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Consumer Perception of Rice Safety in West Africa

Rebecca Owusu[1*], Ifeoma QuinetteAnugwa[2], Jane MbolleChah[2] and Ernest Teye[3]

[1]*Department of Agricultural Economics and Extension, School of Agriculture, University of Cape Coast, Ghana*

[2]*Department of Agricultural Extension, University of Nigeria, Nigeria*

3Department of Agricultural Engineering, School of Agriculture, University of Cape Coast, Ghana

Correspondence should be addressed to Rebecca Owusu, rebecca.owusu@ucc.edu.gh

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ABSTRACT

Recent food borne diseases and food fraud scandals have raised consumers concerns over food safety issues and such concerns tend to affect their risk perceptions. This paper aims at investigating perceptions of rice safety among sampled consumers in Ghana and Nigeria, and to identify the determinants of rice safety perceptions. Using a total of 442 sample from Ghana and Nigeria, our analyses showed that consumers (about 38%) are somewhat confident about rice products safety. However, majority of the consumers (57%) are very much concerned about potential rice safety issues such as plastic rice incidence and food poisoning. Generally, our regression estimates showed that intrinsic attributes such as taste, and extrinsic attributes including price and safety information significantly and positively affect consumers' rice safety perceptions. The findings reveal that consumers' value taste and price as good indicators of rice safety, and in formulating policy for rice industry, we should consider safety information.

KEYWORDS

Consumer perceptions; Rice safety; Regression; Food fraud

INTRODUCTION

In recent times, foodborne diseases and food fraud scandals around the world have raised concerns over food safety issues [1]. It has been estimated that one in ten people in the world falls ill after eating contaminated food and children under five years of age carry 40% of the burden of the foodborne disease with 125 000 deaths annually [1]. Food safety, which has been defined as the conditions and measures that are necessary during production, processing, storage, distribution and preparation of food to ensure it is safe, sound and wholesome and safe for human consumption [2] has become critical in food policy debates. Policymakers are, therefore, gradually emphasising food safety measures in addition to food security. Understanding consumer perceptions of food safety is consequently essential for policymakers and regulatory institutions to establish food safety management systems.

The concept of food safety has been the subject of many empirical studies. Previous studies examining consumer perceptions of food safety have focused on the perceived risk associated with food, food-related hazards, and food technologies [3,4]. Consumer trust in different actors and institutions responsible for guaranteeing and controlling food safety, as well as trust in the information provided by various information sources that communicate about food safety or food-related risks, is considered to be essential for

consumer confidence in food safety [5,6]. Consumer perceptions of risk and their trust in regulators, and risk information, have been identified as critical underlying determinants of consumer acceptance of new food technologies, as well as factors that influence consumer behaviour in the context of food safety incidents [6].

In this paper, we examine the consumer perception of rice safety in West Africa. Rice is a major food security crop in West Africa and is consumed by people in both urban and rural areas. The rice industry in West Africa has also been the subject of recent food scandals such as plastic and fake rice [7]. It is therefore vital to examine whether consumer perceptions of food safety have changed with the scandals or consumers still have a better understanding of the rice consumed in West Africa. The study uses two countries in West Africa, Ghana and Nigeria as case studies. This study deviates from previous studies of Frewer et al. [3]; Rosati et al. [4]; Liu et al., [6] in the following ways. Specifically, we examine the factors that affect consumer perception of rice safety, focusing on intrinsic and extrinsic attributes, trust in stakeholders and consumers' socio-economic factors. We also employ robust econometric techniques such as generalised ordered and binary logit models to examine the drivers of consumer perception of food safety. Policy implications are drawn from the findings of the study to guide food policy debates in the selected countries.

METHODOLOGY

Study Area

The study was carried out in Ghana and Nigeria. Specifically, the research in Ghana was conducted in the Cape Coast metropolis of the Central region of Ghana. Cape Coast metropolis is one of the 22 Metropolitan, Municipal and District Assemblies in the Central region of Ghana. It is located on longitude 1015'W, and latitude 50.06'N. It covers a land area of 122 square kilometres. It is bounded on the south by the Gulf of Guinea, west by the Komenda Edina Eguafo/Abrem municipal, east by the Abura Asebu Kwamankese district and north by Twifo Hemang Lower Denkyira district. In Nigeria, the study was conducted in the South-East zone. The South East zone of Nigeria is one of the six geopolitical zones in the country. The region falls within latitude 6'N and 8'N and longitude 4'30'E and 7'30'E. It covers a total land area of 40,000 square kilometres.

Sampling and Survey Method

The population of the study involved all rice consumers in Ghana and Nigeria, out of which a sample was drawn for the study. The multistage random sampling technique comprising purposive and simple random sampling techniques was employed in selecting the sample for study. In the case of Ghana, the purposive sampling technique was employed in selecting three suburbs in the Cape Coast metropolis including Amamoma, Cape Vars and Akotokyire. The simple random sampling technique was then used to select 50 respondents each from Amamoma and Akotokyire and 53 from Cape Vars, resulting in a sample of 153.

In the case of Nigeria, a similar sampling procedure was employed. Specially, the South-eastern region was purposively selected. Out of the five states of the South-eastern region, three were selected for the study using random sampling technique. The selected states were Enugu, Anambra and Abia. Two Local Government Areas (LGA) were selected from each of the three states, respectively. In Enugu, Enugu North and Nsukka were selected. For Anambra and Abia, Ekulobia and Onitsha; and Umuahi and Ikwano were selected, respectively. In each of the LGAs, 50 rice consumers were selected, giving a total of 300 consumers. However, only 289 questionnaires were returned and used on the final analysis.

A face-to-face interview using structured questionnaires were used to collect information on consumer perception of rice safety in Ghana and Nigeria. The questionnaires were

peer-reviewed and pilot tested before the final version was administered. Questionnaires were structured into two sections. The first section comprised socioeconomic questions on respondents including age, gender, educational status and average monthly income. The second section was composed of questions on consumers' perception of food safety to include questions on consumers' perception of rice safety, concerns of rice safety problems, factors that drive consumers' food safety concerns. Trained research assistants conducted the data collection at the University Cape Coast, Ghana and the University of Nigeria. In all, a total of 442 consumers were interviewed comprising 153 respondents from Ghana and 289 respondents from Nigeria. The data collection started in February 2019 and ended in May 2019.

Measurement of Variables

The dependent variable of interest was the perception of safety of rice products. It was measured by asking consumers to rate on a five-point Likert scale (1 = A little safe; 2 = A somewhat safe; 3 = neither; 4 = safe; 5 = Very safe). The independent variables of interest were perception of intrinsic and extrinsic attributes and trust in stakeholders. The intrinsic attributes involved were taste, smell and appearance and the extrinsic attributes were brand name, price, place of purchase and label (government inspection, food safety assurance, expiry date and country of origin). These attributes were ranked by consumers using a five-point Likert scale (1 = A little dependent; 2 = somewhat dependent; 3 = neither; 4 = dependent; 5 = Total dependent). Trust in stakeholders (Rice producers, Rice processors, rice research stations, government regulators and academic institutions) was measured based on consumers perception of the level of influence of them using a Likert scale (1 = A little influential; 2 = somewhat influential; 3 = neither; 4 = influential; 5 = Very influential). The other independent variables were socio-economic factors: Age, sex (male = 1), educational status (formal education = 1) and employment status (employed = 1).

Statistical Analysis

Statistical analyses were conducted in SPSS software version 20 and Stata software version 14. First measures of central tendencies of the respondents' socio-economic characteristics were computed. Given the ordinal five-level categories of the independent variables, ordinal regression would have been suitable, however, the problem with ordinal regression is that the proportional odds assumption is often violated, and this was confirmed using the brant command in Stata. The result was significant giving an indication that the proportional odds assumption had been violated. The violation problem was addressed using a less restrictive generalized ordered logit model (partial proportional odds model), which relaxes the proportional odds assumption and allows the effect of the independent variables to vary with the point at which the categories of the independent variables are dichotomized. The formula for the predicted probability in the partial proportional odds model is:

$$P(Y_i < j) = \frac{\exp(\alpha_j x_{1i}\beta_1 + x_{2i}\beta_2 + x_{3i}\beta_3)}{1+\{exp(\alpha_j x_{1i}\beta_1 + x_{2i}\beta_2 + x_{3i}\beta_3)\}}, j = 1,2,\dots,M-1 \quad (1)$$

Where Y is the ordinal dependent variable and M is the number of categories of the ordinal dependent variable.

In addition, a logit model was estimated to derive the specific factors that affect consumers' perception of rice safety. The probability (P_i) that an individual consumer, i, given independent variables (x_i), perceives rice product as safe is specified as:

$$P_i = F(z_i) = F(\alpha + \beta x_i) = \frac{1}{[1+\exp(-z_i)]} \quad (2)$$

where β is a vector of unknown parameters, α is an intercept. βx_i is a linear combination of independent variables such that

$$z_i = \log\left(\frac{P_i}{1-P_i}\right) = \beta x_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots \beta_n x_n + \varepsilon \quad (3)$$

where I = 1, 2... n are observations, z_i =the log odds of choice for the *i-th* observation, x_n=the *n-th* explanatory variables for the *I - th* observation, β = the parameters to be estimated and ε is the error term. In order to make inferences about the effect of independent variables on the dependent variable, marginal effects were estimated. Marginal effects are estimates of the change in an independent variable holding all other variables constant [5].

RESULTS

Descriptive Statistics

The descriptive statistics of the respondents and the differences in the characteristics between respondents from Ghana and Nigeria are presented in Table 1. The average age of respondents is 29 years with 67% being males. About 92% of the respondents have had some level of formal education, with 57% of them being employed.

		Ghana		Nigeria		Pooled	
		Mean	**Std.**	**Mean**	**Std.**	**Mean**	**Std.**
Rice Safety[a]	**Average perception of safety**	4.0	1.03	3.90	1.18	3.90	1.13
Socio-Economic Factors	**Average age in years**	27	10	30	10	29	10
	% Males	67	-	53	-	56	-
	% Educated	86	-	94	-	92	-
	% Employed	69	-	52	-	57	-
Food Safety Incident	**% Yes**	39	-	28	-	32	-

Table 1: Descriptive statistics of sampled consumers.

The perception of the respondents was measured on a Likert scale where (1= A little safe; 2 = A somewhat safe; 3 = neither; 4 = safe; 5 = Very safe). Generally, the respondents perceived their consumption of rice products as safe, given a mean value of about 4.

In terms of the difference in the perception of rice safety of the sample in Ghana and Nigeria, a t-test conducted revealed no significant difference, suggesting that sampled consumers in both countries generally perceive the consumption of rice products as safe.

The perception of the sampled consumers that rice products are safe contradicts media reports of the food fraud occurring in the rice industry. The contradiction could be arising from the fact that consumers are unaware of the potential dangers of fraud activities such as plastic rice and fake rice on the market.

Factor Analysis Results

Factor analysis was used to construct new factors affecting consumers' perception of rice safety.

Bartlett's test of sphericity and the Kaiser-Meyer-Olkin test were used to test the relevance of the factor analysis. Bartlett's test of sphericity is significant (P <0.001, p = 0.000) and the KMO measure is 0.80, which is greater than 6, suggesting that factor analysis is appropriate. The indicators loaded unto four factors - Factor 1 (credence extrinsic attribute), Factor 2 (Experience extrinsic attribute), Factor 3 (level of stakeholders' trust) and Factor 4 (intrinsic attribute).

Perception of Potential Rice Safety Problems

[Figure 1] shows the distribution of sampled consumers' perception of potential rice safety issues and from the figure; we observe that about 57% of the consumers were very much concerned about food poison and plastic (fake) rice incidents. However, this concern does not affect their perception of the safety of rice products (Table 1), suggesting that possibly not many consumers are aware of the recent incidences of plastic and fake rice and even if they did, might have ignored its potential effect.

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Uniqueness
Taste	-	-	-	0.712	0.368
Odour	-	-	-	0.775	0.346
Appearance	-	-	-	0.690	0.371
Labeling	0.572	-	-	-	0.600
Place of Purchase	0.720	-	-	-	0.397
Brand	0.682	-	-	-	0.461
Price	0.697	-	-	-	0.475
Government Inspection	-	0.669	-	-	0.490
Safety Information	-	0.771	-	-	0.380
Ingredients	-	0.680	-	-	0.424
Expiry Date	-	0.684	-	-	0.443
Country of Origin	-	-	-	-	0.505
Rice Farmers	-	-	0.624	-	0.483
Rice Processing	-	-	0.668	-	0.436
Retain Stations	-	-	0.566	-	0.555
Government Regulators	-	-	0.750	-	0.413
Academic Institutions	-	-	0.660	-	0.531

Table 2: Rotated factor matrix.

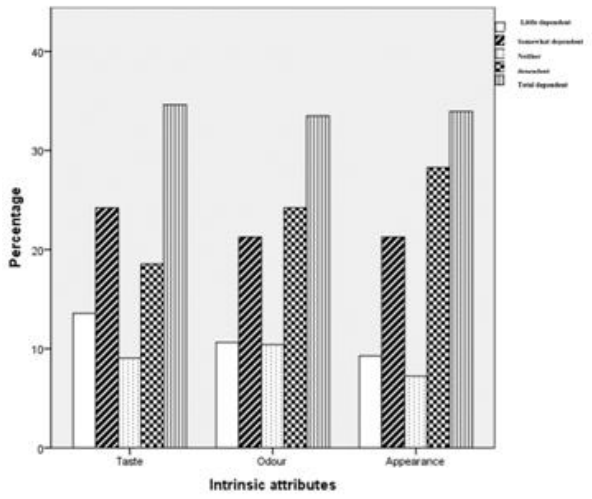

Figure 1: Consumers perception of potential rice safety concerns.

Figure 2 indicates sampled consumers dependence on intrinsic factors in determining rice safety. From the figure, we observe that intrinsic factors such as taste, and appearance are valued the most.

Of the experience extrinsic factors, brand name and price are scored higher compared to the place of purchase (Figure 4).

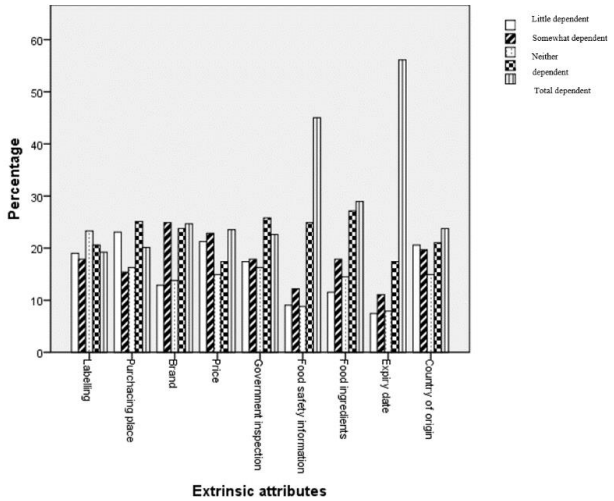

Figure 2: Consumers dependence on extrinsic attributes in determining rice safety.

The level of trust of consumers in stakeholders for ensuring rice safety is presented in Figure 5. From Figure 5, we observe that sampled consumers perceived rice processing

companies (about 55%) as very influential in ensuring rice safety.

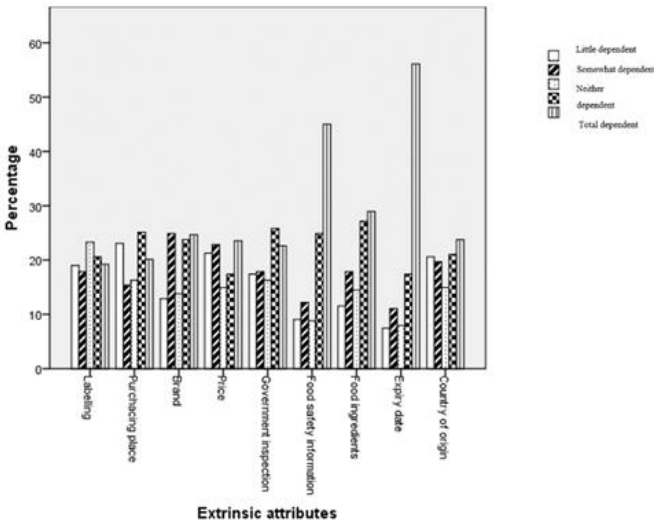

Figure 3: Consumers dependence on experience extrinsic attributes in determining rice safety.

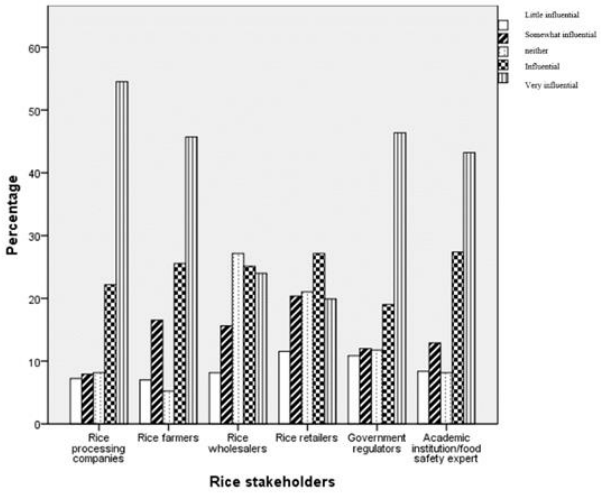

Figure 4: Consumers perception of the level of influence of stakeholders in rice safety issues.

		Constant	Sex	Age	Education	Employment	Factor 1	Factor 2	Factor 3	Factor 4
Somewhat Safe	**Coefficient**	-2.435***	-0.524	-0.003	-0.238	-0.441**	-0.400***	0.149	-0.696***	-0.044
	SE	0.532	0.186	0.010	0.336	0.189	0.099	0.251	0.210	0.233
Neither	**Coefficient**	-0.937*	-0.524	-0.003	-0.238	-0.441**	-0.400***	-0.465***	-0.037	-0.703***
	SE	0.494	0.186	0.010	0.336	0.189	0.099	0.140	0.135	0.129
Safe	**Coefficient**	-0.492	-0.524***	-0.003	-0.238	-0.441**	-0.400***	-0.578***	-0.181	-0.762***
	SE	0.492	0.186	0.010	0.336	0.189	0.099	0.122	0.123	0.120
Very Safe	**Coefficient**	1.593***	-0.524***	-0.003	-0.238	-0.441**	-0.400***	-0.130	-0.010	-0.498***
	SE	0.493	0.186	0.010	0.336	0.189	0.099	0.111	0.109	0.115

Table 3: Generalized ordinal logit regression estimates for Ghana and Nigeria.
Factor 1= Credence extrinsic attributes, Factor 2= Experience extrinsic attributes, Factor 3= Stakeholders, Factor 4=Intrinsic attributes. "*", "**", "***" show 10%, 5% and 1% levels of significant, respectively.

		Constant	Sex	Age	Education	Employment	Factor 1	Factor 2	Factor 3	Factor 4
Somewhat safe	**Coefficient**	-6.691***	-0.710**	0.179	0.524	-1.728***	-0.539**	-0.173	0.030	0.492
	SE	0.848	0.344	0.063	0.500	0.391	0.224	0.160	0.150	0.499
Neither	**Coefficient**	-0.719	-0.710**	-0.012	0.524	-1.728***	-0.539**	-0.173	0.030	-1.173***
	SE	1.184	0.344	0.020	0.500	0.391	0.224	0.160	0.150	0.284
Safe	**Coefficient**	0.404	-0.710**	-0.015	0.052	-1.728***	0.539**	-0.173	0.030	-1.610***
	SE	0.949	0.344	0.028	0.500	0.391	0.224	0.160	0.150	0.281
Very Safe	**Coefficient**	2.617***	-0.710**	-0.012	0.524	-1.728***	-0.539**	-0.173	0.030	-1.051***
	SE	0.848	0.344	0.020	0.500	0.391	0.224	0.160	0.150	0.264

Table 4: Generalized ordinal logit regression estimates for Ghana.
Factor 1 = Credence extrinsic attributes, Factor 2 = Experience extrinsic attributes, Factor 3 = Stakeholders, Factor 4=Intrinsic attributes. "*", "**", "***" show 10%, 5% and 1% levels of significant, respectively.

		Constant	Sex	Age	Education	Employment	Factor 1	Factor 2	Factor 3	Factor 4
Somewhat Safe	**Coefficient**	-3.305***	-0.379	0.003	-0.181	0.074	-0.387***	0.387	-1.530***	-0.239**
	SE	0.915	0.685	0.013	0.562	0.248	0.133	0.343	0.349	0.310
Neither	**Coefficient**	-0.430	-1.802***	0.003	-0.181	0.074	-0.387***	0.252	-0.859***	-0.885***
	SE	0.774	0.406	0.013	0.562	0.248	0.133	0.271	0.280	0.182
Safe	**Coefficient**	-1.657**	-0.431***	0.003	-0.181	0.074	-0.387***	-1.275***	0.138	-0.442***
	SE	0.770	0.337	0.013	0.562	0.248	0.133	0.224	0.216	0.164
Very Safe	**Coefficient**	0.716	-0.245	0.003	-0.181	0.074	-0.387***	-0.205	0.143	-0.315**
	SE	0.749	0.271	0.0133	0.562	0.248	0.133	0.518	0.154	0.137

Table 4: Generalized Ordinal logit regression estimates for Ghana. Factor 1 = Credence extrinsic attributes, Factor 2 = Experience extrinsic attributes, Factor 3 = Stakeholders, Factor 4 = Intrinsic attributes. "*", "**", "***" show 10%, 5% and 1% levels of significant, respectively.

		Constant	Sex	Age	Education	Employment	Factor 1	Factor 2	Factor 3	Factor 4
Somewhat Safe	**Coefficient**	-3.305***	-0.379	0.003	-0.181	0.074	-0.387***	0.387	-1.530***	-0.239**
	SE	0.915	0.685	0.013	0.562	0.248	0.133	0.343	0.349	0.31
Neither	**Coefficient**	-0.43	-1.802***	0.003	-0.181	0.074	-0.387***	0.252	-0.859***	-0.885***
	SE	0.774	0.406	0.013	0.562	0.248	0.133	0.271	0.28	0.182
Safe	**Coefficient**	-1.657**	-0.431***	0.003	-0.181	0.074	-0.387***	-1.275***	0.138	-0.442***
	SE	0.77	0.337	0.013	0.562	0.248	0.133	0.224	0.216	0.164
Very Safe	**Coefficient**	0.716	-0.245	0.003	-0.181	0.074	-0.387***	-0.205	0.143	-0.315**
	SE	0.749	0.271	0.013	0.562	0.248	0.133	0.518	0.154	0.137

Table 5: Generalized ordinal logit regression estimates for Nigeria. Factor 1= Credence extrinsic attributes, Factor 2= Experience extrinsic attributes, Factor 3= Stakeholders, Factor 4=Intrinsic attributes. "*", "**", "***" show 10%, 5% and 1% levels of significant, respectively.

Consumers further revealed that government regulators such as the Food and Drugs Authority in Ghana and the National Agency for Food and Drug Administration and Control (NAFDAC) in Nigeria are the next stakeholders that could ensure rice safety. These stakeholders are followed by rice farmers and Academic institutions/food safety experts in protecting consumers by ensuring rice safety.

Determinants of Consumers Rice Safety Perceptions

(Table 3 presents the results of the generalized ordered logit regression model of the sample on the perception of rice safety. The country specific estimates are reported in Table 4 (Nigeria) and Table 5] (Ghana).

We note that only the odds ratios of the estimation results are presented. From the estimated results (Table 3), it can be observed that the extrinsic attributes, trust in stakeholders and intrinsic attributes of the sample significantly affect perception of rice safety. For instance, consumers with high trust in stakeholders are significantly less likely to rank rice products as somewhat safe (OR=-0.696)-Table 3. At the same time, those with higher level of experience extrinsic attributes are significantly less likely to consider rice products as neither safe nor unsafe (OR=-0.465). The results further show that consumers with high credence extrinsic attributes are less likely to rank rice products as safe (OR=-0.578) in comparison to consumers with low intrinsic attributes (-0.400). In addition to the attributes, the results show that males are significantly less likely to consider the rice products as safe or very safe (OR=-0.524) compared to females (Table 3).

The employed are also less significantly likely to rank the rice products as safe or very safe (OR=-0.441) in both countries, compared to the unemployed.

In the case of Ghana (Table 4), the employed are significantly less likely to consider consumption of rice products as a little safe, safe or very safe (OR = 1.728).

At the same time, those with higher levels of intrinsic attributes are less likely to rank the consumption of rice products as safe or very safe (OR = -1.173). Those with higher levels of credence extrinsic attributes are less likely to rank consumption of rice products as safe or very safe (OR=-0.539). The results also show that males are significantly less likely to rank consumption of rice products as safe or very safe (-0.710).

In relation to Nigeria (Table 5), consumers with high levels of credence extrinsic attributes are significantly less likely to rank consumption of rice products as safe or very safe (Table 5, OR = -0.387). However, higher levels of trust in stakeholders shows a significantly less likelihood of consumers considering consumption of rice products as neither unsafe or safe (Table 5, OR=-0.387). This is consistent with Bener (2000) study outcome that showed that trust in actors reduces level of perceived risk. The results further reveal that consumers with high levels of intrinsic attributes are less likely to rank consumption of rice products as safe or very safe.

The binary logistic model estimates are presented in Table 6. From the results, we observe that consumers perception

of rice safety in Ghana and Nigeria are mainly influenced by gender, and intrinsic and extrinsic attributes. In the case of Ghana, the individuals with high levels of education have a low probability of classifying rice products as safe compared with those with low levels of education. The employed, however, have a high probability of considering rice products as safe compared to the unemployed. In addition, consumers with high levels of intrinsic attributes have a high probability of perceiving rice products as safe. In the case of Nigeria, consumers perception of rice safety is affected by gender, credence attribute, experience attribute and intrinsic attributes. Specifically, consumers with a higher level of intrinsic attributes have a high probability of perceiving rice products as safe compared to those with lower levels of intrinsic attributes.

	Pooled		**Ghana**		**Nigeria**	
Parameters	Coef.	SE	Coef.	SE	Coef.	SE
Sex	0.452*	0.259	0.414	0.525	0.553*	0.317
Age	0.01	0.014	0.006	0.039	0.011	0.018
Education	-0.036	0.494	-1.681*	0.998	-0.163	0.719
Employed	0.256	0.264	1.590**	0.264	0.085	0.333
Factor 1	0.324**	0.134	0.08	0.134	0.414**	0.167
Factor 2	0.561***	0.127	0.302	0.248	0.655***	0.168
Factor 3	0.201	0.124	0.195	0.222	0.186	0.156
Factor 4	0.826***	0.129	1.880***	0.363	0.634***	0.157
Constant	0.828	0.702	1.736	1.464	1.017	0.977
	Pooled		**Ghana**		**Nigeria**	
Parameters	Coef.	SE	Coef.	SE	Coef.	SE
Sex	0.452*	0.259	0.414	0.525	0.553*	0.317
Age	0.01	0.014	0.006	0.039	0.011	0.018
Education	-0.036	0.494	-1.681*	0.998	-0.163	0.719
Employed	0.256	0.264	1.590**	0.264	0.085	0.333
Factor 1	0.324**	0.134	0.08	0.134	0.414**	0.167
Factor 2	0.561***	0.127	0.302	0.248	0.655***	0.168
Factor 3	0.201	0.124	0.195	0.222	0.186	0.156
Factor 4	0.826***	0.129	1.880***	0.363	0.634***	0.157
Constant	0.828	0.702	1.736	1.464	1.017	0.977

Table 6: Logit model estimates.

	Pooled		**Ghana**		**Nigeria**	
Parameters	**Coefficient**	**SE**	**Coefficient**	**SE**	**Coefficient**	**SE**
Sex	0.069*	0.039	0.048	0.585	0.088*	0.049
Age	0.002	0.002	0.001	0.01	0.002	0.003
Education	-0.006	0.075	-0.131***	0.048	-0.025	0.106
Employed	0.038	0.042	0.228**	0.099	0.014	0.054
Factor 1	0.050**	0.021	0.009	0.042	0.066**	0.027
Factor 2	0.087***	0.019	0.036	0.03	0.106***	0.026
Factor 3	0.031	0.019	0.023	0.026	0.03	0.025
Factor 4	0.128***	0.019	0.225***	0.044	0.102***	0.024

Table 7: Marginal effects.

The marginal effects from the logistic regression model are presented in Table 7. The estimated results show that a percentage increase in consumers credence extrinsic attribute increases their perception of rice safety by 5%. Similarly, a percentage increase in their intrinsic attribute increases their perception of rice safety by 128%, suggesting that consumers intrinsic attribute is very important in their perception of safety.

In the case of Ghana, a percentage increase in education reduces perception of rice safety by about 131%, this could be resulting in recent food fraud news items that are mainly accessible by the educated people. However, a percentage increase in employment and intrinsic attributes increases perception of rice safety by 228% and 225%, respectively. In the case of Nigeria, a percentage increase in extrinsic attributes (credence and experience) increases perception of

rice safety by 6.6% and 106%, respectively. The intrinsic attribute also increases perception of rice safety by 102%.

DISCUSSION

Consumers' extrinsic values such as brand name, price and place of purchase significantly affect their perception of rice safety. Also, intrinsic factors including taste and appearance tend to affect consumer perception of rice safety in both countries. It therefore suffices to note that both extrinsic and intrinsic factors are key divers of perception of rice safety in both countries. Price and availability was the second most important characteristic for Croatian consumers. Brecic et al., Murphy et al., Iop et al., Jáuregui-Lobera and Bolaños Ríos [8-11] reported price as an important variable in consumer food choice. Despite its importance, price was not the major attribute that influenced consumer choice in the study area. This agrees with Iop et al. [10]. A high proportion of respondents as indicated in Figure 1, where much concerned about food poison and plastic rice incidents. Because of this many, especially in Nigeria have switch to consuming locally produced rice to foreign rice. Lovers of Healthy and tasty food are very sensitive to intrinsic food characteristics [8]. Meanwhile, Sloan [12] reported that consumers are more interested in nutritious, healthy, and convenient foods. Convenient consumers are mostly concerned about extrinsic quality characteristics of food. When choosing food, they place emphasis on its price and availability. However, Rappaport et al. [13] observed that health motives were negatively correlated with convenience.

On country basis as in the case of Nigeria, we found that increased level of trust in stakeholders of food safety increases perception of rice safety. People believe sources of information that: are possibly not biased, share people's values and concerns, and are able to demonstrate that their interest is to protect the health of the consumers. Consumers are more likely to trust information sources or institutions that have the expertise relevant to the topic of communication, and have shown record of credibility, honesty, integrity and appropriate skills [14]. In addition, the results show that male consumers are less likely to consider consumption of rice products as not at all safe. This finding is consistent with previous study outcomes that have found that females tend to perceive more risk than males [4,15,16]. The reason for this observation could be that in Africa, males are not normally involved in preparing food at home, compared to women whose cultural responsibility is to cook at home and therefore might have had some experiences that tend to affect perception of rice safety in both countries.

CONCLUSION

This study investigated consumer perception of rice safety in West Africa using consumers in Ghana and Nigeria as case studies. A descriptive survey experimental design was adopted where consumers were asked to respond to series of questions indicating their rice safety perceptions, their intrinsic and extrinsic attributes and the level of trust in stakeholders in ensuring that rice products are safe for consumption. Using a sample of 450 consumers, the empirical results show that majority of consumers are somewhat confident of their rice consumption. The study further revealed that consumers are concerned about food safety issues relating to food poisoning and plastic or fake rice, 57% respectively.

A generalized ordered logit regression model estimates showed that males are less likely to consider rice products as little safe compared to females. Also, the employed are less likely to rank rice products as little safe compared to the unemployed. In addition, the results show that consumers with high intrinsic attributes are significantly more likely to rank rice products as little safe. Using binary logit regression model, we found the predictors of consumer rice safety as credence extrinsic attributes (labelling, place of purchase, brand name and price), level of trust in stakeholders and intrinsic attributes (taste, smell,

appearance) are the predictors of consumers perception of rice safety.

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