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Competence of Public Institutions in Food Safety Control: A Consumer Perception Survey in Ghana

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HIGHLIGHTS

- The highest mean score was 2.81±1.198 for consumer perception about public institutions' competence in ensuring food safety.
- Mean score was ranged from 1.46±0.776 to 2.32±1.248 for the degree of public concern about various food hazards.
- Consumer perception of public institutions' competence in ensuring food safety people was below average, showing an unsatisfied situation.

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ABSTRACT

Background: Ensuring food safety and minimizing risks require coordinated efforts of various institutions. The objective of this study was to determine how Ghanaian consumers score the competence of public institutions in controlling food safety risks and the effects of this perceived score on their level of concerns about food safety risks.

Methods: Totally, semi-structured questionnaire administered to 444 Ghanaian consumers in 2017. Public perception of the competence of food safety institutions was assessed by asking a set of questions in addressing each food safety issues. Data were statistically analyzed using SPSS version 20.

Results: The highest and lowest mean scores were 2.81±1.198 and 2.41±1.218, respectively for consumer perception of public institutions' competence in ensuring food safety, in the range of 1-5 where 1 represents very poor and 5 represents excellent. Also, the mean score for the degree of public concern was ranged from 1.46±0.776 to 2.32±1.248 about various food safety hazards and risks on a scale of 1-5, where 1 represents 'extremely worried', and 5 represents 'not at all worried'.

Conclusion: Consumer perception of public institutions' competence was below average in ensuring food safety people, showing an unsatisfied situation. For certain specific food safety hazards and risks, consumer perception about the competence level of public institutions affected their degree of worry about those risks.

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Introduction

Ensuring food safety and minimizing risks require coordinated efforts of various institutions. In Ghana, various ministries play different roles to ensure food safety such as Ministries of Health, Food and Agriculture, Local Government, Tourism as well as their departments and agencies, and research institutions. Furthermore, the Food and Drugs Authority provides and enforces standards for the manufacture and sale of foods, medicines and

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cosmetics. Research institutions also play a role by providing results of food safety researches, contributing to food-borne disease surveillance, and furnishing appropriate information on mitigation measures for most food safety problems (Ministry of Health of Ghana, 2013).

Ghana's food safety system faces major challenges such as poor coordination of activities of the various institutions leading to inefficiencies; lack of resources and sometimes expertise to detect hazards and assess their risks; limited infrastructure such as laboratories, roads, hygienic markets, as well as a lack of structured and regular means of acquiring and disseminating relevant food safety risk-related information (FAO, 2016; Sefa-Dedeh, 2009). Other challenges are the large number of informal sector actors with inadequate knowledge of standards, regulations, and good food safety practices and without regulated, sensitized, or educated on the prevention of food hazards and their risks. Recognizing this challenge, Ghana has developed and adopted its National Food Safety Policy since 2015 to achieve a well-coordinated and structured food safety system that clearly outlines the roles of all relevant institutions and stakeholders for the management and control of food safety. Most often, the people depend on government's institutions to ensure the provision of food safety. As a result, trust and also confidence are important considerations for food choices and practices in these institutions (Berg et al., 2005).

An important component of trust is competence (Frewer et al., 1996; Poortinga and Pidgeon, 2003). Competence is the extent to which an institution is perceived to have knowledge and expertise to assess, manage, and communicate about a risk (FAO, 2016; Mayer et al., 1995). Competence is particularly important because people are more inclined to trust institutions that they perceive to have the necessary knowledge, expertise and skills to address their concerns. One major way by which institutions can prove their competence is performing well their mandated roles. In other words, public perception of the competence of institutions can be a reflection of how well they perform their functions in food safety system to minimize risks. This perception is even more important because many food safety issues are invisible to most people who also do not always understand available scientific information themselves; hence, they rely on information emanating from experts such as scientists, regulators, and other institutions. In this regard, public perception of competence of institutions in controlling food safety risks has the tendency to influence public confidence and concerns about food safety situations. A food safety system that malfunctions probably are due to the incompetence of institutions may be a cause for concern of the consumers.

In view of the above issues, this study sought to determine whether consumer perception about the competence of public institutions provides them adequate assurance of food safety or whether it simply leads to more concerns. The objective of the current research was to determine how consumers score the competence of public institutions in controlling food safety risks as well as the effects of this perceived score on their level of concerns about specific food safety risks.

Materials and methods

Participants

A cross-sectional survey was conducted in urban, peri-urban, and rural parts of Accra, the capital city of Ghana in 2017. Totally, semi-structured questionnaire administered to 444 Ghanaian consumers (18 years and older) selected by convenience sampling technique. The interview was conducted face-to-face by research assistants who were trained to ensure mutual understanding and translation of the questionnaire into the local language if necessary. The interview lasted for approximately 10 to 15 min. The questionnaire contained both closed and open-ended questions on respondents' perceptions and concerns about food safety and its management in Ghana.

Data collection

Data included demographic and socio-economic information namely age, sex, level of education, and primary occupation. Public perception about the competence of food safety institutions in addressing each food safety issues was assessed by asking a set of questions 'How would you score the level of competence of public institutions (such as Food and Drug Authority; Ghana Standards Authority; Relevant Ministries and Departments; Research Institutions; Metropolitan, Municipal and District Assemblies) in addressing each of the twelve food safety risks?'. The responses were rated on a five-point Likert scale where 1=very poor, 2=below average, 3=average, 4=above average, and 5=excellent. Six of the 12 food safety issues were based on food safety issues (hazards and other conditions that compromise food safety) identified by Omari and Frempong (2016). These issues were pesticides residues in fruits and vegetables, bacterial contamination, excessive use of artificial flavour enhancers, excessive use of food colors, leaked substances from plastic packages, and unhygienic cooking and selling sites. Six new food safety issues were added based on prevailing knowledge and discussions on food safety in Ghana and Africa as a whole. These were adulteration of palm oil with Sudan dyes, aflatoxin, food infested with moulds, visibly spoilt food, foods left uncovered, and foods produced near illegal mining sites. Public concerns about twelve specific food safety issues

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were assessed to determine the extent to which respondents worry about each of the food safety issues. These were measured on a five-point Likert scale where 1=extremely worried, 2=very worried, 3=moderately worried, 4=slightly worried, 5=not at all worried.

Data analysis

Data were analyzed using Statistical Package for Social Sciences (SPSS, version 20). Initial data analysis included descriptive statistics of respondents' level of worry about the twelve identified food safety issues as well as their scoring of the performance of public food safety institutions in controlling each food safety problem. Categorical variables were summarized by percentages and presented graphically. The data was further analyzed to calculate Pearson's Correlation Coefficients to determine the unadjusted associations of all variables. Multivariate Regression analysis was performed with public concern in specific food safety issues as dependent variables and consumer perception of competence of public institutions as the independent variable. The dependent variables were also regressed on age, gender, education level, and employment status of respondents.

Results

Totally, 73% of respondents were youthful (18-35 years old), 59% female, 41% male, 54% with tertiary education level, 28.2% with basic education level, and the remained had no education. Also, 39% of respondents were self-employed, 31.8% employed in private or public sector, and the remained were unemployed.

As shown in Table 1, the mean scores for consumer perception of public institutions' competence were below average in ensuring food safety. The highest and lowest mean scores were 2.81±1.198 and 2.41±1.218, respectively, in the range of 1-5 where 1 represents very poor and 5 represents excellent. Also, the mean score for the degree of public concern about various food safety hazards and risks were ranged from 1.46±0.776 to 2.32±1.248 on a scale of 1-5, where 1 represents 'extremely worried', and 5 represents 'not at all worried'.

Being worried about pesticide residue in food was positively associated with worrying about bacteria (r=0.556, $p<0.01$), unhygienic selling environments (r=0.243, $p<0.01$), excessive usage of artificial colors (r=0.305, $p<0.01$), Sudan dyes (r=0.434, $p<0.01$), aflatoxin (r=0.336, $p<0.01$), moulds infestation (r=0.251, $p<0.01$), and food from mining sites (r=0.467, $p<0.01$). Gender had significant negative associations with public level of worry about pesticides (r=-0.14, $p<0.01$) and food from mining sites (r=-0.13, $p<0.01$). Educational level was negatively associated with level of worry about bacteria (r=-0.099, $p<0.01$) and aflatoxin (r=-0.107, $p<0.01$).

The mean score for competence of public institutions associated negatively with level of worry about pesticides (r=-0.259, $p<0.01$) and bacteria (r=-0.206, $p<0.01$), plastic leakages (r=-0.152, $p<0.01$), Sudan dyes (r=-0.122, $p<0.01$), aflatoxin (r=-0.210, $p<0.01$), and food from mining sites (r=-0.233, $p<0.01$).

Multivariate Regression analysis shown in Table 2 confirmed at 95% confidence level, gender was the strongest predictor of level of worry about pesticides (B=-0.291, $p<0.05$) followed by food from mining sites (B=-0.279, $p<0.05$), aflatoxin (B=-0.254, $p<0.05$), plastics leakages (B=-0.213, $p<0.05$), and excessive use of artificial flavors (B=-0.206, $p<0.05$). Table 2 also shows confirmation of educational level as a stronger predictor of worry about aflatoxin (B=-0.179, $p<0.05$) than bacteria (B=-0.157, $p<0.05$). Furthermore, employment status was also confirmed as a better predictor of worry about uncovered foods (B=0.170, $p<0.05$) followed by unhygienic cooking and selling sites (B=0.130, $p<0.05$).

Table 1: Respondents' mean score for competence of public institutions in ensuring food safety and consumer level of worry about specific food safety issues (Range: 1-5)

Food safety risks	Perception of public institutions' competence	Degree of worry about food safety risks
Pesticides residues in food	2.41±1.218	2.01±1.142
Bacteria or germs in food	2.81±1.198	1.82±0.942
Cooking, selling or serving food in unhygienic environments	2.73±1.329	1.46±0.776
Excessive use of artificial flavors	2.57±1.195	1.87±0.915
Leaked contaminants from plastic packages	2.62±1.191	2.04±1.043
Excessive use of artificial colors	2.54±1.172	1.89±0.991
Sudan dye in palm oil	2.68±1.276	1.93±1.059
Aflatoxin	2.50±1.260	2.25±1.204
Food infested with moulds	2.73±1.216	1.79±0.938
Visibly spoilt food	2.81±1.223	1.69±0.996
Uncovered food	2.66±1.237	1.70±0.992
Foods produced near mining sites	2.51±1.290	2.32±1.248

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Table 2: Parameter estimates for Multivariate regression analysis showing predictors of level of worry (only significant values are shown)

Dependent variable/ worry	Parameter	B	Std. error	T	Sig.	95% confidence interval	
						Lower bound	Upper bound
Pesticides	Intercept	3.569	0.358	9.964	0.000	2.865	4.273
	Gender	-0.291	0.107	-2.711	0.007	-0.502	-0.080
	Education level	-0.169	0.070	-2.403	0.017	-0.308	-0.031
	Mean competence score	-0.277	0.051	-5.424	0.000	-0.377	-0.176
Bacteria	Intercept	2.734	0.301	9.086	0.000	2.143	3.325
	Education level	-0.157	0.059	-2.656	0.008	-0.274	-0.041
	Mean competence score	-0.191	0.043	-4.450	0.000	-0.275	-0.106
Unhygienic environ-ments	Intercept	1.459	0.252	5.789	0.000	0.964	1.955
	Education level	-0.119	0.050	-2.390	0.017	-0.216	-0.021
	Employ status	0.130	0.048	2.692	0.007	0.035	0.224
Excess flavors	Intercept	2.424	0.296	8.188	0.000	1.843	3.006
	Gender	-0.206	0.089	-2.322	0.021	-0.380	-0.032
	Education level	-0.133	0.058	-2.279	0.023	-0.247	-0.018
	Employ status	0.121	0.057	2.134	0.033	0.010	0.232
Plastics contaminants	Intercept	2.964	0.336	8.809	0.000	2.302	3.625
	Gender	-0.213	0.101	-2.118	0.035	-0.411	-0.015
	Education level	-0.132	0.066	-1.992	0.047	-0.262	-0.002
	Mean competence score	-0.146	0.048	-3.047	0.002	-0.240	-0.052
Excess colors	Intercept	2.261	0.323	6.996	0.000	1.626	2.896
	Mean competence perception	-0.059	0.046	-1.281	0.201	-0.149	0.032
Sudan dyes	Intercept	2.583	0.343	7.540	0.000	1.910	3.256
	Employ status	0.142	0.065	2.172	0.030	0.013	0.271
	Mean competence score	-0.120	0.049	-2.462	0.014	-0.216	-0.024
Aflatoxin	Intercept	3.794	0.382	9.935	0.000	3.043	4.545
	Gender	-0.254	0.114	-2.222	0.027	-0.479	-0.029
	Education level	-0.179	0.075	-2.382	0.018	-0.327	-0.031
	Mean Performance	-0.239	0.054	-4.387	0.000	-0.345	-0.132
Uncovered food	Intercept	1.484	0.323	4.598	0.000	0.850	2.119
	Employ status	0.170	0.062	2.764	0.006	0.049	0.292
Food from mining sites	Intercept	3.986	0.395	10.081	0.000	3.209	4.763
	Gender	-0.279	0.118	-2.359	0.019	-0.512	-0.047
	Mean competence score	-0.272	0.056	-4.830	0.000	-0.383	-0.161

Discussion

Whereas previous studies such as Omari et al. (2017) and De Jonge et al. (2004, 2008) examined public confidence and concern about food safety in general, this study focuses on public concern in twelve specific food safety hazards and risks as well as the perceived competence of relevant public institutions to control these specific hazards and risks. In the present work, we found that the general perception was that public institutions with a below average level of competence in ensuring food safety. This finding differs from Omari et al. (2017) who found that fast-food consumers perceive government institutions with an average level of competence. The difference in findings could be due to the variations in study contexts. However, the low score for competence recorded in this study could be as a result of several challenges that are known to confront most public food safety institutions in Ghana. The challenges include inadequate enforcement of food safety legislations particularly in the informal sector mostly due to inadequate personnel and logistics such as transport and inspection equipment (FAO, 2005).

The current research showed that consumers were of the view that public institutions had higher level of competence in dealing with microbial hazards and risks such as bacteria, moulds, unhygienic cooking, and selling or serving environments than other types of risks. This finding could be due to periodic public education on appropriate hygienic practices intensified by Ministry of Health, Food and Drugs Authority and other institutions in Ghana in prior to the rainy season particularly to prevent cholera outbreak (FAO, 2016). Conversely, we found that consumers were more worried about microbiological risks from unhygienic cooking, selling or serving environments, visibly spoilt food, uncovered food, and bacterial contamination. These findings support Bruhn and Schutz (1999) who stated that most American consumers as well consumers in the nationwide food marketing institute survey expressed major concern about

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bacterial contamination than any other food safety issue.

Similar to Frewer et al. (1994) we found that any perception of lapses on the part of these institutions could be a cause for concern of the people. The level of worry about bacteria could have been heightened by the annual cholera outbreak that sometimes reaches epidemic proportions in Ghana. For example, since the past three decades, the worst cholera epidemic occurred in 2014 where many Ghanaian people were affected and several deaths were occurred. These issues imply that just having competence is not enough to ensure food safety. On the other hand, it is important to have continuous and sustained consumer's educations as well as the enforcement of relevant laws and standards, too. In Ghana, the Public Health Act prohibits the sale or serving of unwholesome food and food under insanitary conditions. However, these practices persist in both rural and urban centers largely due to inadequate inspection and enforcement of the law (FAO, 2005).

It was found that Ghanaian consumers with higher level education were more likely to be more worried about aflatoxin contamination than other risks probably because their knowledge of these risks centered on only the effects of these hazards but not the mitigation measures. In Ghana, structured and regular means is lacking for acquisition and dissemination of relevant food safety risks and corresponding mitigation measures, although such information systems serve as a basis for building confidence in consumers. In most cases, apart from formal education for students's specializing in the food sciences, there are often limited on-going food safety educational programs for the people. Moreover, consumer associations who are recognised to play catalytic role in promoting food safety, rarely focus on these issues.

We also found low perception of competence of public institutions about control of chemical hazards compared with other risks; this finding could be due to this fact that most public laboratories in Ghana have limited capacities to test for most chemical hazards (Sefa-Dedeh, 2009). As a result, the safety status of most foods is not known until there is an adverse effect on consumers or exporters. This has arisen as a result of inadequate investments in laboratory infrastructure and training of personnel (FAO, 2005). Findings also showed that consumers were relatively less worried about these chemical hazards probably because of inadequate information about the hazards and their health effects. For example, in Africa, there is generally limited public knowledge and awareness of food safety and public health implications of food contaminated with aflatoxin (PACA, 2013) and foods produced around mining sites. The fact that this study was conducted in Accra which is not a mining community could also account for people's relatively lower level of concern about food safety from mining communities.

The role of gender in predicting consumer concern about chemical hazards such as pesticides, aflatoxin, plastics leakages, and excessive use of artificial flavors partly supports reports of Omari and Frempong (2016), Omari et al. (2017) and Miles et al. (2004) who found that gender is a significant predictor of concern about general food safety. This finding has important implication for food safety because women are mostly involved in food preparation, food handling, and providing food for the family; hence their perception of food safety is critical for making healthy and safe food choices (Wang et al., 2014).

The negative association of competence of public institutions with the degree of worry about food safety is an indication that public authorities and other food safety institutions need to demonstrate their competence by playing their mandated roles effectively to boost public confidence and provide food safety assurance. These issues imply that consumers who perceive institutions as having high level of competence are likely to have a higher level of confidence, stronger assurance, and reduced concerns about the safety of food (Omari et al., 2017). Also, De Jonge et al. (2008) indicated that the more consumers confer trust in institutions and organizations, the more confident they are about food safety.

In the current investigation, consumer perception of public institutions' competence was a strong predictor of level of worry about pesticides, followed by food from mining sites, aflatoxin, leaked substances from plastic packages, and Sudan dyes. Similar situation may be found in relation to genetically modified foods, where the lack of confidence in government regulatory system was cause of concern for most people (Quaye et al., 2009). Our results also partly support the finding of Omari et al. (2017) who found competence as a significant predictor of consumers' perception of fast-food safety. It could be suggested that consumers' degree of concern about chemical hazards can be reduced only when public institutions are perceived to be competent in assessing, communicating, and managing risks associated with the hazards. Remarkably, these chemical hazards most often contaminate food before it reaches the final consumer, and, in such cases, the consumer would have minimal control over the hazards such as aflatoxin since these chemicals cannot be adequately destroyed or eliminated from the food through cooking or preparation by the consumer (Jalili, 2015). For this reason, consumers rely on actors along the food chain, including farmers, processors, and regulators to appropriately play their various roles to reduce or prevent contamination (Berg et al., 2005). Thus, when these actors are perceived to be incompetent in dealing with the contamination, then the degree of public concern could be heightened as this study has revealed.

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Conclusion

This study sought to assess consumer perception about the competence of public food safety institutions in controlling food safety risks as well as how the perceptions influence consumer concerns about specific food safety risks. In conclusion, consumer perception of public institutions' competence in ensuring food safety people was below average with a relatively better score for control of microbiological hazards and risks and lowest score for the control of chemical hazards such as pesticides, aflatoxin, and safety of food from mining sites. Also, when people were worried about one specific food safety risk, they were also likely to be worried about all other food safety risks as evidenced by the positive associations in the correlation analysis. For certain specific food safety hazards and risks, consumer perception about the competence level of public institutions affected their degree of worry about those risks. So, it is necessary for public institutions to demonstrate their competence by performing their mandated roles and responsibilities and ensuring that all actors in the food chain comply with the rules, regulations, and codes of practice. Clearly, much of the responsibility lies with public institutions to identify food safety hazards, assess their risks, communicate, and manage them. Only when the people acquire adequate information as well as knowledge about what public institutions are doing about food safety risks, their degree of worry can be minimized. This calls for the need for food safety information, which is quite scientific and technical, to be delivered by experts in simple language while taking into consideration the effects of the problem as well as control measures.

Author contributions

R.O. and G.K.F. designed the study; R.O. and W.A. conducted the study; R.O. analyzed the data; R.O. and W.A. wrote the manuscript. All the authors read, revised, and approved the manuscript.

Conflicts of interest

There is no conflict of interest.

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