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Local Rice Consumption and Attributes Considered in Urban Ghana: Does Internal Migration Matter?

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ABSTRACT

This study was designed to examine the level of local rice consumption, desirable attributes of local rice, the determinants of local rice consumption among migrants and natives in urban Ghana and determine whether internal migration matters in rice consumption . Primary data were sourced from 304 migrants and natives. Likert scale, multinomial probit and fractional probit regressions were employed to analyze the data. The study revealed a low level of local rice consumption in urban Ghana. Migrants were found to predominantly consume only local rice while natives predominantly consume only imported/foreign rice. Hence, local rice consumption is generally higher among migrants than natives/indigenes in urban Ghana indicating that internal migration into urban Ghana matters in local rice consumption. Attributes considered in choosing a preferred rice type are aroma, availability, cleanliness, healthiness, stickiness, packaging, appearance, price, the standard of measurement, quantity obtained after cooking, taste, and the length of cooking time. Being a migrant, female, older or low-income consumer, purchasing rice on open markets, having a relative who grows rice, eating a lower proportion of cooked rice away from home, as well as consideration for rice popularity, rice availability for purchase and rice certification by Regulatory Authorities such as the Food and Drugs Authority in Ghana are factors that directly influence local rice consumption in urban Ghana. To boost up local rice consumption, producers need to improve on rice attributes like aroma, cleanliness, packaging, the standards of measurement, and availability.

Keywords: *local rice consumption, imported/foreign rice, migrants, natives/indigenes, internal migration, urban Ghana, rice attributes*

1. Introduction

Rice is the second most important cereal after maize and is increasingly a main part of the diet in many Ghanaian homes due to its relative convenience in preparation and palatable recipes (Taylor, 2018). In Ghana, rice has become a major staple crop in recent times although the crop has been cultivated for several years. It is an essential food for both rural and urban dwellers and is gradually taking over from traditional crops, mainly root, tuber, and cereals like maize and millet (MoFA, 2015). Both imported and domestically produced rice are sold on the same market in urban Ghana, but the supply of locally produced rice can be irregular. About 70% of rice sold through retail outlets in Ghana is imported. With import substitution, an important policy objective in Ghana, rice enjoys trade protection in the form of a 40% import tariff (Ragasa and Chapoto 2016). Sector policies complement trade policy by creating an enabling environment for increased investment in local rice production and improved competitiveness of domestic rice. Substituting rice import and providing a higher-quality product that is more acceptable to Ghanaian consumers and can compete with imported rice has over the years been the objective of the government (MoFA, 2017). Ghanaians pay attention to grain quality and favorable pricing in their choice of rice types (Danso-abeam et al., 2014).

The promotion of domestic rice production and consumption has been one of the new transformational agenda adopted by the Government of Ghana to reduce rice importation and forestall its negative impact on the balance of payment (Tey and Brindal, 2014). This has resulted in a gradual shift towards the cultivation of more preferred aromatic varieties, with an estimated 45% of rice farmers now planting such varieties (Ragasa et al. 2014).

Urban consumers, who represent 55 percent of Ghana's population, account for 76% of total imported rice consumption (Taylor, 2018). The high consumption of rice, especially in the urban regions, is perhaps, due to the relative easiness of rice preparation compared to most of the local foods (Kwofie et al., 2016). Ghanaian urban consumers prefer imported rice due to its higher quality. Only 20% of domestically produced rice is

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consumed in urban areas due to its perceived poor quality and higher concentration of debris and stones. The import share of rice consumed in Ghana stays above 50% of total rice consumption (MoFA, 2018). The urban dwellers, who either temporarily or permanently migrated from Northern Ghana during the long dry season in search of various forms of short-term income-generating activities in the South, are relatively poor and deprived in most cases (Amfo et al., 2022). This income disparity among urban migrants and natives may favor the consumption of local rice by migrants who are relatively poor since research has found that income has a positive association with consumers' preference for imported rice (Tomlins et al., 2005) and a negative influence on a household preference for local rice (Ehiakpor et al., 2017). Consumption of locally produced rice among rice consumers is far lower than imported rice and is known to be influenced by price, grain and consumer characteristics (Danso-abeam et al., 2014). However, the level of local rice consumption among urban migrants and natives of Ghana is not empirically known. It is imperative, therefore, to evaluate the level of local rice consumption, desirable attributes of local rice, the determinants of local rice consumption among migrants and natives in urban Ghana and examine whether internal migration matters.

The purpose of this study was to examine the level of local rice consumption, desirable attributes of local rice, the determinants of local rice consumption among migrants and natives in urban Ghana and examine whether internal migration matters. The study was designed to address the following research questions. (1) What is the level of local rice consumption among urban migrants and natives in the Kumasi Metropolis of Ghana? (2) Which attributes are considered by consumers in choosing the preferred rice? (3) Which factors determine local rice consumption among migrants and natives in urban Kumasi, Ghana?

2. State of the Art

2.1 Rice consumption in Ghana

Rice consumption and importation are increasing in Ghana, outnumbering other cereal crops. Annual per capita rice consumption has more than quadrupled over the last 60 years, from 6.5 kg in 1957 to 32 kg in 2015 (MoFA, 2018). This has resulted in a rising disparity between local supply and demand. Imports are being used to meet Ghana's unmet rice demand. Ghana purchased 54 percent of its rice needs from China, Thailand, Vietnam, and the United States in 2015 (MoFA, 2018). Ghana's annual rice demand is currently a little over one million metric tons, and it is expected to continue to climb (MoFA, 2018).

Ghanaian customers prefer imported rice over locally grown rice due to the absence of foreign materials, superior grain quality, greater ease of cooking, and fragrant quality of many imported types (Asante et al., 2013). Anang et al. (2011) identified, in their study in Ghana, taste, cooking quality, cooking duration, and aroma as the most important factors in determining rice quality. Rice preferences vary greatly between countries and even between different regions within the same country (Calpe, 2003). Consumers in the United States place a great value on rice with specific cooking and processing qualities, but those in the Middle East prefer long grain kinds that are well-milled and have a strong aroma.

Consumers in Europe prefer unscented long-grain rice (Musa et al., 2011). Consumers in Nigeria enjoy clean, flavorful, and long-grain rice, according to studies, and these features are among the reasons why many choose imported rice over locally produced rice (Lancon et al., 2003). In Togo, city dwellers prefer imported non-parboiled rice to indigenous non-parboiled rice, owing to its cleanliness, superior taste, larger swelling capacity, and longer shelf life after cooking (Fiamohe et al., 2014).

2.2 Quality characteristics and quality attributes of local rice

Consumer preferences for particular rice quality features have market-specific effects on rice prices in specific markets (Anang et al., 2011). Consumer preferences are also influenced by rice cooking characteristics such as cooking time, water absorption ratio, elongation ratio, swelling capacity, and amylose concentration. Grain elongation during cooking is influenced by both genetic and processing parameters. Highly polished rice has less bran on the grain, less expansion of the starch granules and a higher elongation ratio. Additionally, smaller grains and highly polished rice need less time to cook than larger grains and rice with coarser surfaces (Mohapatra and Bal, 2006). According to Rutsaert et al. (2013), rice that has a higher capacity to swell during cooking is thought to be able to feed a higher number of people with the same amount of grain. The swelling capacity of rice at cooking is determined by the variety and amount of time it has been stored. Rice that has been stored for a longer period of time takes longer time to cook. Local aromatic cultivars in Ghana are superior to imported kinds in terms of nutrient content (Diako et al., 2011). Imported rice, on the other hand, has better cooking qualities. Domestic rice varieties in Ghana take longer time to cook, have a greater water uptake ratio, higher swelling capacity and contain more amylose than imported types.

The percentage of cracked kernels, the share of 'chalky' kernels, the degree of co-mingled varieties and organoleptic qualities are all conventional measures of rice quality attributes, according to the United States International Trade Commission (MoFA, 2018). Chemical features such as gelatinization temperature, apparent amylose content, gel consistency, alkali spreading value, and aroma are all varietal characteristics. Shape and size, grain color, chalkiness, bulk density, thermal conductivity, equilibrium moisture content, and grain flow ability are all physical features (MoFA, 2015). Moisture content, grain purity, physical and insect damage, cracked grains, and the presence of immature grains are all environmental factors to consider (MoFA, 2015). According to observations made in Ghana's numerous markets, most unbranded indigenous rice contains more than 25% broken kernels. As a result, this rice is considered low-quality.

2.3 Factors influencing local rice consumption

In both urban and rural markets, many varieties and brands of imported rice compete with locally produced rice. Sultana, Lele, Royal Feast, Uncle Sam, Uncle Bob, Savanna, Neat, Tiger, Special Lady, and Cindy are some of the imported brands in the Ghanaian market (Diako et al., 2010). These brands differ from one another and from the local rice in terms of origin, flavor, cooking ease, price, and grade (generally, percentage of broken grains). In Ghana, there is a scarcity of data on the factors that influence consumer choice for locally produced and processed rice. Diako et al. (2010) found that understanding and consumption of local rice in general and local aromatic kinds in particular were restricted among 390 rice users in Accra.

Rice choice and consumption are not uniform across all types and brands. Consumer preferences for specific types of rice are

influenced by factors such as physical appearance, ease of cooking, aroma, lack of foreign material, percentage of broken rice, perception of nutrient content, and origin (Diako et al., 2010). Consumer experience and marketing methods are critical in a liberalized market for creating customer loyalty to a specific type of rice. To enhance demand for local Ghanaian rice, build its competitiveness, and help to safeguarding future markets for rice farmers, it will be required to ensure that local rice types are grown and processed in a way that allows them to match the qualities desired by consumers (Diako et al., 2010).

3. Materials and methods

3.1 Study area, sample size and sampling procedure

The study was conducted in the Greater Kumasi Metropolis in the Ashanti Region of Ghana. Kumasi, the second largest city in Ghana, is cosmopolitan and the capital of the Ashanti Region. Local rice production is common in the Ashanti Region of Ghana due to favorable climatic and soil conditions. As centrally located in Ghana, Ashanti Region remains a center for many businesses in the country. As a result, the region has historically attracted several migrants from other parts of the country, especially northern Ghana (Amfo et al., 2021; GSS, 2013). For instance, many people migrate from northern Ghana to the Ashanti Region and other parts of southern Ghana during the long dry season in order to prevent themselves from becoming redundant (Amfo et al., 2021). The majority of these migrants settle in the regional capital, Kumasi. These migrants might be permanent or temporary/seasonal (Amfo et al., 2021).

Multi-stage sampling technique was used to sample 304 rice-consuming households in the Kumasi Metropolis of Ghana, approximated from a statistically determined sample size of 272 households using Equation 1 developed by Cochran (1963) to yield a representative sample for populations that are greater than 50,000.

$$n = \frac{Z^2 pq}{e^2} \quad (1)$$

Where n is the sample size, Z is the statistic for the desired confidence level (in this study 90% which is 1.65 in the statistical table), e^ is the desired level of precision (confidence interval expressed as decimal, in this study, ⟦e=0.05⟧^ (i.e. +/- 5% margin of error meaning the study accommodated 5.0% error), p is the estimated proportion of an attribute that is present in the population (in this study, rice-consuming households in Kumasi Metropolis) which may be known from prior research or other sources. If p is unknown, the variability of the attribute in the proportion is not known, we then equate p = 0.5 which assumes maximum heterogeneity or variability (i.e. a 50:50 split), then q is given as q=1-p ((Daniel, 1999).

Internal migration refers to the movement of people from one region of Ghana to settle either temporarily or permanently in another region (GSS, 2013a). A non-migrant is someone born in his/her current dwelling place (GSS, 2008). Thus, in this study, a migrant is someone who is a non-native of the Ashanti Region but has immigrated and settled in the region temporarily or permanently. In contrast, a native is an indigene of the Ashanti Region. Therefore, migrants were born and brought up outside the Ashanti Region while natives/indigenes were born in the Region.

A multistage sampling procedure was used to select respondents for the study. In stage one, a stratified sampling procedure was used to classify suburbs in the Kumasi Metropolis into two strata: migrant and native suburbs. In the second stage, four suburbs were randomly selected in each stratum based on the sample size of 304 to get a total of eight suburbs for the study. The four migrant suburbs selected for the study were Ayigya, Sawaba, Anloga and Fanti New Town. The four native suburbs covered for the study were Oforikrom, Bantama, Bomso and Asokwa. Migrant/settler suburbs refer to those dominated by migrants from other parts of the country. In contrast, native suburbs refer to those dominated by indigenes of the Ashanti Region. The stratification made it relatively easier to sample migrants and natives for the study. In the third and last stage of sampling, 38 households were randomly selected from each of the 8 suburbs sampled to arrive at 304 households comprising 152 migrant-households and 152 native-households. Because the target population of the selected suburbs was not readily known, each suburb was assigned a sample size of 38 households. In selecting the households, each suburb was divided into 4 quadrants using major streets and every 5th or 7th house along a major street in each quadrant was selected depending on the size of the suburb. One household from each selected house was sampled using a simple random sampling technique by making a list of households available at the time of interview.

The study targeted household members who play leading roles in food preparations and purchasing decisions. Thus, members in charge of household food shopping and cooking chores were sampled and interviewed. A semi-structured questionnaire was used to obtain cross-sectional data via personal interviews (face-to-face interaction with migrant and native households).

3.2 Data analysis

The five-point Likert scale ranking technique, multinomial probit, and fractional probit regressions were employed to analyze the data and draw conclusions. In addition, descriptive statistics were used to explore the level of local rice consumption among urban migrants and natives of Ghana.

3.2.1 Likert Scale ranking technique

A five-point Likert Scale ranking technique was used to examine attributes considered by consumers in choosing preferred rice. Households were made to rank twelve attributes of rice on a scale of 1 to 5 as unconsidered, not really considered, indifferent, considered, or highly considered respectively. The attributes examined using the Likert scale are as follows: aroma, taste, availability/consistency in supply, cleanliness, healthiness, packaging, the appearance of grains, price, the standard of measurement, the length of cooking time, the quantity obtained after cooking, non-stickiness after cooking.

3.2.2 Multinomial probit regression

Multinomial probit regression was used to investigate the factors influencing the desire for local rice consumption. It fits discrete/categorical response variables that have more than two outcomes and do not possess any natural ordering (StataCorp, 2015; Greene, 2012). The response variable for the multinomial probit estimation was local rice consumption: 1=only local rice, 2=only imported/foreign rice, and 3=both. Hence, there were three responses/outcomes (1, 2 and 3) in the response variable. To facilitate the estimation of the multinomial probit, there is only one choice/observation made by each respondent (migrants and natives). According to StataCorp (2015); Cameron and Trivedi (2005), multinomial probit uses a latent-variable framework. The latent variable for the j^th choice, j=1,…,J, is

$$n_{ij} = z_i\alpha_j + \varepsilon_{ij} \quad (2)$$

where the 1×q row vector z_i consists of observed independent variables for the i^th migrant or native. Moreover, α_j is the J vector of the regression coefficient, and it is linked to z_j. ε_(i,1,…,) ε_(i,j), which represents independently and identically standard normal. Following StataCorp (2015); Cameron and Trivedi (2005), a migrant or native chooses the alternative k such that n_ik≥n_im for m≠k. Assuming that migrant or native i chooses alternative k, and the difference between the latent variable n_ij and J-1 and others:

$$v_{ijk} = n_{ij} - n_{ik} = z_i(\alpha_j - \alpha_k) + \varepsilon_{ij} - \varepsilon_{ik} = z_i\gamma_j + \varepsilon_{ij} \ (3)$$

The probability that k is chosen is:

$$\Pr(i \ selects \ k) = \Pr\left(v_{i1k} \le 0, \dots, v_{i,k} \le 0\right) \ (4)$$

$$\Pr\left(\epsilon_{i1} \le z_i\gamma_i, \dots, \epsilon_{i,}J - 1 \le -z_i\gamma_i - 1\right) \ (5)$$

In the multinomial probit regression, 3=both local and imported/foreign rice was used as the base outcome. Thus, 3=both local and imported/foreign rice was set to 0. The coefficients for the remaining outcomes/responses, 1=only local rice and 2=only imported/foreign rice, assessed changes in local rice consumption in comparison to 3=both local and imported/foreign rice.

3.2.3 Fractional probit regression

Fractional probit regression was used to assess the factors influencing the proportion of local rice in total household rice consumption. The reconnaissance survey conducted for the study indicated that half of the urban folks do not eat local rice while a quarter consumes only local rice. Hence, the proportion of local rice in total household rice consumption among each of the urban rice consumers was either 0% or 100%. This leads to a response variable that is more than or equal to 0 and less than or equal to 1

$$\ln L = \sum_{j=1}^{N} w_j y_j \ln\{G(x_j'\beta)\} + w_j(1 - y_i) \ln\{1 - G(x_j'\beta)\} \ (6)$$

where N represents the sample size (304 migrant and native households); y_j represents the response variable (proportion of local rice in total household rice consumption); w_j represents the optional weight; lnL is maximized. The functional form for G (x_j^' β) for the probit fractional model is

$$\phi(x_j'\beta) \ (7)$$

where x_j represents covariates for individual j, and ϕ represents standard normal cumulative density function.

4. Results and Discussion

4.1 Socioeconomic characteristics of urban rice consumers

The socioeconomic characteristics of respondents examined in the study are outlined in Table 1. The study disaggregated the respondents into internal migrant and native residents of urban Ghana. Migrant residents could either be permanent or temporary/seasonal in the study area. A majority (60%) of the respondents, as shown in Table 1, were females. In Ghana, women usually take the leading role in food preparations and purchase decisions (Amfo et al., 2019). According to He et al. (2019); Demont and Ndour (2015), women play essential roles in household food provision, choice and processing. The field survey further indicated that the majority of males who were in charge of household food shopping and cooking were unmarried or had no female household members. The average age of respondents was 38 years, with 13 years of formal education. This means that on average, a respondent had attained Senior High School education. The respondents had an average monthly household income of US$400. About one-fifth of the respondents had relatives who cultivate rice. The remainder might have relatives who were farmers but did not cultivate rice. About 40% of the respondents consider the popularity of rice before purchasing. Such people consume brands of rice that are well-known and patronized by many people. Also, a little above one-fourth of the respondents considers certification of rice by the Food and Drugs Authority (FDA) of Ghana before purchasing. FDA is a Government of Ghana Regulatory Agency that ensures the safety and quality of food and drugs to safeguard human health in the country. Thus, consumers who strictly consume FDA-certified food products have a higher consciousness about their health. Furthermore, the respondents purchase rice from supermarkets (42%) as well as open markets (58%). Close to 75% of the respondents eat cooked rice away from home. Such households purchase cooked rice from restaurants, street food vendors, canteens, cafeterias and other eateries. As further indicated in Table 1, the proportion of rice eaten away from home by a typical household constituted only one-quarter of the total household rice consumption.

Table 1: Variable description and socioeconomic characteristics of respondents

Variable	Description	Measurement	Aggregate (n=304)	
			Mean	*Standard deviation*
Residential status	1=native, 0=migrant	%	0.50	0.500
Type of migrant	1=temporary/seasonal, 0=permanent	%	–	–
Sex	1=male, 0=female	%	0.408	0.492
Age	Respondent's age	Years	37.865	11.707
Education	Years of schooling	Years	12.961	4.935
Income	Monthly household income	US$*	400.500	218.870
Grow rice	1=a relative grows rice, 0=otherwise	%	0.224	0.417
Consideration of rice popularity	1=considers rice popularity before buying, 0=otherwise	%	0.385	0.487

Consideration of FDA certification	1=considers FDA certification before buying rice, 0=otherwise	%	0.273	0.446
Where consumer buys rice	1=supermarkets, 0=open markets	%	0.421	0.495
Eat away from home	1=eat cooked rice away from home, 0=otherwise	%	0.730	0.445
Proportion eaten away from home	Proportion of cooked rice eaten away from home	%	0.253	0.211

**Exchange rate: Ghana cedis (GH¢) is the currency of Ghana; US$1 = GH¢6.57*

Differences in socioeconomic characteristics between migrant and native residents were identified. The t-statistic in Table 2 reveals statistically significant differences in socioeconomic characteristics between migrants and natives. Migrant residents were either temporary/seasonal (54%) or permanent (46%). Due to the unimodal rainfall pattern, poor soil and climatic conditions, infrastructural development and job opportunities in Northern Ghana, many people migrate to the southern part on a temporary/seasonal or permanent basis (Amfo et al., 2022). Thus, some people either temporarily or permanently migrate to Southern Ghana during the long dry season to engage in various forms of short-term income-generating activities (Amfo et al., 2022).

Table 2: Differences in socioeconomic characteristics between migrant and native residents

Variable	Migrants (n=152)		Natives (n=152)		t-test
	Mean	*Standard deviation*	*Mean*	*Standard deviation*	
Type of migrant (%)	0.536	0.500	–	–	–
Sex (%)	0.375	0.486	0.441	0.498	-2.367**
Age (years)	42.914	10.937	32.816	10.201	54.601***
Education (years)	11.553	5.350	14.368	4.032	45.112***
Income (US$)	346.952	218.184	454.047	206.758	31.901***
Grow rice (%)	0.322	0.469	0.125	0.332	-6.655***
Consideration of rice popularity (%)	0.257	0.438	0.513	0.501	3.347***
Consideration of FDA certification (%)	0.184	0.390	0.362	0.482	6.588***
Where consumer buys rice (%)	0.368	0.484	0.474	0.501	- 2.069**
Eat away from home (%)	0.770	0.422	0.691	0.464	6.279***
Proportion of cooked rice eaten away from home (%)	0.264	0.206	0.242	0.217	-8.081***

*** and *** denote statistical significance at 5% and 1% respectively*

Close to 40% of the migrants were males while about half of the natives were males. Male migrants in charge of household food shopping and cooking were predominantly those who stayed alone in the study area or those without female members. On average, migrant respondents were older than natives. Natives had higher years of formal education and income than migrants. There were more migrant residents (32%) who had relatives cultivating rice than natives (13%). This implies that many non-natives migrated from farming communities; and thus, had relatives who were farmers. More natives consider the popularity and FDA certification of rice before purchasing than migrants. Though eating cooked rice away from home is associated with only one-quarter of total rice consumed by a household, it was more prevalent among migrants (77%) than natives (69%). Many (temporary/seasonal) migrants are without household members and cooking appliances at destinations, making it slightly difficult to cook compared with natives.

4.2 Local rice consumption in Urban Ghana

The pattern of local rice consumption by migrant and native residents in urban Ghana is encapsulated in Table 3. The t-test suggests statistically significant differences in the pattern of local rice consumption between the two parties. One-fourth of urban folks in the Kumasi Metropolis of Ghana consume only local rice while half consume only imported/foreign rice. This implies that half of the urban folks do not eat locally cultivated rice in Ghana. However, a substantial proportion (23%) consumes both local and imported/foreign rice. This observation suggests a high level of imported/foreign rice consumption among urban dwellers in Ghana. This trend is attributable to the fact that many Ghanaians have developed a favorable preference for imported/foreign rice due to its preferred attributes (especially taste) over the local varieties. Compared with natives (17%), a higher proportion of migrants (36%) consumes only local rice since they have been identified

as poor and deprived (Amfo et al., 2022). Conversely, a higher proportion of natives (68%) consume only imported/foreign rice than migrants (34%). Most people who migrate from other parts of Ghana to the Kumasi Metropolis in search of greener pastures are usually in the low-income bracket. Such low-income migrants could afford local rice more easily, especially the cheaper brands with low-value addition, than imported/foreign rice. Also, some people migrated from farming communities/households; and thus, had relatives who cultivate local rice. Such farming-relatives could offer migrants a quantity of local rice for household consumption.

Table 3: Local rice consumption in urban Ghana by migrant and native residents

Variable	Description	Aggregate	Migrants	Natives	t-test
Type of rice consumed (%)	Only local	26.640	36.180	17.110	9.433***
	Only imported	50.660	33.550	67.760	
	Both	22.700	30.260	15.130	
Quantity of rice consumed per month (kg)	Mean	14.622	14.243	15.000	36.762***
	Standard deviation	6.707	6.947	6.459	
	Minimum	5.000	5.000	5.000	
	Maximum	30.000	30.000	30.000	
Quantity of local rice consumed per month (kg)	Mean	11.033	10.990	11.122	19.011***
	Standard deviation	6.886	6.893	6.942	
	Minimum	5.000	5.000	5.000	
	Maximum	30.000	30.000	30.000	
Quantity of imported/foreign rice consumed per month (kg)	Mean	12.511	10.876	13.770	25.540***
	Standard deviation	7.069	6.997	6.890	
	Minimum	5.000	5.000	5.000	
	Maximum	30.000	30.000	30.000	
Proportion of local rice in total household rice consumption (%)	Mean	38.076	51.283	24.868	2.756***
	Standard deviation	43.091	42.931	39.137	
	Minimum	0.000	0.000	0.000	
	Maximum	100.000	100.000	100.000	

**** denote statistical significance at 1%.*

The quantity of rice consumed by a typical urban household per month ranged from 5kg to 30kg, with an average of 15kg. Averagely, local rice forms 38% of rice consumed by households in the Kumasi Metropolis of Ghana. This observation is an indication that over 60% of rice consumed in Urban Ghana is imported. However, the minimum and maximum values of local rice proportion in total rice consumption reveal that some households in the metropolis do not consume local rice at all while others consume only local rice. Also, on average, local rice constitutes a higher proportion of rice consumed by migrant households (51%) than native households (25%). This trend is consistent with the fact that local rice consumption is higher among migrants than among indigenes.

4.3 Attributes considered in choosing a preferred type of rice

Attributes considered by urban households in choosing a preferred type of rice are ranked in Table 4 using a five-point Likert Scale of 1 to 5 as unconsidered, not really considered, indifferent, considered, or highly considered respectively. The attributes include aroma, availability, cleanliness, healthiness, stickiness, packaging, appearance, price, the standard of measurement, the quantity obtained after cooking, taste, and length of cooking time. Consumers look out for these attributes in deciding whether to consume local or imported/foreign rice or a particular variety/brand. The majority of the respondents consider aroma (55%) and taste (83%) in choosing the preferred rice. Therefore, the palatability and aroma of rice determine the level of its consumption. Availability is another attribute considered by about 70% of rice consumers in choosing the preferred rice. Such consumers prefer types/brands of rice that are consistent in supply; and thus, easily accessible and reliable in supply. Also, cleanliness (62%) and healthiness (33%) are paramount in choosing the preferred type of rice. This implies that consumers prefer rice brands with no foreign materials and are hygienic. Consumers purchase rice

they trust is healthy for human consumption since the production, processing, storage and transportation processes could render rice unsafe/unhealthy. For instance, using excessive and unapproved agrochemicals for the production and processing of rice could render it unwholesome. Such a phenomenon alerts consumer consciousness about their safety.

Table 4: Attributes considered for type of rice preferred

Rice attribute	Rank level of attributes (%)				
	Highly considered	*Considered*	*Indifferent*	*Not really considered*	*Unconsidered*
Aroma	27.96	26.97	9.87	28.29	6.91
Taste	45.72	37.50	3.62	13.16	0.00
Availability/consistency in supply	29.61	39.14	5.59	22.37	3.29
Cleanliness	28.95	32.57	4.93	27.30	6.25
Healthiness	7.57	25.33	10.86	42.11	14.14
Packaging	10.53	25.99	5.26	31.25	26.97
Appearance of grains	6.58	23.03	2.63	38.82	28.95
Price	61.18	34.21	4.61	0.00	0.00
Standard of measurement	9.54	28.29	3.29	49.67	9.21
length of cooking time	7.57	33.88	3.62	24.01	30.92
Quantity obtained after cooking	14.80	24.01	14.47	37.50	9.21
Non-sticky when cooked	28.29	25.00	11.84	29.93	4.93

Also, 37% of consumers prefer rice brands/types with good packaging (Table 4). In addition to attractiveness, the package conveys relevant information about rice such as brand, name, contact of manufacturer/producer, country of origin, weight, nutritional value, manufacturing, and expiry dates. Furthermore, the pleasing appearance/whiteness of rice grains is paramount to 30% of consumers. Ehiakpor et al. (2017) ranked good-looking grains of rice as the most prominent trait considered by consumers in choosing a rice brand. Also, Mottaleb and Mishra (2016) reported that the visual appearance of the rice grain is an important attribute that affects a consumer's choice. The price of rice is an attribute considered by 95% of consumers. There is a high variation in the price of rice depending on the brand/manufacturing firm. In developing countries like Ghana, the majority of consumers are low-income; and thus, prefer rice brands with relatively low prices. Consumers further consider cooking features of rice such as the length of cooking time (41%), the quantity obtained when cooked (39%) and non-sticky when cooked (53%). According to Ehiakpor et al. (2017), major attributes considered by households in purchasing rice are cleanliness, packaging, taste, aroma, ease of cooking, the volume of expansion after cooking and price. Moreover, Abubakar et al. (2015); Alhassan et al. (2015) indicated that color, aroma, and taste are important attributes considered by consumers in choosing foreign or local rice.

4.4 Determinants of local rice consumption in Urban Ghana

Determinants of local rice consumption in Urban Ghana were estimated using multinomial probit and fractional probit and the results are shown in Table 5. Whilst the multinomial probit estimates show the factors influencing local rice consumption, the fractional probit identifies the factors influencing the proportion of local rice in total household rice consumption. The pseudo R-squared indicates that about 60% of variations in the proportion of local rice in total household rice consumption could be attributed to the explanatory variables used for the fractional probit estimation. The Wald chi-squared in both estimations is statistically significant. This means that the explanatory variables jointly contribute to variations in the consumption of local and imported rice among consumers in the study area.

Sex was identified as a significant factor that positively influences the consumption of imported rice in the multinomial probit regression. This indicates that being a male household member, who plays major role in food preparations and purchasing decisions, increases the likelihood of consuming imported/foreign rice. Sex is also seen as a significant and negative factor in the fractional probit regression indicating that being a male household member, who takes major decisions on rice consumption, reduces the proportion of local rice in the household total rice consumption. This study sampled and interviewed members of households who play leading roles in food preparations and purchasing decisions. Hence, the results imply that households whose shopping and cooking decisions are influenced by males have a higher probability of choosing to consume imported/foreign rice over local rice than their counterparts with female influence. A household in Ghana

whose food preparation and purchasing decisions are taken by a male is generally one-member household or a male living with little child(ren). In Ghana and most African countries, females are traditionally in charge of cooking and purchasing food for their respective households (Amfo et al., 2019; Ben, 2015; Kassali et al., 2010). Moreover, Demont and Ndour (2016) asserted that women play essential roles in household food provision and choice. As a result, females from low-income households usually develop various economizing strategies in food shopping than males. One of these economizing strategies could be the purchase/consumption of local rice since it is relatively less expensive in Ghana than imported/foreign rice (depending on the level of value addition). This result is consistent with Ehiakpor et al. (2017); Ogundele (2014), who found that the probability of consuming local rice is greater for females than males.

Age is significant and positive for local rice but negative for imported rice in the multinomial probit regression (Table 5). This implies that the consumption of local rice increases with age while the consumption of imported/foreign rice decreases with age. The fractional probit regression shows that age significantly and positively influences the proportion of local rice in the total rice consumed by a household. Thus, households who have older people making decisions on shopping and cooking choices are more likely to opt for local rice consumption and increase the proportion of local rice consumption than their counterparts whose decisions are made by younger generations. This trend is attributed to the fact that traditionally, local rice has been produced and consumed in Ghana for many years compared with the importation of foreign rice and that the majority of older people are highly accustomed to the taste and other attributes of local rice. On the other hand, younger people are more likely to develop a higher taste and preference for imported/foreign rice since they might probably have consumed it away from home since childhood. According to Ehiakpor et al. (2017), because of the high respect/prestige associated with imported rice consumption in most parts of Ghana, majority of youth prefer imported rice to local rice. This result is in agreement with Ehiakpor et al. (2017) who reported that age has a positive relationship with a household's preference for local rice. Nevertheless, this result is in contrast with Danso-Abbeam et al. (2014) who reported that the consumption of local rice has an indirect association with age.

The multinomial probit regression further revealed that household income is a significant factor that negatively influences the preference for local rice consumption but positively influences that for imported/foreign rice consumption. This means that the consumption of local rice decreases with income while the consumption of imported/foreign rice increases with income. From the fractional probit regression, household income is identified as a significant and negative factor influencing the proportion of local rice in household total rice consumption. This observation suggests that the proportion of local rice in the total rice consumed by a household reduces with a percentage rise in its income. Thus, high-income households are more likely to consume a higher proportion of imported/foreign rice while low-income households are more likely to consume a higher proportion of local rice. Unlike imported/foreign rice, local rice mostly exhibits poor value addition and attributes in terms of packaging, cleanliness (devoid of foreign materials) and improvement in the aroma. This phenomenon makes local rice less expensive than imported/foreign rice. Thus, low-income households are better able to afford local rather than imported rice. This finding agrees with Tomlins et al., (2005) who found that income has a positive association with consumers' preference for imported rice. Similarly, Ehiakpor et al. (2017) revealed that income negatively influences a household's preference for local rice.

Table 5: Results from multinomial probit and fractional probit regression

Variable	Coefficient (z-value)		
	Multinomial probit estimates		*Fractional probit estimates*
	Local rice	*Imported rice*	
Sex	-0.614 (-1.50)	1.115 (2.04)**	-0.264 (-1.73)*
Age	0.054 (2.50)**	-0.070 (-2.56)**	0.022 (2.97)***
Education	0.006 (0.14)	-0.055 (-1.12)	0.006 (0.32)
Income	-0.0001 (-3.22)***	0.0001 (2.15)**	-0.0003 (-5.02)***
purchasing source of rice	-1.730 (3.23)***	4.286 (5.70)***	-0.743 (-3.99)***
Whether a relative grows rice	1.507 (3.73)***	-2.756 (-2.50)**	0.803 (4.17)***
Proportion of rice eaten away from home	-4.355 (-4.35)***	-0.028 (-0.02)	-1.315 (-3.54)***
Consideration of rice popularity	-13.521 (0.001)	2.392 (3.81)***	-1.320 (-6.53)***
Consideration of FDA certification	-12.116 (0.001)	2.529 (2.99)***	-1.308 (-4.38)***
Consideration of rice availability	0.224 (1.06)	0.744 (2.68)***	-0.164 (-2.05)**
Residential status	0.283 (0.64)	1.154 (2.34)**	-0.197 (-1.31)
Constant	-1.356 (-1.08)	0.347 (0.22)	0.294 (0.59)
Number of observations	304		304
Pseudo R-squared	–		0.584
Wald chi-squared	88.66***		251.19***
Log likelihood	-89.88		–
Log pseudo likelihood	–		-84.138

, ** and * denote statistical significance at 10, 5% and 1% respectively. The base outcome for the multinomial probit estimation is consumption of both local and imported rice*

The source from which households buy rice has been proven by the multinomial probit regression to be a significant factor that negatively influences local rice consumption, but positively influences the consumption of imported rice (Table 5). The results from the multinomial probit regression have established that purchasing rice in supermarkets has a higher tendency to reduce household desire for consuming local rice and enhance the consumption of imported/foreign rice. From the fractional probit regression, the purchasing source has been shown as a significant factor that negatively affects the proportion of local rice in household total rice consumption. This infers that households who purchase rice in supermarkets have a higher likelihood of reducing the proportion of local rice in their total rice consumption. It could, therefore, be deduced that households that purchase rice from open markets have a higher probability of consuming local rice than those who purchase from supermarkets. Most supermarkets in Ghana sell more imported/foreign food products (including rice) than local products. On the other hand, the sale of local food products (like rice) is rifer in open markets than in supermarkets. In Ghana, shopping of foodstuffs in supermarkets is commonly practiced among high-income households rather than low-income households. Thus, consumers who buy foodstuffs in open markets are more likely to consume more local rice than their counterparts who buy from supermarkets.

Consumption of local and imported rice may depend on whether or not a relative of a household grows rice. The multinomial probit regression revealed a significant and positive relationship between households whose relative grows rice and consumption of local rice. The relationship turns out to be negative for the consumption of imported rice. It can be inferred that having a relative who grows rice increases household desire to consume local rice and reduces it for imported/foreign rice. From the fractional probit regression, the proportion of local rice in household total rice consumption was significantly and positively influenced by having a relative who grows rice. Having a relative who grows rice may induce local rice consumption and increase the proportion of local rice in the total rice consumed by a household. Therefore, households whose relatives grow rice have a higher probability of consuming local rice than those who do not. Rice production in Ghana is characterized by the cultivation of local varieties which farmers could present to their relatives in urban areas as gifts to induce local rice consumption among such households.

The proportion of cooked rice eaten away from home, as revealed in the multinomial probit regression estimates in Table 5, is a significant and negative factor influencing local rice consumption. This means that the consumption of local rice reduces with the proportion of cooked rice eaten away from home. The fractional probit regression estimates show a significant and negative relationship between local rice consumption and the proportion of cooked rice eaten away from home. This implies that the proportion of local rice in the household total rice consumption consumed by a household reduces with the proportion of cooked rice eaten away from home. Thus, households whose eating pattern is characterized by eating higher proportions of cooked rice away from home have a lower probability of consuming local rice. This observation emanates from the fact that the majority of food vendors in Ghana sell cooked imported rice rather than local rice.

Many other factors such as rice popularity, availability, and certification by Regulatory Bodies, as outlined in Table 5, influence local rice consumption in urban Ghana. The consideration for rice popularity, availability, and certification by regulatory bodies like FDA significantly and positively influences the consumption of imported rice, as indicated by the multinomial probit regression estimates. Households that considered rice popularity, availability, and certification by a FDA as major attributes of rice increased the consumption of imported rice. The fractional probit regression estimates show that each of these three attributes reduces the proportion of local rice in the total quantity of rice consumed in a household. It could be established from this trend that consumers who consider rice popularity, availability and certification as major attributes of rice have a higher probability of consuming imported/foreign rice than those who do not consider these attributes. This infers that consumers have a higher preference for rice brands that are easily available and accessible on the market. This observation confirms the findings of Ehiakpor et al. (2017) that product availability directly influences consumers' choice of foreign products. There is a high demand for food safety due to increasing concerns about consumer health (Amfo and Ali, 2021). Thus, health-conscious consumers prefer to consume rice certified by FDA of Ghana. Such consumers purchase rice they trust are healthy for human consumption. Imported rice are more likely to possess these attributes than local rice.

Residential status, defined as being a native of the study area or a migrant, was estimated in the multinomial probit regression (Table 5). It was a significant factor that positively influences the consumption of imported rice. The regression estimates infer that natives of the study area are likely to increase the consumption of foreign rice. This observation infers that being a native of an urban centre increases the consumption of imported/foreign rice. Thus, the consumption of local rice is likely to be prevalent among migrants while that of imported/foreign rice is more prevalent among natives. . This is because a majority of migrants who travel from other parts of Ghana to the urban areas in search of better means of livelihood are usually low-income (Amfo, 2022) and could better afford local rice, especially those with low value-addition and are usually cheaper than imported/foreign rice. Moreover, some people (especially those from northern Ghana) migrate from farming communities/households on a temporary basis to prevent them from being redundant during the dry season. Therefore, they are likely to have relatives who cultivate local rice. Such relatives could supply migrants with local rice, as remittance, for household consumption.

5. Conclusions and policy recommendations

One-fourth of urban folks in Kumasi Metropolis of Ghana consume only local rice while half consume only imported/foreign rice, implying that half of the urban folks in Ghana do not eat locally cultivated rice. Therefore, compared with imported/foreign rice, there is a low level of local rice consumption in urban Ghana. Furthermore, compared with natives, a higher proportion of migrants consume only local rice. Conversely, a higher proportion of natives consume only imported/foreign rice than migrants. Hence, local rice consumption is higher among migrants than natives/indigenes.

Averagely, local rice forms 38% of rice consumed by households in urban Ghana. Also, local rice constitutes a higher proportion of rice consumed by migrant households than that of native households in urban areas of Ghana. Therefore, internal migration into urban Ghana matters in local rice consumption. Attributes considered in choosing preferred rice (either local or imported/foreign) are aroma, availability, cleanliness, healthiness, stickiness, packaging, appearance, price, the standard of measurement, the quantity obtained after cooking, taste, and duration of cooking time. Being a migrant, female, older or low-income consumer, purchasing rice on open markets, having a relative who grows rice, eating a lower proportion of cooked rice away from home, as well as consideration of rice popularity, FDA certification, and availability are factors that directly influence local rice consumption in urban Ghana.

To boost up local rice consumption in urban Ghana, producers should improve on attributes such as aroma, cleanliness (devoid of foreign materials), packaging, and the standard of measurement since these are highly considered by consumers in choosing preferred rice. With improved attributes, the younger generation, the high-income consumers and food vendors need to be encouraged to patronize the consumption of local rice. Also, the availability of local rice should be enhanced so that consumers can easily access it on the market. Like imported/foreign rice, local rice should be made available on supermarkets. Local rice should be certified by FDA and/or other regulatory agencies since certification is a major attribute considered by health-conscious consumers in purchasing rice. Improvement in local rice attributes requires extra cost which would be borne by the consumers. Therefore, further studies should be conducted on consumers' willingness to pay for improved local rice attributes by migrants and natives in urban Ghana.

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Conflict of interest
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