0)	15 (10.7)	8 (5.7)	1.64
					2.61

Marketing attributes:					
Price	0 (0.0)	21(15.0)	87 (62.1)	32 (22.9)	3.08
Convenience of packaging	0 (0.0)	16 (11.4)	16 (11.4)	90 (64.3)	3.53
MA Mean Index					3.30
Cooking attribute:					
Sticky in nature	0 (0.0)	24 (17.1)	30 (21.4)	86 (61.4)	3.44
Swelling capacity	23 (16.4)	83 (59.3)	17 (12.1)	17 (12.1)	2.20
Ease of cooking	0 (0.0)	43 (30.7)	68 (48.6)	29 (20.7)	2.90
CA Mean Index					2.84

Source: Field Survey Data, 2022

4.4 Premium consumers are willing to pay for the characteristics of locally produced rice varieties

Objective three present consumers' willingness to patronize improved local rice and the amount willing to pay for improved local rice is regarded as an important indicator in achieving this goal.

4.4.1 Perceived consumers' willingness to patronize locally produced rice

According to the study's Figure 4.4, there is a sizable proportion of respondents who are willing to buy locally produced rice. From the result, majority (70.0%) of the respondents are willingness to patronize locally produced rice. While (30.0%) of the respondents are not willing to patronize locally produced rice. Generally, rice consumers prefer rice with good quality in terms of taste and cleanness. When these good taste and cleanness are imbedded in local rice the likelihood of consumers patronizing it would be high. This finding is consistent with Daniel and Teferi's (2015) observation that more respondents were willing to pay for irrigation water use than the non-willing group. According to Porpino, Parente and Wansink (2015), most people in developing countries are always ready to spend extra money on highly nutritional food products such as rice and meat.

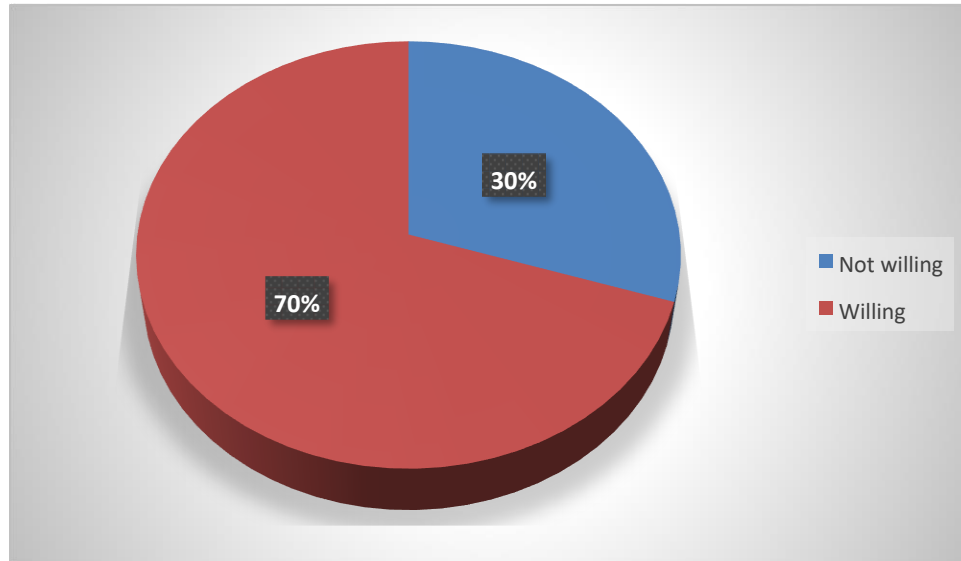


Figure 4.4: Consumers’ willingness to patronize locally produced rice

Source: Field Survey Data, 2022

4.4.2 Extra premium consumers are willing to pay for an improved locally produced rice

This section calculates the average price that consumers are willing to pay for various characteristics of locally produced rice. The extra premium is the additional amount that consumers are willing to pay for a better quality of locally produced rice. Respondents were asked how much they were willing to pay for specific characteristics of locally produced rice varieties. According to Table 4.12, the average amount respondents were willing to pay on the attributes of varieties of locally produced rice was GH¢ 1.08 per "olonka" bowl of rice. This means that on average, the respondents were willing to pay GH¢ 1.08 for one "olonka" bowl of rice that possesses the specified attributes. Respondents were willing to pay as much as GH¢ 1.15 per “olonka” bowl of rice based on improved aroma quality. However, the least amount respondents were willing to pay for good taste was GH¢ 1.04.

This indicates that respondents were not willing to pay more than GH¢ 1.04 for a bowl of rice, even if it had the attribute of "good taste." This price is considered the minimum threshold for the respondents in terms of taste preference.

Table 4.12: Extra premium consumers are willing to pay for an improved locally produced rice

Attributes	Extra premium payment per “olonka” bowl (Average)
Good taste	1.04
Nutritional value	1.06
Aroma	1.15
Ease of cooking	1.07
Proper package	1.06
Rice safety	1.05
Overall Average Index	1.08

Source: Field Survey Data, 2022

4.5 Factors that determine consumers' willingness to patronize locally produced rice

The objective four analysis presents findings regarding the factors that influence consumers' willingness to purchase locally produced rice. The dependent variable in this model was a dummy variable representing consumers' willingness to purchase locally produced rice, which was either 1 or 0. Respondents were, however, asked to indicate how much they were willing to pay for improved local rice attributes in Ghana.

Seven (7) independent variables from Logit Table 4.13 were used to determine consumers' willingness to patronize locally produced rice: gender, age, marital status, educational level, employment status, monthly income, good taste, nutritional value, price, aroma, ease of cooking, proper package, and rice safety. Based on literature reviews, these variables were chosen.

The study revealed that sex, age, marital status, good taste, price, aroma and rice safety were all statistically significant in determining consumers' willingness to patronize locally produced rice.

Furthermore, marital status, aroma and rice safety were statistically significant at a 1% significant level. However, sex, age, good taste, and price were statistically significant at 10% significant level.

Sex of consumers

The sex of consumers was found to have a positive influence on consumers willing to patronize improved local rice with a coefficient of 0.9671. This means that male consumers of rice had a higher probability of being willing to patronize improved local rice as compared to their female counterparts. Though female consumers are the master of household keepers, money is usually provided by men as they serve as household heads.

Hence, this finding suggests that more men are most likely to consume improved local rice in Ghana if made available.

Age of consumers

The age of rice consumers, with a coefficient of 0.7715, is another important factor revealed by the study to influence consumers' willingness to patronize improved local rice. The positive age distribution of rice consumers implies that an increase in rice consumers increases the likelihood of his/her patronizing improved local rice. As rice consumers get older, their willingness to buy better local rice grows significantly. The reason for this is that older people have more financial resources to purchase improved local rice than young people who are unemployed (Hossen et al., 2021).

Marital status of consumers

The marital status of rice consumers, with a coefficient of 1.535, is another important factor revealed by the study to influence consumers' willingness to patronize improved local rice. The positive marital status of rice consumers implies that married people are willing to patronize improved local rice as compared to non-married people. Generally, in Ghana societies, a married person decides household consumption. According to Hill (2018), the marital institution is the only institution that both parties contribute to providing food for their household members. Hence, rice being the second most consumed grain in Ghana, it's imperative that if local rice is improved to meet the needs of consumers, the likelihood of its consumption would be high in Ghana.

Good taste of improved local rice

A good taste of improved local rice is another important factor revealed by the study to influence consumers willing to patronize improved local rice, with a coefficient of 0.8746.

The positive good test of improved local rice indicates that consumers are more likely to purchase improved local rice with a good taste than improved local rice without a good taste. Taste, in general, plays an important role in consumer preferences. According to Wijesinghe and Nazreen (2020), the taste of rice was related to willingness to pay a higher price. As a result, this finding agreed with Curvelo et al. (2019), because consumers are much more concerned with the taste attribute and thus willing to pay more for it.

Price of rice

The price of rice, with a negative coefficient of -0.8055 , is another important factor revealed by the study to influence consumers' willingness to patronize improved local rice. The negative price status implies that more consumers are willing to buy better local rice if the price is reduced to meet their financial needs. Because consumers are less likely to choose an option with a lower price cut if the price of improved local rice is higher. As a result, price increases reduce the associated utility level provided by the choice option (Van-Loo et al., 2020).

Rice aroma

With a coefficient of 1.571 , rice aroma was found to have a positive influence on consumers willing to purchase improved local rice. This means that if the rice contains an aroma trait, consumers are more likely to be willing to purchase improved local rice than rice without a good aroma. This finding demonstrates the high value of aromatic rice among rice consumers. This finding is consistent with the findings of Custodio et al. (2019), who reported that consumers prefer aromatic rice and that rice aroma was one of the most effective price traits among consumers. According to Menozzi et al. (2020), aroma influences consumer preference for rice and, as a result, their willingness to pay the higher

price. This finding would also help local rice producers and processors understand consumer preferences for aromatic traits. As a result, a noticeable improvement in this attribute will serve as a marketing strategy for local rice products, producing aromatic and appealing rice that is comparable to imported rice varieties. Since aromatic rice has become popular, particularly among the upper-income group.

Rice safety

With a coefficient of 1.623, rice safety was found to have a positive influence on consumers willing to patronize improved local rice. This means that consumers are more likely to purchase improved local rice if it is safe to consume, as opposed to non-safe rice. Because of the health implications, rice consumers placed a higher value on food safety. Furthermore, this study agrees with Imathiu (2020), who stated that food safety is an important factor to consider when making food choices. According to the findings, Ghanaian consumers are concerned about their health and safety when eating rice.

Table 4.13: Logistic regression on factors that influence consumers' willingness to patronize locally produced rice

Attributes	Coefficients	Std. Err	Z - values	P-value
Sex	.9671*	.5058	1.912	0.056
Age	.7715*	.4451	1.733	0.083
Marital status	1.535***	.4627	3.317	0.001
Educational level	-.1206	.1208	-0.998	0.318
Employment status	.1716	.2407	0.712	0.476
Monthly Income	.6159	.4765	1.292	0.196
Good taste	.8746*	.4936	1.771	0.076
Nutritional value	-.3492	1.022	-0.341	0.733
Price	-.8055*	.4408	-1.827	0.068
Aroma	1.571***	.4626	3.396	0.001
Ease of cooking	.4276	.4841	0.883	0.377
Proper package	.1600	.1735	0.922	0.356
Rice safety	1.623***	.4456	3.642	0.000
Number of observations				140
LR chi2(7)				7.18
Prob > chi2				0.0003
Log-likelihood				-77.007111
Pseudo R2				0.5445

4.4.4 Marginal willingness to pay estimates for improved local rice

The marginal willingness to pay (MWTP) indicates the average amount that a consumer would be willing to pay for improved local rice indefinitely for a one-unit increase (decrease) in the attribute level. Table 4.14 shows that consumers are willing to pay more for food safety, with an associated MWTP estimated to be 2.72. This result was not expected as proper packaging of local rice is not always considered by consumers of local food products, however, this study proves otherwise. The next attribute consumers are willing to pay more for good nutritional value, with an associated MWTP estimated of 0.87. Furthermore, with an associated MWTP of 0.292, consumers are willing to pay more for rice safety. Consumers take the safety of every item they consume seriously, according to empirical evidence. Because of the importance of food safety, consumers are willing to pay a higher price. Consumers placed the highest relative value on food safety certification, according to Grunert et al. (2018).

Consumers prefer the good taste of rice, which has significant utility for them, as an attribute for which they are willing to pay more, with an associated WTP estimate of 0.07. This finding was consistent with the findings of Britwum, Owusu, and Demont (2020), who reported that consumers in developed countries are willing to pay high premiums for good-tasting rice.

However, the study found that people are unwilling to pay for rice attributes such as aroma and ease of cooking. According to some studies, consumers are willing to pay more for rice with a pleasant aroma (Jarma-Arroyo et al., 2020; Liem et al., 2018; Sriwaranun et al., 2015). This study, however, proves otherwise. Consumer preferences for rice by different

brands, as well as the effect of different qualitative traits on the prices of these rice species, were studied by Sedem-Ehiakpor et al. (2017). According to their findings, consumers are more willing to pay for taste and other attributes such as aroma, cooking quality, and time.

Table 4.14: Marginal Willingness to Pay (MWTP) estimates from logit model

Attributes	Price Coefficients	Attributes Coefficients	MWTP
Good taste	.0673	.8746	0.07
Nutritional value	.3054	-.3492	0.87
Aroma	-.5869	1.571	- 0.373
Ease of cooking	-.7207	.4276	- 1.86
Proper package	.4359	.1600	2.72
Rice safety	.4741	1.623	0.292

Source: Field Survey Data, 2022

4.5 Constraints consumers are likely to face in buying locally-produced rice

Objective five presents the constraints consumers are likely to face in buying locally produced rice sourced from literature. These constraints are the high cost of local rice (Uduma et al., 2016), the poor texture of local rice (Danvi et al., 2016), the difficulty to cook (Zhang et al., 2019), a lot of foreign material in local rice (Ajala & Gana, 2015), non-sticky nature of rice (Sattari et al., 2015), very hard after cooking (Ohtsubo et al., 2016), small grain size (Ren et al., 2018) and local rice not tasty (Agbas & Ceballos, 2019).

Kendall's coefficients of concordance revealed a highly significant agreement among the respondents' ranking scores of the constraint consumers are likely to face when purchasing locally produced rice. The Chi-Square ($df = 7$) = 196.379, as shown in Table 4.15. Asymptotic Significance = 0.000, indicating 1% agreement among respondents' rank scores. Kendall's coefficient of concordance (W) = 0.653, implying that 65.3% of respondents' ranking scores agree.

The highest rank constraint is the high cost of local rice, with a mean rank of 2.81. The poor texture of local rice was next. The cost of rice farming in Ghana is very high making it difficult for locally produced in competing with cheaper imported rice from China and Taiwan (Amanor, 2015). According to Sedem-Ehiakpor et al. (2017), local rice is known for its poor quality in terms of texture.

The third constraint is the difficulty to cook and a lot of foreign material in local rice was the fourth constraint. Because of poor processing due to poor handling of rice by farmers during threshing and milling (Danbaba et al., 2019).

The fifth constraint is non-sticky and very hard after cooking is the sixth constraint. The varietal attributes of local rice make it very difficult to cook, with most of the attributes being non-sticky (Custodio et al., 2019).

The final constraint is local rice is not tasty. The non-tasty nature of local rice makes its imported rice more attractive than local rice. Customers believe imported rice to be superior to local rice and are prepared to spend more money on imported rice (Ragasa et al., 2020).

Table 4.15: Rankings of constraints consumers are likely to face in buying locally produced rice

Constrains	Mean Rank	Ranking
High cost of local rice	2.81	1 st
Poor texture of local rice	3.21	2 nd
Difficult to cook	4.34	3 rd
A lot of foreign material in local rice	4.36	4th
Non-sticky	4.40	5th
Small grain size	5.64	7th
Very hard after cooking	5.59	6th
Not Tasty	5.66	8th
<i>No observation</i>	140	
<i>Kendall's W</i>	0.653	
<i>Chi-Square</i>	196.379	
<i>Degree of freedom</i>	7	
<i>Asymp. Sig.</i>	0.000	

Source: Field Survey Data, 2022

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the findings, conclusions, and recommendations. Sections 5.2.0 and 5.3.0 present the summary and conclusions, respectively. Section 5.4.0 contains recommendations based on the study's findings. Section 5.5.0 also includes suggestions for future research.

5.2.0 Summary of Findings

This section provides a summary of the study's background, methodology, and key findings.

5.2.1 Summary of background and methodology

The study was conducted to assess the preparedness of local rice industries to meet local rice demand, as well as consumers' willingness to pay for and consume locally produced rice in Ghana's Northern Region.

Despite the government's efforts to increase rice production in Ghana, consumer willingness plays a dominant role in the localization and adoption of rice varieties. The number of Ghanaians willing to eat rice and pay premium prices is growing by the day (Ogunleke, 2020). Therefore, the future of local rice will also rely, to a large extent, on customer willingness and their motivation to pay an additional price for locally grown rice. It is undoubtedly that customer tastes and the ability to pay high premiums will play a major

role in the country. Since most farmers and producers understand customers', tastes influence their willingness to pay.

In order to achieve the study's objective, a descriptive study design was used. The research was conducted in Sagnarigu Municipal, Tamale Metro, and Tolon District. From each district, proportion sampling procedures were used to allocate the total sample size per district with Tamale Metro (40.0%), Sagnarigu Municipal (35.0%), and Tolon District (25.0%). An interview schedule was used for data collection. Data were frequency counts, percentages, Kendall's Coefficient of Concordance, Logistic regression models and direct quotations from respondents.

5.2.2 Summary of Key Findings

According to the study, the majority of respondents (55.7%) were female, while the remaining (44.3%) were male. The study found that the majority of respondents (34.3%) were under 30 years old and between 30-45 years old. In terms of respondents' marital status, the majority (53.6%) of those polled are married. Furthermore, nearly half of the respondents (45.0%) had no formal education.

Furthermore, the study revealed that local rice processors are fully prepared to meet the local consumer's demand. Based on data obtained from the field, it was revealed that most of these small processors receive paddy rice from natives within their operation areas. However, the ability to get paddy rice throughout the year was a major challenge expressed by almost all the small rice processors in the study area. According to a rice plant operator in Nyankpala, he stated that non-availability of paddy during the off-season was hindering their operation.

Furthermore, the results revealed that the majority (67.9%) of respondents preferred imported rice, while 18.6% preferred local rice and 13.6% preferred both imported and local rice. Also, all (140) of the respondents indicated that price, taste, food safety and cleanliness (absence of bran) were the most important attributes they consider when buying rice in general. While over 80.0% of respondents indicated that price and taste were the attributes they consider when buying local rice. However, over 50.0% of the respondents indicated that colour, packaging and whiteness were the attributes they consider when buying imported rice.

In terms of respondents' satisfaction with the quality of locally produced rice, the study found that (48.6%) were somewhat satisfied with the quality of locally produced rice. On the other hand, all (140) respondents stated that nutritional value is the most important factor they consider when purchasing imported rice.

Furthermore, the study discovered that the majority (70.0%) of respondents are willing to patronize locally produced rice, with an average amount each respondent was willing to pay on the attributes of varieties locally produced rice being GHC 1.08 per "olonka" bowl of rice.

The study also found that marital status, aroma, and rice safety were statistically significant in consumers' willingness to buy locally produced rice, with a 1% significance level. However, sex, age, good taste, and price were statistically significant in consumers' willingness to purchase locally produced rice, accounting for 10% of the total.

Finally, the study revealed that local rice is expensive, has poor texture, is difficult to cook, contains a lot of foreign material, is non-sticky, has small grain size, is very hard after cooking, and is not tasty.

5.3.0 Conclusions

Generally, the study established those local industries and producers are well positioned in taken advantage of the government' desire of banning imported rice into the country by providing consumers with needed quality and quantity. However, in as much as local industries are fully prepared for this task, the local producers are confronted with the issue of a low market for paddy rice during bumper harvest, while processors are unable to get paddy rice for processing during the off-season

Secondly, in assessing the attributes that are most likely to inform consumers decision to patronize local rice, the study concluded that rice attributes such as easy of consumption, delicious nature of local rice, the nutritious status of local rice, easy to cook nature of local rice were the attributes they considered before buying local rice.

Furthermore, the study concluded that rice consumers are willing to patronize improved local rice, with much emphasis being placed on improved aroma quality. Moreover, the study discovered that sex, age, marital status, good taste, price, aroma and rice safety were all statistically significant in affecting consumers' willingness to patronize locally produced rice.

Finally, in examining the constraints consumers faced in buying locally produced rice, the study revealed that several constraints were encountered by local rice consumers, however,

the study concluded that the main constraint faced by local rice consumers was high cost of local rice.

5.4 Recommendations

Based on the study findings, the following research and policy recommendations are made.

- 1) According to the study, investors should take advantage of the ready market for improved local rice by investing in efficient processing facilities to scale up production of improved local rice in comparison to imported rice commodities. This provides farmers with a good price for the locally produced commodity.
- 2) The Buffer Stock Company should buy most locally produced rice and resupply of paddy rice to industries all year round.
- 3) This study further recommends that crop research institute and other research institutions should develop new rice attributes that are make local rice attractive to consumers.

5.5.0 Suggestions for Future Research

Future research should focus on consumer preferences and perceptions of the health consequences of consuming both imported and locally produced rice.

REFERENCE

- (2020). Mapping disruption and resilience mechanisms in food systems. *Food Security*, 12(4), 695-717.
- 3: Sampling, data collection and analysis. *European Journal of General Practice*, 24(1), 9-18.
- Abdullahi, Farah, 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).
- Abildgaard, J. S., Saksvik, P. Ø., & Nielsen, K. (2016). How to measure the intervention process? An assessment of qualitative and quantitative approaches to data collection in the process evaluation of organizational interventions. *Frontiers in Psychology*, 7, 1380.
- Acheampong, M., Yu, Q., Cansu Ertem, F., Deba Enomah Ebude, L., Tanim, S., Eduful, Addae, G., Oduro-Kwarteng, S., Fei-Baffoe, B., Rockson, M. A. D., Ribeiro, J. X. F., & Antwi, E. (2021). Market waste composition analysis and resource recovery potential in Kumasi, Ghana. *Journal of the Air & Waste Management Association*, 71(12), 1529-1544.
- Agbas, N. S., & Ceballos, R. F. (2019). On The Conjoint Analysis of Consumer's Preferences on Quality Attributes of Rice. *Ceballos, Roel Famat, On the Conjoint Agriculture*, 45(1), 72-74.
- Ajala, A. S., & Gana, A. (2015). Analysis of challenges facing rice processing in

- Akaeze, H. O. (2010). *Consumer preference for imported rice in Nigeria—Perceived quality differences or habit persistence?* Michigan State University.
- Alhojailan, M. I. (2012). Thematic analysis: A critical review of its process and evaluation. *West East Journal of Social Sciences*, 1(1), 39-47.
- Alipour, K., Schulze, J. P., Yao, Y., Ziskind, A., & Burachas, G. (2020). A study on multimodal and interactive explanations for visual question answering. *arXiv preprint arXiv:2003.00431*.
- Amanor, K. S. (2015). Rising powers and rice in Ghana: China, Brazil and African agricultural development. In *CBAA Working Paper 123. Future Agricultures Consortium*. Institute of Development Studies, University of Sussex Brighton.
- Amfo, B., Abankwah, V., & Tanko, M. (2022). Consumer satisfaction with local rice attributes and willingness to pay for improvement by internal migrants and natives in urban Ghana. *Journal of Agribusiness in Developing and Emerging Economies*. *Analysis of Consumer's Preferences on Quality Attributes of Rice (October 15, 2019)*. *Advances and Applications in Statistics*, 58(1), 45-55.
- Anang, B. T., Adjetey, S. N. A., & Abiriwe, S. A. (2011). Consumer preferences for rice quality characteristics and the effects on price in the Tamale Metropolis, Northern Region, Ghana.
- Andriamparany, J. N., Hänke, H., & Schlecht, E. (2021). Food security and food quality among vanilla farmers in Madagascar: The role of contract farming and livestock keeping. *Food Security*, 13(4), 981-1012.
- Asante, M. D., Asante, B. O., Acheampong, G. K., Offei, S. K., Gracen, V., Adu-Dapaah,

- Aschemann-Witzel, J., Giménez, A., & Ares, G. (2019). Household food waste in an emerging country and the reasons why: Consumer's own accounts and how it differs for target groups. *Resources, Conservation and Recycling*, *145*, 332-338.
- Asuming-Brempong, S., & Osei-Asare, Y. B. (2007). Has imported rice crowded-out domestic rice production in Ghana. What has been the role of policy, 91-97?
- Barker, R., Herdt, R. W., & Rose, B. (2014). *The rice economy of Asia*. Routledge.
- Basu, D., & Miroshnik, V. (2021). *Economic and Political Dangers of Globalization*. Springer International Publishing.
- Bilgin, Y. (2018). The effect of social media marketing activities on brand awareness, brand image and brand loyalty. *Business & management studies: an international journal*, *6*(1), 128-148.
- Bimbo, F., Russo, C., Di Fonzo, A., & Nardone, G. (2020). Consumers' environmental responsibility and their purchase of local food: evidence from a large-scale survey. *British Food Journal*.
- Britwum, K., Owusu, E. S., & Demont, M. (2020). Confronting genetic gains with markets: Brunei: An Application of Choice Model. *J. ISSAAS*, *16*(2), 104-115.
- Cabral, A. C. G., Gemmell, N., & Alinaghi, N. (2021). Are survey-based self-employment income underreporting estimates biased? New evidence from matched register and survey data. *International Tax and Public Finance*, *28*, 284-322.
- Carney, J. (2020). Rice Cultivation in the History of Slavery. In *Oxford Research*
- Carson, R. T. (2012). Contingent valuation: A practical alternative when prices aren't available. *Journal of economic perspectives*, *26*(4), 27-42.

- Chauvin, N. D., Mulangu, F., & Porto, G. (2012). Food production and consumption trends in sub-Saharan Africa: Prospects for the transformation of the agricultural sector. *UNDP Regional Bureau for Africa: New York, NY, USA.*
- Consumer perceptions, knowledge and preferences for aromatic rice types in Ghana. *Nature and Science*, 8(12), 12-19.
- cooking and taste qualities of germinated brown rice. *Food chemistry*, 289, 232-239.
- Coppock, A. (2019). Generalizing from survey experiments conducted on Mechanical Turk: A replication approach. *Political Science Research and Methods*, 7(3), 613-628.
- countries. *Nutrients*, 12(9), 2650.
- Curvelo, I. C. G., de Moraes Watanabe, E. A., & Alfinito, S. (2019). Purchase intention of organic food under the influence of attributes, consumer trust and perceived value. *Revista de Gestão*.
- Custodio, M. C., Cuevas, R. P., Ynion, J., Laborte, A. G., Velasco, M. L., & Demont, M. (2019). Rice quality: How is it defined by consumers, industry, food scientists, and geneticists? *Trends in food science & technology*, 92, 122-137.
- Custodio, M. C., Cuevas, R. P., Ynion, J., Laborte, A. G., Velasco, M. L., & Demont, M. (2019). Rice quality: How is it defined by consumers, industry, food scientists, and geneticists; *Trends in food science & technology*, 92, 122-137.
- Dabija, D. C., Bejan, B. M., & Grant, D. B. (2018). The impact of consumer green behaviour on green loyalty among retail formats: A Romanian case study. *Moravian geographical reports*, 26(3), 173-185.
- Dahan, E., Kim, A. J., Lo, A. W., Poggio, T., & Chan, N. (2011). Securities trading of concepts (STOC). *Journal of Marketing Research*, 48(3), 497-517.

- Danbaba, M. K. (2019). Rice postharvest technology in Nigeria: An overview of current status, constraints and potentials for sustainable development. *Open Access Library Journal*, 6(8), 1-23.
- Danbaba, N., Idakwo, P. Y., Kassum, A. L., Bristone, C., Bakare, S. O., Aliyu, U., ... & Daniel, T., & Teferi, T. (2015). Determinates of small holder farmers willingness to pay for agricultural extension services: A case study from Eastern Ethiopia. *African Journal of Agricultural Research*, 10(20), 2152-2158.
- Danvi, A., Jütten, T., Giertz, S., Zwart, S. J., & Diekkrüger, B. (2016). A spatially explicit approach to assess the suitability for rice cultivation in an inland valley in central Benin. *Agricultural water management*, 177, 95-106.
- Dash, S. S., Debnath, S., & Behera, M. (2020). Evaluation of Evapotranspiration Methods for Rice Yield Simulation in a Tropical River Basin. *Int. J. Curr. Microbiol. App. Sci*, 9(5), 2560-2566.
- Dastane, O., Goi, C. L., & Rabbanee, F. (2020). A synthesis of constructs for modelling consumers' perception of value from mobile-commerce (M-VAL). *Journal of Retailing and Consumer Services*, 55, 102074.
- Demont, M. (2013). Reversing urban bias in African rice markets: A review of 19 National
- Diako, C., Sakyi-Dawson, E., Bediako-Amoa, B., Saalia, F. K., & Manful, J. T. (2010).
- Ding, D., Liu, P., & Ravenscroft, N. (2018). The new urban agricultural geography of dissertation, Massey University).
- Ditlevsen, K., Denver, S., Christensen, T., & Lassen, J. (2020). A taste for locally produced food-Values, opinions and sociodemographic differences among 'organic 'and 'conventional 'consumers. *Appetite*, 147, 104544.

- Donkor, E., Matthews, N., & Ogundeji, A. A. (2018). Efficiency of rice farming in Ghana: Duplaga, M. (2017). Digital divide among people with disabilities: Analysis of data from a nationwide study for determinants of Internet use and activities performed online. *PloS one*, *12*(6), e0179825.
- Durand-Morat, A., Chavez, E. C., & Wailes, E. J. (2019). AGREP.
- Eltholth, M., Fornace, K., Grace, D., Rushton, J., & Häsler, B. (2015). Characterization of production, marketing and consumption patterns of farmed tilapia in the Nile Delta of Egypt. *Food Policy*, *51*, 131-143.
- Encyclopedia of African History*.
- FAO (2006). *Rapid Growth of Selected Asian Economies: Lessons and Implications for Agriculture and Food Security* (Vol. 1). Food & Agriculture Organization.
- Feldmann, C., & Hamm, U. (2015). Consumers' perceptions and preferences for local food: A review. *Food quality and preference*, *40*, 152-164.
- Ferdous, N. (2018). *Improvement of grain and nutritional qualities of rice varieties through breeding* (Doctoral dissertation, University of Dhaka).
- Fernández-Ferrín, P., Calvo-Turrientes, A., Bande, B., Artaraz-Miñón, M., & GalánLadero, M. M. (2018). The valuation and purchase of food products that combine local, regional and traditional features: The influence of consumer ethnocentrism. *Food Quality and Preference*, *64*, 138-147.
- Florent, N., Kalimang'asi, N., & Majula, R. (2014). Determinants of consumers attitudes on imported products in Tanzania: The case study of Dodoma Municipal. *International Journal of Scientific and Research Publications*, *4*(11), 1-6.

- Galawat, F., & Yabe, M. (2010). Assessing Consumer's Preference for Local Rice in
Gathala, M. K., Ladha, J. K., Saharawat, Y. S., Kumar, V., Kumar, V., & Sharma, P. K.
(2011). Effect of tillage and crop establishment methods on physical properties of a
medium-textured soil under a seven-year rice– wheat rotation. *Soil Science Society*
- Gazeley, I., & Newell, A. (2015). Urban working-class food consumption and nutrition in
Britain in 1904. *The Economic History Review*, 68(1), 101-122.
- Gbigbi, T. M. (2019). Survival of the fittest: the choice between local and imported rice
consumption in Delta central agricultural zone, Delta state, Nigeria. *Agricultural
Science & Technology (1313-8820)*, 11(3).
Ghana (pp. 119-136). Routledge.
Ghana. Appetite, 98, 49-54.
- Ghauri, P., Grønhaug, K., & Strange, R. (2020). *Research methods in business studies*.
Cambridge University Press.
- Ghimire, R., Wen-Chi, H. U. A. N. G., & Shrestha, R. B. (2015). Factors affecting adoption
of improved rice varieties among rural farm households in Central Nepal. *Rice
Science*, 22(1), 35-43.
- Griliches, Z. (2013). 1. Introduction: Hedonic Price Indexes Revisited. In *Price indexes
and quality change* (pp. 3-15). Harvard University Press.
- Gross, B. L., Skare, K. J., & Olsen, K. M. (2009). Novel Phr1 mutations and the evolution
- Grunert, K. G., Sonntag, W. I., Glanz-Chanos, V., & Forum, S. (2018). Consumer interest
in environmental impact, safety, health and animal welfare aspects of modern pig
production: Results of a cross-national choice experiment. *Meat science*, 137,
123129.

- Gujarati, D. N., & Porter, D. C. (1999). *Essentials of econometrics* (Vol. 2). Singapore: Irwin/McGraw-Hill.
- H., & Danquah, E. Y. (2013). Farmer and consumer preferences for rice in the Ashanti region of Ghana: Implications for rice breeding in West Africa.
- Hagan, M. A. S., & Awunyo-Vitor, D. (2020). Factors Influencing Consumers' Preference for Imported Rice in Kumasi Metropolis, Ghana. *Asian Journal of Economics, Business and Accounting*, 1-11.
- Ham, J. R. (2017). Cooking to be modern but eating to be healthy: the role of Dawa-Dawa in contemporary Ghanaian foodways. *Food, Culture & Society*, 20(2), 237-256.
- Hanley, N., Wright, R. E., & Alvarez-Farizo, B. (2007). Estimating the economic value of improvements in river ecology using choice experiments: an application to the water framework directive. In *Environmental value transfer: Issues and methods* (pp. 111-130). Springer, Dordrecht.
- Harahap, D. A., & Amanah, D. (2020). Determinants of consumer purchase decision in SMEs. *International Journal of Scientific & Technology Research*, 9(03), 3981-3989.
- Hill, P. (2018). The West African Farming Household. In *Changing social structure in*
- Hille, S., Weber, S., & Brosch, T. (2019). Consumers' preferences for electricity-saving programs: Evidence from a choice-based conjoint study. *Journal of Cleaner Production*, 220, 800-815.
- Hoek, A. C., Pearson, D., James, S. W., Lawrence, M. A., & Friel, S. (2017). Healthy and environmentally sustainable food choices: Consumer responses to point-of-purchase actions. *Food quality and preference*, 58, 94-106.

- Hossain, M. I., Rahman, N. M. F., Kabir, M. S., Siddique, M. A. B., & Tareq, M. (2015). Development and validation of producer and consumer preference models for rice varieties in Bangladesh. *Bangladesh Rice Journal*, 19(1), 63-71.
- Hossen, M. A., Benson, D., Hossain, S. Z., Sultana, Z., & Rahman, M. M. (2021). Gendered perspectives on climate change adaptation: a quest for social sustainability in Badlagaree Village, Bangladesh. *Water*, 13(14), 1922.
- Households' preference for local rice in the upper east region, Ghana. *Advances in Agriculture*, 2017.
- Hu, W., Batte, M. T., Woods, T., & Ernst, S. (2012). Consumer preferences for local production and other value-added label claims for a processed food
- Huang, C. C. (2021). Aging consumers and their brands: the customer journey perspective. *Asia Pacific Journal of Marketing and Logistics*.
- Imathiu, S. (2020). Benefits and food safety concerns associated with consumption of edible insects. *NFS journal*, 18, 1-11.
- Improvement of the eating and cooking qualities of rice: a review. *International Journal of Farming and Allied Sciences*, 4(2), 153-160.
- IN THE HOHOE MUNICIPALITY OF VOLTA REGION, GHANA. *European Initiative. Globalization and health*, 11(1), 1-20.
- International.
- Issahaku, A. L. H. A. S. S. A. N. (2016). Rural-Urban Migration and Its Socio-Cultural Effects on the Origin Community: The Case of Kpatinga in the Gushegu District in the Northern Region of Ghana. University of Ghana, Accra, Ghana.
- Jarh, A. K., Asiedu, S. Y., Azaglo, J. O., & Lavoe, R. (2020). ASSESSMENT OF

- Jarma Arroyo, S. E., Hogan, V., Ahrent Wisdom, D., Moldenhauer, K. A., & Seo, H. S. (2020). Effect of geographical indication information on consumer acceptability of cooked aromatic rice. *Foods*, 9(12), 1843.
- Jensen, J. D., Christensen, T., Denver, S., Ditlevsen, K., Lassen, J., & Teuber, R. (2019). Heterogeneity in consumers' perceptions and demand for local (organic) food products. *Food Quality and Preference*, 73, 255-265.
- Jones, S. A., Walter, J., Soliah, L., & Phifer, J. T. (2014). Perceived motivators to home food preparation: focus group findings. *Journal of the Academy of Nutrition and Dietetics*, 114(10), 1552-1556.
- Journal of Social Sciences Studies*, 5(4).
- Kassali, R., Kareem, R. O., Oluwasola, O., & Ohaegbulam, O. M. (2010). Analysis of Demand for Rice in Ile Ife, Osun State, Nigeria. *Journal of Sustainable Development in Africa*, 12(2), 63-78.
- Klar, S., & Leeper, T. J. (2019). Identities and intersectionality: a case for Purposive sampling in Survey-Experimental research. *Experimental Methods in Survey Research: Techniques that Combine Random Sampling with Random Assignment*, 419-433.
- Klunklin, W., & Savage, G. (2018). Biscuits: a substitution of wheat flour with purple rice flour. *Advances in food science and engineering*, 2(3), 81-97.
- Kothari, C. R. (2004). *Research methodology: Methods and techniques*. New Age
- Kumar, S., Talwar, S., Murphy, M., Kaur, P., & Dhir, A. (2021). A behavioural reasoning perspective on the consumption of local food. A study on REKO, a social mediabased local food distribution system. *Food Quality and Preference*, 93, 104264.

- Kumasi Metropolis of Ghana* (Doctoral dissertation, Doctoral dissertation).
- Kwakwa, S. (2013). *Consumer preferences and willingness to pay locally produced rice in labels on farmed salmon: do young educated consumers like it*
- Lanna, A. C., Coelho, G. R. C., Moreira, A. S., Terra, T. G. R., Brondani, C., Saraiva, G. R., ... & Vianello, R. P. (2020). Upland rice: phenotypic diversity for drought tolerance. *Scientia Agricola*, 78.
- Legendre, P. (2005). Species associations: the Kendall coefficient of concordance revisited. *Journal of agricultural, biological, and environmental statistics*, 10(2), 226-245.
- Lemon, L. L., & Hayes, J. (2020). Enhancing trustworthiness of qualitative findings: Using
- Lentz, E. C. (2018). Complicating narratives of women's food and nutrition insecurity: Domestic violence in rural Bangladesh. *World Development*, 104, 271-280.
- Leximancer for qualitative data analysis triangulation. *The Qualitative Report*, 25(3), 604-614.
- Li, L. F., & Olsen, K. M. (2016). To have and to hold: selection for seed and fruit retention during crop domestication. *Current topics in developmental biology*, 119, 63-109.
- Liem, D. G., Turchini, G. M., Wanich, U., & Keast, R. (2018). Sustainability descriptive
- Lii, D. T. (2017). The cultural politics of food: rice as an anti-globalization project. *Gastronomica*, 17(3), 24-35.
- Long, J. S., & Long, J. S. (1997). *Regression models for categorical and limited dependent variables* (Vol. 7). Sage.
- M., ... & Ananga, E. (2019). Is Ghana ready to attain Sustainable Development Goal (SDG) number 7; A comprehensive assessment of its renewable energy potential and pitfalls. *Energies*, 12(3), 408.

- Maddala, G. S., & Yin, Y. (1997). 10 Outliers, unit roots and robust estimation of nonstationary time series. *Handbook of statistics, 15*, 237-266.
- Made in Italy food products: The role of ethnocentrism and product knowledge. *Marketing*.
- Martinez, O., Rodriguez, N., Mercurio, A., Bragg, M., & Elbel, B. (2018). Supermarket retailers' perspectives on healthy food retail strategies: In-depth interviews. *BMC Public Health, 18*(1), 1-16.
- Massaglia, S., Borra, D., Peano, C., Sottile, F., & Merlino, V. M. (2019). Consumer preference heterogeneity evaluation in fruit and vegetable purchasing decisions using the best–worst approach. *Foods, 8*(7), 266.
- Mattei, J., Malik, V., Wedick, N. M., Hu, F. B., Spiegelman, D., Willett, W. C., & Campos, H. (2015). Reducing the global burden of type 2 diabetes by improving the quality of
- Menozzi, D., Nguyen, T. T., Sogari, G., Taskov, D., Lucas, S., Castro-Rial, J. L. S., & Mora, C. (2020). Consumers' preferences and willingness to pay for fish products with health and environmental labels: Evidence from five European
- Migliore, G., Galati, A., Romeo, P., Crescimanno, M., & Schifani, G. (2015). Quality attributes of cactus pear fruit and their role in consumer choice: the case of Italian consumers. *British Food Journal*.
- Mitchell, A., & Education, A. E. (2018, July). A review of mixed methods, pragmatism, and abduction techniques. In *Proceedings of the European Conference on Research Methods for Business & Management Studies* (pp. 269-277).
- MoFA (2017). Agricultural in Ghana Facts and Figures 2010. Ministry Of Food and Agriculture Statistics, Research and Information Directorate (SRID). Government of Ghana (GOG). Accra.

- more? *Sustainability*, 10(7), 2397.
- Morris, A. (2015). *A practical introduction to in-depth interviewing*. Sage.
- Moser, A., & Korstjens, I. (2018). Series: Practical guidance to qualitative research. Part
- Moulton, B. R. (2018). The measurement of output, prices, and productivity. *Report*,
- Muça, E., Pomianek, I., & Peneva, M. (2022). The Role of GI Products or Local Products in the Environment—Consumer Awareness and Preferences in Albania, Bulgaria and Poland. *Sustainability*, 14(1), 4.
- Naab, F. Z., Dinye, R. D., & Kasanga, R. K. (2013). Urbanization and its impact on agricultural lands in growing cities in developing countries: A case study of Tamale in Ghana. *Modern Social Science Journal*, 2(2), 256-287.
- Nchanji, E. B., & Bellwood-Howard, I. (2016). Traditional provisioning responsibilities of women in Northern Ghana. In *Gender and food: From production to consumption and after* (Vol. 22, pp. 41-64). Emerald Group Publishing Limited.
- Nigeria. *Journal of food processing*, 2015.
- Noltze, M., Schwarze, S., & Qaim, M. (2012). Understanding the adoption of system technologies in smallholder agriculture: The system of rice intensification (SRI) in Timor Leste. *Agricultural systems*, 108, 64-73.
- Nyarko, A. D., & Kassai, Z. (2017). High rice import as a threat to food security and a hindrance to sustainable rice production in Ghana. *Archives of current Research international*, 7(2), 1-13.
- of phenol reaction variation in US weedy rice (*Oryza sativa*). *New of America Journal*, 75(5), 1851-1862.

- OFORI-ATTA, K. E. N. (2018). Mid–year fiscal policy review of the 2018 budget statement and economic policy.
- Ohtsubo, K., Nakamura, S., Maeda, S., Kobayashi, A., Yamazaki, A., & Watanabe, S. (2016). Possibility of diabetes prevention by high-amylose rice and super hard rice. *Journal of Diabetes and Obesity*, 3(1), 1-7.
- Omari, R., & Frempong, G. (2016). Food safety concerns of fast-food consumers in urban
- Omari, R., Ampadu-Ameyaw, R., & Essegbey, G. O. (2018). Marketing and Promotional Plan for Local Rice Based on Drivers of Traders and Consumers Preferences. Forum for Agricultural Research in Africa (FARA).
- Opong, A. K. (2020). *Value chain interventions for satisfying urban high-quality rice demand in the Ashanti region of Ghana: a thesis presented in partial fulfilment of the requirements for the degree of Master of Agribusiness, School of Agriculture and Environment, Massey University, Manawatu Campus, New Zealand* (Doctoral
- Paciarotti, C., & Torregiani, F. (2021). The logistics of the short food supply chain: A literature review. *Sustainable Production and Consumption*, 26, 428-442.
- Phytologist*, 184(4), 842-850.
- policy implications for rice sector development. *African Development Review*, 30(2), 149-161.
- Porpino, G., Parente, J., & Wansink, B. (2015). Food waste paradox: antecedents of food disposal in low-income households. *International journal of consumer studies*, 39(6), 619-629.
- Prameela, V., & Husain, A. S. (2008). Consumer choice of branded agro-processed products in Kannur municipality of Kerala state. *Journal of Tropical*

Preference, 83, 103916.

product. *European Review of Agricultural Economics*, 39(3), 489-510.

Productivity Measurement Initiative under The Hutchins Center on Fiscal and Monetary Policy, Brookings Institution, Washington, DC.

QUALITY OF PARBOILED JASMINE AND TOGO MARSHALL RICE GROWN

Ragasa, C., Andam, K. S., Asante, S. B., & Amewu, S. (2020). Can local products compete against imports in West Africa? Supply-and demand-side perspectives on chicken, rice, and tilapia in Ghana. *Global Food Security*, 26, 100448.

Ren, D., Hu, J., Xu, Q., Cui, Y., Zhang, Y., Zhou, T., ... & Qian, Q. (2018). FZP determines grain size and sterile lemma fate in rice. *Journal of experimental botany*, 69(20), 4853-4866.

Research, 6(2), 98-119.

Retrospective lessons from New Rice for Africa (NERICA) in Uganda. *Outlook on Agriculture*, 49(4), 298-310.

Ricci, E. C., Stranieri, S., Casetta, C., & Soregaroli, C. (2019). Consumer preferences for Rice Development Strategies. *Global Food Security*, 2(3), 172-181.

Rondoni, A., Asioli, D., & Millan, E. (2020). Consumer behaviour, perceptions, and preferences towards eggs: A review of the literature and discussion of industry implications. *Trends in Food Science & Technology*, 106, 391-401.

Sahu, R. K., & Mishra, R. K. (2018). Consumer preference on organic food products: A review. *Asian Journal of Multidimensional Research (AJMR)*, 7(3), 19-28.

Sapkota, S., & Phuyal, R. K. (2016). An analysis of consumers' awareness and their purchasing behavior for adulterated rice-grains in Nepal. *World Review of Business*

Sattari, A., Mahdinezhad, N., Fakheri, B., Noroozi, M., & Beheshtizadeh, H. (2015).

- Savary, S., Akter, S., Almekinders, C., Harris, J., Korsten, L., Rötter, R., ... & Watson, D. Scalvedi, M. L., & Saba, A. (2018). Exploring local and organic food consumption in a holistic sustainability view. *British food journal*.
- Schifferstein, H. N., de Boer, A., & Lemke, M. (2021). Conveying information through food packaging: A literature review comparing legislation with consumer perception. *Journal of Functional Foods*, 86, 104734.
- Schmidt, J., & Bijmolt, T. H. (2020). Accurately measuring willingness to pay for consumer goods: a meta-analysis of the hypothetical bias. *Journal of the Academy of Marketing Science*, 48(3), 499-518.
- Schneider, P., & Asch, F. (2020). Rice production and food security in Asian Mega deltas—A review on characteristics, vulnerabilities and agricultural adaptation options to cope with climate change. *Journal of Agronomy and Crop Science*, 206(4), 491-503.
- Sedem Ehiakpor, D., Apumbora, J., Danso-Abbeam, G., & Adzawla, W. (2017).
- Serba, D. D., Yadav, R. S., Varshney, R. K., Gupta, S. K., Mahalingam, G., Srivastava, R. K., ... & Tesso, T. T. (2020). Genomic designing of pearl millet: a resilient crop for arid and semi-arid environments. *Genomic designing of climate-smart cereal crops*, 221-286. Shanghai. *Geoforum*, 90, 74-83.
- Smith, R. D. (2000). The discrete-choice willingness-to-pay question format in health economics: should we adopt environmental guidelines? *Medical Decision Making*, 20(2), 194-204.
- Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, 104, 333-339.

- Sriwaranun, Y., Gan, C., Lee, M., & Cohen, D. A. (2015). Consumers' willingness to pay for organic products in Thailand. *International Journal of Social Economics*.
- staple foods: The Global Nutrition and Epidemiologic Transition
- Thabane, L., & Akhtar-Danesh, N. (2008). Guidelines for reporting descriptive statistics in health research. *Nurse researcher*, 15(2).
- Uduma, B. U., Samson, O. A., & Mure, U. A. (2016). Irrigation potentials and rice selfsufficiency in Nigeria: A review. *African Journal of Agricultural Research*, 11(5), 298-309.
- Valaskova, K., Durana, P., & Adamko, P. (2021). Changes in consumers' purchase patterns as a consequence of the COVID-19 pandemic. *Mathematics*, 9(15), 1788.
- Van Loo, E. J., Caputo, V., & Lusk, J. L. (2020). Consumer preferences for farm-raised meat, lab-grown meat, and plant-based meat alternatives: Does information or brand matter? *Food Policy*, 95, 101931.
- Van Nguyen, N., & Ferrero, A. (2006). Meeting the challenges of global rice production. *Paddy and Water Environment*, 4(1), 1-9.
- Veloutsou, C. (2015). Brand evaluation, satisfaction and trust as predictors of brand loyalty: the mediator-moderator effect of brand relationships. *Journal of Consumer*
- Vukasovič, T. (2016). Consumers' perceptions and behaviors regarding organic fruits and vegetables: Marketing trends for organic food in the twenty-first century. *Journal of international food & agribusiness marketing*, 28(1), 59-73.
- Wang, E., Gao, Z., Heng, Y., & Shi, L. (2019). Chinese consumers' preferences for food quality test/measurement indicators and cues of milk powder: A case of Zhengzhou, China. *Food Policy*, 89, 101791.

- Wann, J. W., Kao, C. Y., & Yang, Y. C. (2018). Consumer preferences of locally grown specialty crop: The Case of Taiwan Coffee. *Sustainability*, *10*(7), 2396.
- Wijesinghe, A. G. K., & Nazreen, A. H. P. (2020). Consumer willingness to pay for organic rice: with reference to Kurunegala District in Sri Lanka. *Kelaniya Journal of Management*, *9*(1), 35.
- Williams-Forsen, P. (2010). Other women cooked for my husband: Negotiating gender, food, and identities in an African American/Ghanaian Household. *Feminist Studies*, *36*(2), 435-461.
- Zhang, Q., Liu, N., Wang, S., Liu, Y., & Lan, H. (2019). Effects of cyclic cellulase conditioning and germination treatment on the γ -aminobutyric acid content and the
- Zhang, T., Grunert, K. G., & Zhou, Y. (2020). A value-beliefs-attitude model of local food consumption: An empirical study in China and Denmark. *Food Quality and*

APPENDIX

APPENDIX A:

**PUBLIC WILLINGNESS TO CONSUME AND PAY FOR LOCALLY
PRODUCED RICE IN THE NORTHERN REGION, GHANA**

This study is purely for academic purpose towards award of Master of Philosophy degree in Innovation Communication. You will be contributing to it success if you answer the items as frankly and honestly as possible. You are assured of confidentiality and anonymity because the study is purely for academic purposes.

SECTION A. DEMOGRAPHIC DATA

1. Sex of respondent? 1= Male [] 2= Female []
2. Age of respondent? 1 = Below 30 [] 2 = 30-45 [] 3 = 46-60 [] 4 = Above 60 []
3. Marital status?; 1= Married [] 2 = Single [] 3= Divorced [] 4= Widowed []
4. Educational level? (Number of years in school); 1=No education [] 2=Primary school [] 3=Junior high school [] 4=Secondary/vocational institute [] 5 = tertiary []
5. Religion affiliation of respondents? 1 = Christianity [] 2 = Islam [] 3 = Traditional [] 4 = Other (specify).....
6. Ethnic group? 1 = Akan [] 2 = Dagbon [] 3 = Frafra [] 4 = Konkomba [] 5 = Gonja [] 6 = Other (specify).....
7. What is your total household size? :.....
8. What is your employment status? 1= Public sector work [] 2 = Private sector work [] 3= Self-employed [] 4= Unemployed []
9. What is your average monthly income? (In GHc)

Section B: To examine the most attributes consumers in Northern Region consider when buying locally produced rice.

10. How often do you eat rice dish? 1 = Once a week [] 2 = 2 to 4 times a week [] 3 = Daily [] 4 = Once in a month [] 5 = Rarely []

11. What kind of rice do you prefer to eat (multiple choice)? 1 = Local rice [] 2 = Imported rice [] 3 = Both local and imported rice []

12. Which of the following attributes do you consider when you are buying rice for consumption (multiple choice)?

Attributes of rice	Response	
	Yes	No
Price		
Colour		
Texture		
Taste		
Packaging		
Aroma		
Food safety (hygienic/purity)		
Size of grain		

Cleanliness (absence of bran)		
Whiteness		
Shape of rice		
Sticky in nature		
Swelling capacity		
Ease of cooking		

13. Which of the following attributes do you consider buying local or imported rice for consumption (multiple choice)?

Attributes of rice	Local Rice		Imported Rice	
	Yes	No	Yes	No
Price				
Colour				
Texture				
Taste				
Packaging				

Aroma (perfume)				
Food safety (hygienic/purity)				
Size of grain				
Cleanliness (absence of bran)				
Whiteness				
Shape of rice				
Sticky in nature				
Swelling capacity				
Ease of cooking				

Section C: To determine the premium consumers are willing to pay for the attributes of the varieties of locally produced rice in Northern Region.

12. Are you willing to buy locally produce or process rice? 1 = Yes [] 2 = No []

13. What is your level of satisfaction of the quality of locally produced rice?

1 = Very satisfy [] 2 = Satisfy [] 3 = Somehow satisfy [] 4 = Moderately satisfy [] 5 = Not satisfy []

14. Which of the following reasons will influence your decision to buy local rice? (Multiple responses)? 1 = Easy to consume (Convenience) [] 2 = Easy to buy (Available) [] 3 = Delicious [] 4 = Nutritious [] 5 = Cheaper price []; 6 = easy to cook []

15. Which of the following reasons will discourage you from buying local rice? (Multiple responses)? 1 = Inferior Taste [] 2 = Expensive [] 3 = Poor appearance [] 4 = Low nutrition [] 5 = Less availability compared to the imported rice []; 6 = difficulty to cook []

16. Kindly rate your perceived importance on the attributes of improved local rice that will influence you to buy it?

Attributes	Rating			
	Not Important	Somewhat Important	Important	Very Important
Price				
Convenience of packaging				
Size of grain				
Aroma				
Food safety (hygienic/purity)				
Texture				
Colour of rice				

Taste				
Cleanliness (absence of bran)				
Whiteness				
Shape of rice				
Sticky in nature				
Swelling capacity				
Ease of cooking				

17. How much are you willing to pay for addition price/premium on local rice base on following attribute per 1 kg.

Rice attributes	Additional amount willing to pay per “olonka” bowl
Taste	
Cleanliness (absence of bran)	
Aroma (perfume)	
Packaging	

Shape of rice	
Sticky in nature	
Swelling capacity	
Ease of cooking	

Section D: To examine the constraints consumers are likely to face in buying and consuming locally produced rice in Northern Region.

18. Kindly rank the constraints you likely to face in buying and consuming local rice in order of severity

Constraints	Ranking
High cost of local rice	
Poor texture of local rice	
Difficult to cook	
A lot of foreign material in local rice	
Non-sticky	
Very hard after cooking	
Small grain size	

Not Tasty	
Others (specify)	

Section E: To examine the factors that determine consumers' willingness to patronized locally produced rice in Northern Region.

19. Are you willing to buy the improved local rice if they are made easily available? 1= Yes [] 2= No []

20. Will good taste influence you to consume locally produced rice? 1= Yes [] 2= No []

21. Will nutritional benefit influence you to consume locally produced rice? 1= Yes [] 2= No []

22. Will price of local rice influence you to consume locally produced rice? 1= Yes [] 2= No []

23. Will good aroma influence you to consume locally produced rice? 1= Yes [] 2= No []

24. Will ease of cooking influence you to consume locally produced rice? 1= Yes [] 2= No []

25. Will proper labelling or packaging influence you to consume locally produced rice? 1= Yes [] 2= No []

26. Will rice safety influence you to consume locally produced rice? 1= Yes [] 2= No []

Thank You

APPENDIX B: PROCESSORS

PUBLIC WILLINGNESS TO CONSUME AND PAY FOR LOCALLY PRODUCED RICE IN THE NORTHERN REGION, GHANA

This study is purely for academic purpose towards award of Master of Philosophy degree in Innovation Communication. You will be contributing to its success if you answer the items as frankly and honestly as possible. You are assured of confidentiality and anonymity because the study is purely for academic purposes.

- 1) What is the role of your business in ensuring smooth supply of processed local rice to consumers?
- 2) How do you get paddy rice for your plant throughout the year?
- 3) How do government policies affect operation?
- 4) Do you get the needed support to operate your plant?
- 5) How is the market for your processed rice over the years?
- 6) Are you able to meet the demand for consumers over the years?
- 7) What are the challenges that your plant face in ensuring smooth operation and processing of local rice?
- 8) What recommendation will you prefer government to consider in the Ghana rice sector?

Thank You

APPENDIX B: PRODUCERS

**PUBLIC WILLINGNESS TO CONSUME AND PAY FOR LOCALLY
PRODUCED RICE IN THE NORTHERN REGION, GHANA**

This study is purely for academic purpose towards award of Master of Philosophy degree in Innovation Communication. You will be contributing to its success if you answer the items as frankly and honestly as possible. You are assured of confidentiality and anonymity because the study is purely for academic purposes.

- a) How do you get agricultural inputs for your rice cultivation?
- b) How does government policies affect your farming operation?
- c) How is the market for your produced rice over the years?
- d) Are you able to meet the demand for processors over the years?
- e) What are the challenges that your farm face in ensuring smooth cultivation of rice?
- f) What recommendation you prefer government to consider in the Ghana rice sector?

Thank You