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# Consumers' Perception of Safety of Leafy Vegetables and Its Effect on Their Vegetable Purchasing Decisions in the Kumasi Metropolis of Ghana

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## **Authors' contributions**

*This work was carried out collaboratively by all three authors as a team work as follows: Author SKD was responsible for the design of questionnaire, data collection and writing of the first draft of this manuscript. Authors JOM and RA supervised the entire research process from idea development to through questionnaire design, data collection and analysis. Authors JOM and RA were also responsible for revising, fine-tuning the draft manuscript into the final manuscript and further revisions based on reviewers' comments. All authors read and approved the final manuscript.*

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## **ABSTRACT**

**Aim:** The study sought to determine consumers' perception of the safety of leafy vegetables and how it affects their decision to purchase leafy vegetables in the Kumasi Metropolis of Ghana.

**Methodology:** Data employed in the study comes from 200 consumers in the study area. Perceptions of consumers were assessed by using a 5-point Likert-type scale. Consumers were asked to indicate the extent to which they agree to statements about safety of vegetables in the retail market of Kumasi-Ghana. These perception scores were averaged to form the consumer perception index. Consumers' demographic characteristics were cross tabulated against their perception to find the influence one has on the other. Also, consumers' perceptions were cross-tabulated against their purchasing decision of leafy vegetable to find the association between them.

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**Results:** The main findings are that consumers are very much aware of the unsafe nature of leafy vegetables in the retail market, which is caused by the use of chemicals and contaminated water on vegetables during production. Consumers also perceive retailers as mishandling leafy vegetables in the retail market and that consuming leafy vegetable with chemical residue is a risk to consumers' health. Demographic characteristics such as educational level, type of occupation and monthly income had a significant positive relationship with consumers' perception of leafy vegetable safety. Unsafe perception had a significant effect on the purchasing decision of leafy vegetable.

**Conclusions:** The findings of the study imply that consumers' demographic characteristics have the ability to influence his or her perception regarding the safety of leafy vegetables. Also, consumers' negative perception is likely to affect their decision to purchase leafy vegetables. Moreover, the high awareness and consumer perceptions indicate consumers are likely to patronize products of retailers whose products are perceived to be safe by consumers. Thus, efforts to assist retailers should aim at making them understand this perception and how products can be handled well.

*Keywords: Consumer; safety; perception; vegetable; purchasing decision; Kumasi.*

## 1. INTRODUCTION

About 90% of fresh vegetables in Ghana are produced and supplied from urban and peri-urban production systems [1]. They are produced close to markets to avoid spoilage and contamination by pathogens. The increase in urbanization and the awareness of healthy living by consumers globally have resulted in a higher demand for vegetables.

A study on behaviour and attitude by [2] emphasized that health hazards were the main motivation why consumers will purchase organic and pesticide-free vegetables. The excessive use of pesticides and sewage water on vegetables raises health concerns, and increases consumers' interest in organically produced foods in response to human health [3]. The use of chemicals on (leafy) vegetables during production will definitely leave some residues in the crop. Studies conducted in Ghana [4], revealed that peri-urban produced vegetables contained considerable chemical deposits and faecal coliform as residues. They report that farmers had no other choice than to use water from highly polluted sources. This raises public health concerns due to possible crop contamination with pathogens and health risks associated with the consumption of the produce.

The significance and rising importance of hygienic food consumption has drawn the need to better understand the extent to which food safety and hygiene influence consumers' attitude when purchasing vegetables. The use of sewage and polluted wastewater cannot be disregarded because access to clean water for irrigating vegetables has become a major challenge. As an alternative, the use of polluted or contaminated water is extensive [4]. Also, vegetables on the retail market in urban cities are carelessly handled (unsafe) and this leads to increasing health risk to consumers.

As consumers become more and more concerned with their safety, nutritional value, and environmental effects of their vegetable consumption and its production, it is important that we gain an understanding of consumers' perceptions of leafy vegetables grown as foods. It is also important to find out how consumers' perceptions influence their buying decisions. There have been several researches on safety of vegetables to the consumer looking at its

health concerns [1,4]. These studies revealed that peri-urban produced vegetables contained considerable chemical deposits and faecal coliform, but what has not been done is the extra step to find out how the perceptions of safety affect consumers' vegetable purchasing decisions. The study therefore seeks to address this gap.

Safety is defined as "the assurance that a food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use" [5]. A vegetable is said to be safe when it is free of chemical residues such as pesticides used in conventional vegetable production and the use of polluted water on vegetables which is known to cause contamination.

Demand for aesthetic attributes, for example, spotlessness and good looking produce especially colour, size and shape by urban consumers has also encouraged excessive use of pesticides and chemical fertilizers as revealed by [6]. Also, the increase in global food production has largely been fuelled by increasing use of pesticides, herbicides, and other chemicals. Research has found that majority of consumers view organically grown food products as "safer" or "less risky" when compared with conventionally grown food [7]. For example, according to [7], approximately 700 organic and conventional food buyers were surveyed on what they thought the risk of death was from pesticide residue on conventionally grown food. Survey respondents estimated that between 50 and 200 people per million die each year from pesticide residue in food. The study also found that majority of consumers perceived a relatively high risk to be associated with conventionally grown produce when compared with other public health hazards.

Consumption is described as a natural process that goes from birth until death [8]. The act of consumption influences consumers' purchasing decision while allowing them to adapt to new behaviours and attitudes [9]. Considering food products, especially in the case of vegetables, criteria other than price affect the purchasing decision. For instance, [10] found safety and quality perception to affect consumers' choice and demand for food products. Taste has also been identified by [11] as affecting consumers' decision to purchase canned products in Ghana. Consumers in recent times attach importance to safety of food products than the external appearance of the vegetable. Literature reviewed by [12] suggests that consumer purchasing decision is driven by their perception of risk. Consumers will avoid purchasing leafy vegetables that are perceived as unsafe. According to [13], pesticide use has been thought by consumers to be associated with long-term and unknown effects on health. Whether or not this is true is arbitrary, but is still relevant in that, if people believe those chemicals are associated with unknown health effects, that perception alone can influence buying decisions. Health and safety concerns according to [14] are seen to be key factors in influencing consumer preference and sub-sequential buying decisions.

## **2. METHODS**

### **2.1 Sampling and Data Collection**

The data employed in the study were collected in January 2013 using structured questionnaires. Section one of the questionnaire focused on consumers' demographic characteristics whilst section two sought to obtain consumers' perception as far as safety of leafy vegetables is concerned by asking them to indicate their level of agreement to a set of safety related statements. Respondents were also asked to state their reasons for perceiving leafy vegetables to be safe or otherwise. The final part of the questionnaire aimed at finding

out the extent to which consumers' decision to purchase leafy vegetables or not is influenced by their safety perception. Based on a number of product attributes such as price, storability, freshness, colour/appearance, nutrition, shopping environment, product display, cut/bruised, rot/decay, pest and disease damaged, respondents were made to assess the safety of leafy vegetables (from 1-'very low' to 5- 'very high'). Consumers' awareness of unsafe leafy vegetable in the retail market was assessed by the use of 'yes' and 'no' responses. Perceptions of consumers were assessed by using a 5-point Likert-type scale (from 1 representing 'strongly agree', 2 for 'agree', 3 for 'neutral', 4 for 'disagree' and 5 for 'strongly disagree'). Consumers were asked to indicate the extent to which they agree to statements of safety of vegetables in the retail market. These perception scores were averaged to form the consumer perception index.

To ensure the validity of the survey instrument and the subsequent results/findings, the survey instrument was given to three lecturers at the Department of Agricultural Economics, Agribusiness and Extension, KNUST to review and corrections effected appropriately. Also, together with a linguistic expert the questions were translated into the local dialect (*Twi*) to ensure that both enumerators had a common understanding of how the questions are to be asked on the field. The draft questionnaires were then pre-tested on 10 consumers bearing similar characteristics as the sample to ensure whether questions would be understood by final respondents. Finally, the items in the final instrument were tested for reliability by the use of Cronbach's Alpha. A reliability coefficient of 0.72 indicates that the instruments and the items making up the instrument are reliable.

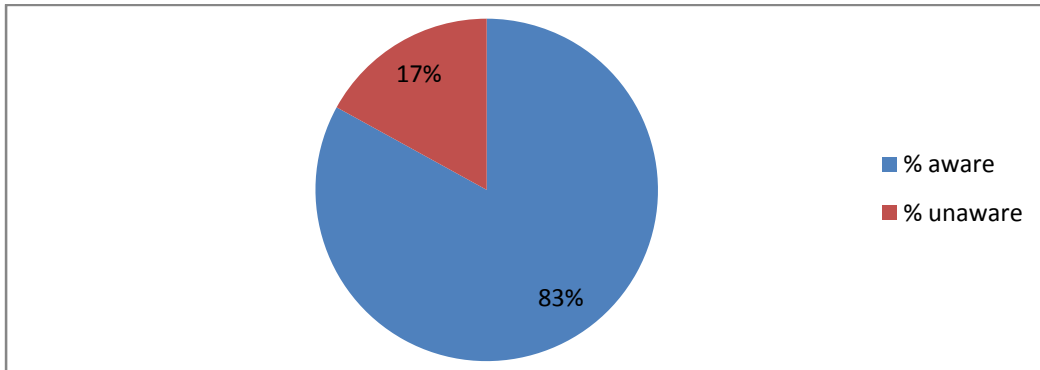
The data were collected from Kumasi Metropolis in the Ashanti region of Ghana. Out of the ten sub-metros of the metropolis, five were selected using simple random sampling. Again, five suburbs were selected, each from the five selected sub-metros using simple random sampling. The major or biggest retail market in each suburb was purposively selected due to degree of expected consumer concentration. Forty (40) buyers or consumers were purposively selected from each retail market using convenience sampling, making a total sample size of 200. The questionnaires were administered to 200 consumers of the ages 18 years and above because of their ability to make informed decision and purchasing power through face to face interviews.

All questions or statements making up the questionnaire were coded and keyed into SPSS. The demographic characteristics of consumers were analyzed using descriptive statistics including means, percentages and frequency tables. Consumers' demographic characteristics were cross-tabulated against their perception to find the association between them. Also, consumers' perceptions were cross tabulated against their purchasing decision of leafy vegetable to find the association between them. The results obtained were compared with literature to find out if perception actually has influence on purchasing decision of leafy vegetables in the retail market.

### 3. RESULTS AND DISCUSSIONS

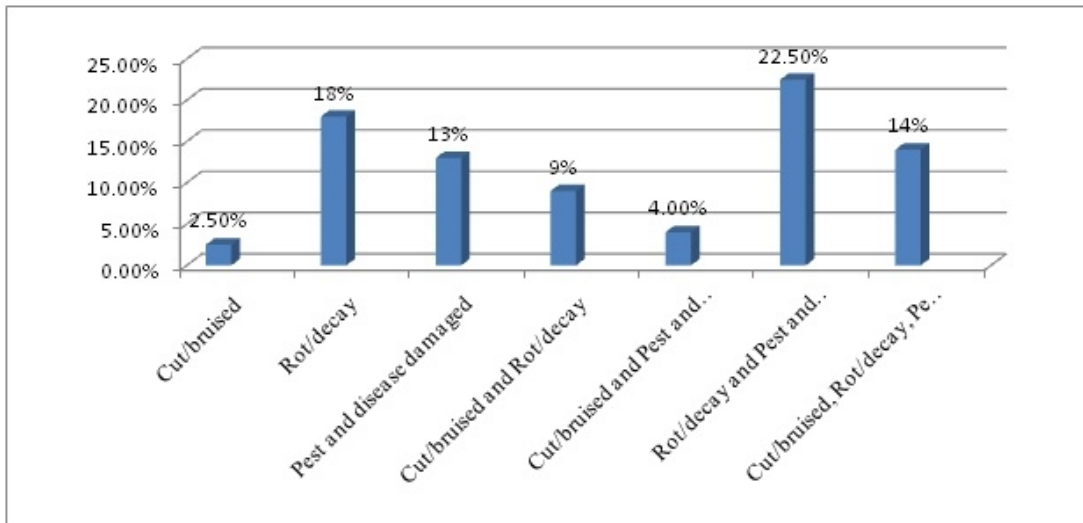
#### 3.1 Consumer Awareness and Perception of the Safety of Leafy Vegetable

Almost all consumers (83%) were aware of unsafe leafy vegetable and stated indicators used to describe vegetable safety (Fig. 3.1).



**Fig. 3.1 Awareness of unsafe leafy vegetable**  
 Source: Field Data (2013).

Fig. 3.2 shows that a relatively higher number of surveyed consumers (22.5%) perceive rot/decay and pest and disease damage to be indicators for unsafe leafy vegetable. Also, 18% agreed solely on rot/decay as an indicator for unsafe leafy vegetable. Whereas 14% indicated cut/bruised, rot/decay, pest and disease damaged, 13% also agreed on pest and disease damaged as unsafe. Only 2.5% indicated cut/bruised leafy vegetable as unsafe.



**Fig. 3.2 indicators of unsafe leafy vegetables as perceived by surveyed consumers**  
 Source: Field Data (2013).

Based on the responses to the perception statements in Table 3.1, leafy vegetables are generally considered as not being safe with an average score of 2.55. The perception of leafy vegetables produced with excessive use of chemical had an average score of 1.55. Average scores of 2.52 and 1.22 were obtained for the perception of retailers mishandling leafy vegetable in the retail market and the fact that consuming leafy vegetables with chemical residue poses health risk respectively. Consumers are aware of the excessive use of chemical on leafy vegetable produce which is a major activity in vegetable production to meet market demand. With this, consumers are of the view that leafy vegetables are unsafe because of health implications and the fact that leafy vegetables with chemical residue are very unsafe for consumption which can even cause death in extreme cases when high dosages of harmful chemicals have been consumed over a long period of time.

**Table 3.1 Consumer perception on safety of leafy vegetables**

Perception statement	Strongly agree score=1	Agree score=2	Neutral score=3	Disagree score=4	Strongly disagree score=5	Mean score
Leafy vegetables in Ghana are generally not safe	35 (17.5%)	75 (37.5%)	44 (22%)	37 (18.5%)	9 (4.5%)	2.55
Leafy vegetables sold in the retail market are produced with excessive chemicals	107 (53.5%)	79 (39.5%)	11 (5.5%)	3 (1.5%)	-	1.55
Retailers mishandle leafy vegetables in the retail market	42 (21.0%)	52 (26.0%)	69 (34.5%)	34 (17%)	3 (1.5%)	2.52
Consuming leafy vegetable with chemical residue possess health risk	162 (81.0%)	35 (17.5%)	1 (0.5%)	1 (0.5%)	1 (0.5%)	1.22

Source: Field Data (2013).

### 3.2 Relationship between Consumers' Demographic Characteristics and Safety Perception

The results obtained for the study did not vary with the demographic groupings of the respondents as proposed by [15] that demographic characteristics are determinants of consumer perception. The demographic characteristics of respondents cross tabulated with their perception gave significant results. As table 3.2 indicates, level of formal education (years), and occupation were significant at 10% whilst monthly income was significant at 1%. Thus, there is a relationship between these three attributes of consumers and their perception of safety of leafy vegetables. It is expected that more educated would be more health conscious, have a better understanding of the dangers of consuming vegetables that bear any of the traits in Fig. 3.2 above. Demographic factors like gender, marital status and age did not have any significant relationship with consumers' perception of safety of leafy vegetables. The finding on gender is inconsistent with findings made by [7]. In their studies, gender was a significant predictor of perceived microbial pathogen (disease) risks with women having a higher perceived risk than men; but was associated with perceived pesticide residue risk at 10% level.

**Table 3.2 Relationship between demographic characteristics and unsafe perception of leafy vegetables**

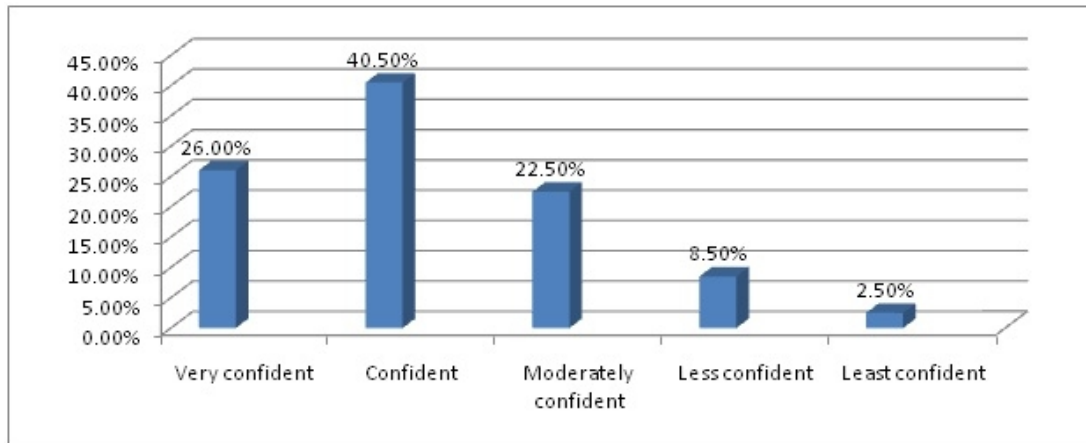
Demographic characteristics	SA	A	N	D	SD	Chi square	Df	Sig.
Gender								
Males	9	27	7	11	2	5.507	4	.239
Females	26	49	37	26	6			
Age (years)								
Below 20	5	4	5	6	0	27.323	20	.126
21-30	20	30	19	25	6			
31-40	4	18	7	4	0			
41-50	3	10	12	2	2			
Above 50	0	3	6	1	8			
Marital status								
Single	13	13	31	10	2	9.707	8	.286
Married	22	42	31	27	6			
Widowed	0	1	0	0	2			
Level of formal education								
Primary	0	5	2	0	1	29.760*	20	.074
JHS/Middle	7	15	17	6	1			
SHS	6	22	8	6	0			
University/Training college	22	34	17	25	6			
Occupation								
Paid employment	9	23	10	4	0	29.867***	12	.003
Student	13	28	9	20	6			
Self employed	11	24	22	9	2			
Unemployed	2	1	3	4	0			
Monthly income (GHC)								
Below 100	6	4	6	2	4	28.534***	12	.005
101 -500	12	32	23	22	3			
501 – 1000	13	26	14	9	1			
Above 1000	4	14	1	4	0			

Source: Field Data, 2013.

SA-Strongly agree, A- Agree, N-Neutral, D-Disagree, SD-Strongly disagree  
 \*, \*\*, \*\*\* indicates 10%, 5% and 1% significant levels respectively

### 3.3 Consumer Perception and Purchasing Decision

Most of the respondents (76%) were confident in purchasing leafy vegetables from the retail market whilst 24% were not. Out of the 76%, 26.0% were strongly confident, 40.5% were confident, 22.5% were moderately confident, 8.5% were less confident and 2.5% were least confident in the purchase of leafy vegetable in the retail market (Fig. 3.3).



**Fig. 3.3 Confidence levels of consumers regarding the safety of leafy vegetables**  
 Source: Field Data (2013).

The perception of respondent cross-tabulated with purchasing decision was significant at certain levels. The perception of leafy vegetables in the retail market produce with excessive chemical was significant at 10% (Table 3.3). Also, general perception of consumers of the safety of leafy vegetables in Ghana significantly influences purchasing decision at 1% significant level (Table 3.4). Consumers' perception on mishandling of leafy vegetables in the retail market significantly influenced their purchasing decision at 1% significant level (Table 3.5). Consumers who had negative perceptions about pesticides residue had an increased likelihood of purchasing organic produce.

**Table 3.3 Safety Perception and Purchasing Decision**

Leafy vegetables in retail markets are produced with excessive chemical	Purchasing decision		Chi square	df	Sig
	Yes	No			
Strongly agree	89	19	6.638*	3	.084
Agree	55	23			
Neutral	6	5			
Disagree	2	1			

Source: Field Data (2013).

**Table 3.4 Safety perception and purchasing decision**

How do you perceive safety of leafy vegetables in Ghana	Purchasing decision		Chi square	Df	Sig
	Yes	No			
Very safe	2	1	13.802***	4	.008
Safe	16	2			
Not certain	54	7			
Unsafe	66	27			
Very unsafe	14	11			

Source: Field Data (2013).



**Table 3.5 Safety perception and purchasing decision**

<b>How do you perceive the safety of leafy vegetables with regard to how they are handled in the retail market</b>	<b>Purchasing decision</b>		<b>Chi square</b>	<b>Df</b>	<b>Sig</b>
	<b>Yes</b>	<b>No</b>			
Very safe	4	0	29.807***	4	.000
Safe	32	5			
Not certain	79	12			
Unsafe	30	29			
Very unsafe	7	2			

Source: Field Data (2013).

#### **4. CONCLUSION AND RECOMMENDATIONS**

The study assessed the perception of consumers of leafy vegetable safety and its effects on their purchasing decision with a cross-sectional data collected among 200 consumers in the Kumasi Metropolis of the Ashanti region of Ghana. The survey results indicate high awareness of unsafe use of excess chemical and unsafe perception of leafy vegetable. Consumers are of the view that leafy vegetables produced in Ghana are not safe. There were also significant relationships between consumers' characteristics such as years of formal education, type of occupation, monthly income level, and safety perception. The general perception of consumers of safety of leafy vegetables in Ghana significantly influences purchasing decision at 1% significance level.

Based on the finding of the study it is recommended that there should be education of producers on appropriate use of chemicals and retailers on proper handling methods that will go a long way to reduce the negative perceptions of consumers and eventually boost the demand for leafy vegetables. Retailers on the other hand should develop appropriate means of handling leafy vegetable in a safe way since its perception significantly associated with consumers' purchasing decision. The study also has limitations that future research should attempt to overcome. The first is the sample size of 200 which is not representative of the population of Kumasi. Although the sampling technique, convenience, is scientifically not robust, it was the most practically feasible method. It is therefore recommended that future works on the subject to adopt random sampling in the selection of respondents.

#### **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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