



## Cassava Processors and Marketers' Perception on Lassa Fever-Food Safety Information Nexus concerning Cassava Products' Processing and storage in Lagos state

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**Abstract:** The increasing spread of Lassa fever has generated concerns both among the dealers (processors and marketers) and consumers as to the path in the value chain through which it is spread. While some believe a major cassava product- *gaari* is the route, through improper processing techniques and storage which exposes it to rodents' faeces and urine which when consumed becomes lethal and caused Lassa fever, others, especially the producers believe otherwise. The paper examines processors' and marketers' perceptions on information food safety about Lassa fever concerning cassava products processing and storage in Lagos state. Descriptive research design was adopted while a sample size of 120 participants were purposively selected from two LCDAs in Lagos state. A well-structured questionnaire was used for data collection. The data collected were analyzed with frequency, percentage, mean, standard deviation and t-test statistics. The results showed that the majority of the respondents were male (56.7 %), married (48.3%), between ages 26 and above (79.4%) and majorly engaged in cassava mill operator services and wholesale of cassava products (59%). Mean monthly income and household size were 18,000.02(SD=1101.7) and 05 (SD=1.37). The study reveals that majority of the cassava products dealers perceived that information about contamination of cassava processed foods and the incidence of Lassa fever in Lagos state is gaining popularity. It recommended among other that early education of stakeholders will serve to curb the incidence of Lassa fever where wrong information could trigger and affect consumers' confidence.

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### 1. Introduction

Cassava is an important staple food and cash crop. It plays a principal role in the economy of Nigeria as it supplies more than half the caloric intake of Nigerians. In 2019, the Food and Agriculture organization Statistics (FAOSTAT) stated that Nigeria produced 59.19 million tons of cassava to keep its spots as the leader in the sector on world scene.

Over the years cassava has undergone many modifications in terms of consumable products which have added variety to its food value. These include (i) *gaari*, the traditional product; (ii) *fufu/akpu* which has assumed a national spread in consumption; (iii) tapioca, a delicacy among the Urhobos, Itsekiris, Ijaws of the Niger Delta; (iv) Cassava chips, (*Mbuba/bobozi*) boiled cassava that is very popular among the Ibos of the South East; (v) cassava flour (*Lafun*) is made- a very popular food among the Yorubas of the South West; (vi) Starch (*Usi*) is a highly Cherished food among the people of the Niger Delta. In some parts of the Country, cassava leaves are consumed as vegetables. The leaves are rich in protein, Vitamins and minerals (Sylvester 1989). However, seventy per cent (70%) of cassava

processed as human food is *gaari* (Cassava Master Plan ,2006). The next to it are *fufu* and *lafun*. The processing methods of *gaari*, a common root product include peeling, boiling, steaming, slicing, grating, soaking or seeping, fermenting, pounding, roasting, pressing, drying, and milling. Traditionally, cassava roots are processed by various methods into numerous products and utilized in various ways according to local customs and preferences. The two main foods peculiar to the local areas of focus of this study are *gaari* and *lafun*.

The Traditional System of processing and storage of this important food staple especially among the local or poor households is believed to have opened up the products to contamination by rodents and other wild stocks, hence leading to the emergence of deadly diseases such as the Lassa fever. Primary transmission of the Lassa virus from its host to humans can be prevented by avoiding contact with *Mastomys* rodents. Putting food away in rodent-proof containers is one major remedy while the real problem is exposure to urine or faeces of infected *Mastomys* rats. For *gaari* the possible point of exposure to urine and faeces of rats

and other rodents is likely not at the processing but at the market or domestic storage point. Whereas, for the *lafun*, it is most likely at the point of sun-drying, though contamination at the storage cannot also be ruled out. Chukuezi (2010) reported that Street food vendors work under crude unsanitary conditions and are often unlicensed and untrained in food safety, food hygiene and sanitation. Ifenkwe (2012) buttressed that most food vendors, especially those in rural communities, would fail if subjected to food safety and hygiene tests, stating that a good number of food selling and processing points serve as breeding grounds for cockroaches, flies, and rodents which are disease vectors for cholera, dysentery, diarrhea, Lassa fever, etc, and presenting risks to consumer's health.

It remains alarming that over 200,000 Nigerians die from food poisoning every year (Ihenkurye, 2020) as a large quantity of food produced and distributed in the country gets to the consumers in unpleasant conditions ensuing from poor handling, inadequate storage practices, inefficient processing, high ambient tropical temperature and humidity conditions that promote rapid bacterial decomposition, fungal contamination, and insect infestation (Ifenkwe, 2012). World Health Organisation (2022) reported that Lassa fever in Nigeria and its infection peaked during the dry season which coincides with the harvest period. In January 2022 alone two hundred and eleven cases of Lassa fever were confirmed in Nigeria's laboratory with forty deaths, according to World Health Organisation (2022).

Since the public outcry on the emergence of Lassa fever has linked the spread of the disease to improper food processing and storage among the peasants, and cassava is a major food staple among the group. Consequently, more and more peoples are health conscious and concerned about the 'how' of processing and storage of cassava products they consumed. They are apprehensive not only about the appearance of the products but also about the storage and hygiene of cassava products sold at retail outlets. While it has been argued that processing and storage may not have any effect viz-a-viz contamination by *mastomys* rat, because most cassava products passed through boiling or cooking before being consumed, which is expected to have killed all the germs or pathogens, we also know that most people consume them without boiling or cooking as in the case of soaked cassava flake/granules (called *gaari*). Thus, the processing and the storage become implicated and the bulk is passed back to processors and marketers, somehow.

This study attempts to examine the general perception of processors and marketers of cassava products concerning how informed, and their readiness to embrace information and reformation on Lassa

fever-causing factors. The outcome of this research will serve to fill a gap in knowledge in target control expedients to curb facilitators of Lassa fever among cassava processors and consumers in local areas.

## 2. Material and Methods

### 2.1 Design and Sample

The population for the study comprised all cassava product value-chain actors or stakeholders including processors, producers, marketers (wholesalers and retailers) and store owners. The research design was descriptive in nature. Due to the rural nature of activities in the cassava value chains, two rural local government areas (LGAs) of Lagos state were purposively selected for the study. The two LGAs are Ikorodu and Epe. Two LCDAs each were purposively selected in the two LGAs for their rural nature and prominence of cassava production activities. They are Ikorodu North and Igbogbo-Bayeku LCDAs in Ikorodu and Ikosi-Ejirin and Eredo LCDAs in Epe. Thirty participants were purposively selected from each of the LCDAs in a survey that last two months. In each LCDAs, ten processors and twenty marketers were purposively selected. This brings the total number of participants to one hundred and twenty. The intention here is to have a heterogeneous view/perception of the subject matter.

A well—designed questionnaire adapted from various sources was used to elicit information from the cassava processors and marketers. The survey questionnaire was divided into two major sections. Each section contained questions addressing the research objectives. Section A comprised nine questions using a nominal scale and focused on respondent socio-economics characteristics. Section B contains twenty items which assess the general perception of cassava processors and marketers on health safety concerning Lassa fever in the cassava products processing, storage and marketing. Respondents were required to translate their view on a five-type Likert scale ranging from 1 = "totally disagree" to 5= "totally agree". All the One hundred and twenty questionnaires administered to the participants were recovered, collated and analysed for the study.

### 2.2 Analytical Technique

Percentages, mean, standard deviation and T-test analysis were deployed for statistical analysis of the collected data.

#### T-test

A T-test was conducted to evaluate if there are any statistically significant differences in every single attribute between Male and Female respondents. This test is aimed to give a descriptive overview of the statistical variables to analyze. The basic hypothesis is that the variances differ and that two independent

samples exist where the observations are normally distributed (Newbold, 1991).

The population variances and  $\mu$  is estimated by the sampling variance and the population mean value  $\mu_x$  and  $\mu_y$  is estimated by the sample mean values of X and Y.

The significant level is  $\alpha$  and  $D_0 = 0$

The null hypothesis is that  $H_0: \mu_x - \mu_y = 0$  which is tested against the alternative hypothesis

$H_1: \mu_x - \mu_y \neq 0$ . The decision rule is:

$$\frac{\bar{X} - \bar{Y} - D_0}{\sqrt{\frac{S_x^2}{n_x} - \frac{S_y^2}{n_y}}} < -Z_{\alpha/2} \quad \text{or}$$

$$\frac{\bar{X} - \bar{Y} - D_0}{\sqrt{\frac{S_x^2}{n_x} - \frac{S_y^2}{n_y}}} > Z_{\alpha/2} \quad (1)$$

$n_x$  and  $n_y$  relate to the sampling size for X and Y;  $Z_{\alpha/2}$  relate to a value from the normal distribution table where the probability for the outcome is (Newbold, 1991). This statistical test compares the mean value for an observed factor between Male cassava dealers' perception of Cassava products contamination by Lassa fever-causing factor, X, and female perception, Y.

### 3. Results

#### 3.1 Socio-Economics Characteristics of sampled Cassava Processors and Marketers

The socio-economics characteristics of respondents are summarized in Table 1, As the Table shows 56.7 % (n = 68) of the respondents were male compared to 43.3 % (n = 52) female. 46.9 % (n = 56) were 36 years and above, followed by 32.5 % (n = 39) who were between 26 to 35 years of age as opposed to 20.8% (n= 25) who were under 25 years. The highest proportion of the respondents were married and accounted for 48.3% (n = 58) as opposed to 38.4 % (n = 46) single, 8.3 % (n = 10) widow and the smallest proportion (5 %, n= 6) were divorced. The sample also showed that 33 % (n= 44) of the respondents were cassava mill operators, 26 % (n= 32) were among the cassava products wholesalers, 23 % (n=27) were farmers and 18% (n= 21) were petty traders in cassava products. 83% (n=100) had a secondary occupation while 17% (n=20) had no secondary occupation. The average monthly income was N18, 000.02 (SD=1011.7). The mean household size was 5 and the standard deviation was 1.37. Educational Qualification shows that 45 % (n= 54) had

no formal education, followed by 35 % (n= 42) who completed primary education, 12% (n= 14) with secondary education and 8 % (n=10) who completed tertiary education.

#### 3.2 Cassava Processors and Marketers' Perception

The mean scores of the cassava products dealers on their perception of Lassa fever concerning their business are presented in Table 2. As the Table shows, the majority of the cassava dealers perceived food safety need information as important (M=3.43) as it can help them to determine good processing and storage practices that prevent mastomys rat contamination of their cassava products (M=4.35). This could be the underpinnings of their agreement to look for hygiene information relevant to their trade activities (M=3.87) and their agreement to pay attention to information on contamination sources of Lassa fever infection in doing their business (M=3.16). Interestingly, the Majority agreed to be confident about their ability to handle storage to prevent contamination (M=3.74), being knowledgeable about Lassa fever (M=3.03), and always looking for food safety information in future (M=4.15). With these notions, it was not surprising that they agreed to the government giving more education on Lassa fever as it affects their business (M=4.34), so that information on the disease will not be misleading (M=3.87). Conversely and surprisingly too, these respondents while agreeing to the government giving more information, also agreed that "there is no Lassa fever; it is either malaria or typhoid" (M=3.51); which is in tandem with their agreement to "not believe that rat urine cause Lassa fever (M=3.07). This outcome shows that respondents were yet to accept the fact of or believe in an outbreak of Lassa fever or that they were deliberately feigning ignorance of the epidemic, perhaps to avoid tagging their business. This attitude is, however, justifiable as Lagos state (study area) has not recorded a high incidence of Lassa fever, unlike other states where the disease is popular. In what seems to be a twist, the respondents however disagreed with the item "I could not care less whether my shop has rats or not." with the mean score (M=2.43); and that it is quite costly for cassava products dealers to keep food safety rules and regulation (M=2.62).

These perceptive responses are unexpected for respondents who have expressed unbelieve about the existence of Lassa fever and possible contamination through mastomys rat's urine. It goes to support the assertion that human behaviour/choices cannot be predicted with accuracy.

Table 1: Socio-Economics Characteristics of Participant (N=120)

	Frequency	Percentage (%)	Mean	SD
<i>a) Gender</i>				
Male	68	56.7		
Female	52	43.3		
<i>b) Age bracket (year)</i>				
20-25	25	20.8		
26-35	39	32.5		
36 Above	56	46.9		
<i>c) Marital status</i>				
Single	46	38.4		
Married	58	48.3		
Divorced	6	5		
Widow	10	8.3		
<i>d) Educational Qualification</i>				
No formal education	54	45		
Completed primary education	42	35		
Secondary education	14	12		
Tertiary education	10	08		
<i>e. Average Household size</i>				
	05	1.37		
<i>f. Average Monthly Income</i>				
	18,000.02	1011.7		
<i>g. Main occupation</i>				
Cassava Mill operator	40	33		
Gaari and Elubo Wholesale	32	26		
Farming	27	23		
Petty trader in Gaari and Elubo	21	18		
<i>h. Religion</i>				
Islam	67	56		
Christian	53	44		
Traditional				
<i>i. secondary occupation</i>				
yes	20	17		
No	100	83		

Of course, they agreed to the fact that proper fumigation of shops and stores can help reduce the incidence of cassava product contamination (M=4.12) and believe that complaints on cassava product contamination were most times fabricated by consumers (M=3.07). They also did not agree that Lassa fever can also be contracted through human—to—human Source (M=2.69); which is in line with their thought pattern as shown in their perceptive reasoning in this study.

These findings indicate that cassava processors and marketers were generally ready to receive as much information as possible on food safety and Lassa fever as much as to protect their business. Their disagreement with the existence of Lassa fever, and contamination through mastomys rat urine confirms their ignorance of or deceit as to their interest in getting more information about the epidemic or being willing to adopt any available preventive measures as perceptively expressed. Generally, the study shows information

about contamination of cassava processed foods and the incidence of Lassa fever in Lagos state is gaining popularity and this is consistent with the literature (Thomas and Mills, 2008).

### 3.3 Comparison of Cassava Products Dealers Perceptions based on Gender Dimension

Table 3 presents an attempt to disaggregate respondents' perceptions of the subject matter by gender. Consequently, an independent t-test procedure was utilized to identify if there were any statistically significant differences between male and female responses.

Out of twenty items, thirteen showed statistically significant differences between females' and males' perceptions of contaminations of processed cassava foods and Lassa fever concerning marketing as shown by the coefficients of the two-tail t-test. Items 9, 10, 13, 14, 15, 17 and 20 respectively were not statistically significant as the analysis revealed.

Table 2: Mean Scores on Perception of Cassava Processors and Marketers on Lassa fever

	N	Mean	SD
1. food safety need information is important to me	120	3.43	1.32
2. I believed food safety needs information (concerning Lassa fever) help me determine good processing and storage practices.	120	4.35	1.14
3. I am interested in looking for hygiene information relevant to my activities.	120	3.87	0.89
4. I intend to pay attention to a new path of Lassa fever infection information while engaging in gaari business	120	3.16	1.08
5. I could not care less whether my shop has rats or not.	120	2.43	0.76
6. I am quite knowledgeable about Lassa fever information	120	3.03	1.53
7. I feel confident about my ability to handle the storage of cassava products against Lassa-causing rodents	120	3.74	0.73
8. I am confident in using food safety information.	120	2.19	1.34
9. I will always be looking for food health and safety information on cassava products in future.	120	4.15	1.26
10. I would like to see additional information about Lassa fever as it affects my cassava products processing and marketing in the future	120	4.60	0.61
11. I would not sell cassava products without high compliance with food safety practices in the future.	120	3.74	1.43
12. Government should educate cassava products dealers on Lassa fever/food safety information	120	4.34	0.96
13. I believe food safety/Lassa fever information should not be misleading.	120	3.87	1.87
14. There is no Lassa fever; it is either malaria or typhoid	120	3.51	0.58
15. I believe it is quite costly for cassava products dealers to keep food safety rules and regulations.	120	2.62	1.66
16. I believe contamination of cassava product by mastomys rat take place at the consumers' custody	120	4.04	0.78
17. I do not believe that rat urine causes Lassa fever.	120	3.07	1.93
18. I know that proper fumigation of shops and stores can help reduce incidence of cassava product contamination.	120	4.12	1.32
19. I believe that complaints about cassava product contamination were fabricated by consumers	120	3.07	0.98
20. I know that Lassa fever can also be contracted through human-to-human	120	2.69	0.17

However, they showed that Female cassava dealers (processor and marketers) have higher agreement coefficient/value on several items of the questionnaire, from the analysis. For instance, Female (M= 3.93, p = 0.50) more than males (M=2.15) agreed to look for food health and safety information on cassava products in future, believed that food safety information is important to them (M= 4.13, p = 0.00) more than male (M=4.03), are more interested in looking for hygiene information relevant to their activities (M= 3.54, p = 0.02) more than male (M=1.87), believe food safety/Lassa fever information should not be misleading (M= 0.30, p=0.11) more than male (M=0.211). This is not surprising as females by nature are slightly more active than males in food and they are also considered by many scholars as a playing

gatekeeper role in providing meal and meal solutions for families (Norrina Din, Mohd. Zahari and Shazali, 2012). However, they could not care less whether their shop has rats or not (M=2.41, p=0.00) than males (M=4.43), are less knowledgeable about Lassa fever information (M=2.05, p=0.02) than males (M=3.03) and less confident about their ability to handle storage of Cassava products against Lassa-causing rodents (M=2.10, p=0.00) than male (M=4.74), as well as food safety information (M=2.13, p=0.02) than male (M=3.19). Hence females (M=3.57, p=0.09) more than males (M=3.74) would sell cassava products without high compliance to food safety practices in the future, believe (M=3.04, p=0.00) more than males (M=3.74) that contamination of cassava product by mastomys rat takes place at the consumers' custody and did not

believe ( $M=4.23$ ,  $p=0.27$ ) than male ( $M=2.07$ ) that mastomys rat urine cause Lassa fever. Little wonder they ( $M=3.07$ ,  $p=$ ) more than males ( $M=4.09$ ) believed that complaints on cassava product contamination were fabricated by consumers. They are also less likely to be amenable to changes as they, ( $M=3.21$ ,  $p=0.00$ ), more than males ( $M=3.34$ ), did not agree with the idea that Government should educate cassava products dealers on Lassa fever/food safety information, even though that they agreed ( $M= 4.77$ ,  $p=0.00$ ) more than male ( $M=4.45$ ) that proper fumigation of shop and store can help reduce the incidence of cassava product contamination.

Analysis, however, revealed that males and females strongly believed that proper fumigation of shops and

Table 3: Gender comparison of Perception of Cassava Processors and Marketers on Lassa fever

	Gender	Mean	SD	T-V	Sig
1. food safety need information is important to me	M	2.43	1.32	-4.03	0.00
	a. F	3.56	0.57	-4.13	
2. I believed food safety needs information (concerning Lassa fever) help me determine good processing and storage practices.	M	4.35	1.04	-4.01	0.00
	F	2.44	0.83	-4.34	
3. I am interested in looking for hygiene information relevant to my activities.	M	1.87	0.89	-4.65	0.02
	F	3.54	1.24	-3.64	
4. I intend to pay attention to a new path of Lassa fever infection information while engaging in gaari business	M	2.16	1.08	-2.54	0.00
	F	3.23	1.05	-2.59	
5. I could not care less whether my shop has rats or not.	M	4.43	0.76	2.34	0.00
	F	2.41	1.52	1.44	
6. I am quite knowledgeable about Lassa fever information	M	3.03	1.53	-3.53	0.02
	F	2.05	0.51	-3.93	
7. I feel confident about my ability to handle the storage of Cassava products against Lassa-causing rodents	M	4.74	0.73	-1.34	0.00
	F	2.10	1.11	-2.65	
8. I am confident in using food safety information.	M	3.19	1.34	-3.26	0.02
	F	2.13	0.71	-2.45	
9. I will always be looking for food health and safety information on cassava products in future.	M	2.15	1.21	-3.87	0.50
	F	3.93	0.63		
10. I would like to see additional information about Lassa fever as it affects my cassava products processing and marketing in the future	M	3.63	0.61	2.34	0.58
	F	4.12	1.54	-2.29	
11. I would not sell cassava products without high compliance with food safety practices in the future.	M	3.74	1.43	1.70	0.09
	F				

stores can help reduce the incidence of cassava product contamination. ( $M= 4.77$  for females and  $M= 4.45$  for males,  $p = 0.00$ ). They also agreed that Government should educate cassava products dealers on Lassa fever/food safety information ( $M= 3.34$  for females and  $M= 3.21$  for males,  $p = 0.00$ ). Generally, the analysis shows that female cassava food dealers demonstrated more unbelieve/ignorance, and unwillingness to adapt information that will serve preventive measures against contamination of cassava products more than males as expressed through their perceptions as Tables 2 and 3 show.

	F	3.57	1.71	1.65	
12. Government should educate cassava products dealers on Lassa fever/food safety information	M	3.34	1.96	-3.72	0.00
	F	3.21	0.73	-3.70	
13. I believe food safety/Lassa fever information should not be misleading.	M	2.87	1.87	-2.65	0.11
	F	3.00	0.00	-1.73	
14. There is no Lassa fever; it is either malaria or typhoid	M	2.21	0.58	-1.97	0.40
	F	3.00	0.00	-1.73	
15. I believe it is quite costly for cassava products dealers to keep food safety rules and regulations.	M	2.35	1.76	-1.84	0.37
	F	2.74	0.99	-1.82	
16. I believe contamination of cassava product by mastomys rat take place at the consumers' custody	M	3.04	0.98	3.34	0.00
	F	3.78	1.25	3.04	
17. I do not believe that rat urine causes Lassa fever.	M	2.07	1.93	-1.98	0.27
	F	4.23	0.80	-1.69	
18. I know that proper fumigation of shops and stores can help reduce the incidence of cassava product contamination.	M	4.45	1.62	-4.86	0.00
	F	4.77	1.42	-4.54	
19. I believe that complaints about cassava product contamination were fabricated by consumers	M	3.07	0.98	2.93	0.03
	F	4.09	1.99	1.98	
20. I know that Lassa fever can also be contracted through human-to-human Source	M	2.69	0.17	4.00	0.72
	F	2.55	1.45	3.09	

T-V= t-value; Sig= (two-tail) Significant level

#### 4. Conclusion

While the long-term consequences of the Lassa fever pandemic will become more apparent in the coming months, this study is an attempt at informing policy and creating awareness among dealers in the cassava value chain of the possible impact of the disease on agriculture and food security in Lagos state. The study elicited the perception of cassava products processors and marketers(dealers) on the food safety requirements concerning rampaging Lassa fever, through the use of a twenty-item instrument that incorporates adapted information on the preventive requirement for food safety as applicable to the Lassa fever. The study concluded that women perceived Lassa fever information very differently to men, as women are more interested in looking for hygiene information relevant to their activities Hence, females were found to be the driver behind certain concerns than males on certain elements related to cassava products contamination and food safety information. It

is important to begin an awareness drive on Lassa fever-induced contamination among actors or dealers in the cassava value chain early in order to curb the spread of Lassa fever in rural areas of Lagos state. Information is a major variable in all economic equations. Early education of stakeholders will serve to curb the incidence of Lassa fever where wrong information could trigger and affect consumers' confidence. It is necessary to maintain confidence, and trust between producers and consumers of cassava products regarding the safety and availability of food.

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