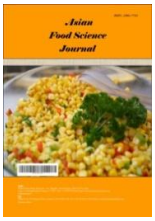

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Assessment of Safety Practices in Garri Production among Cassava Processors in Ido Local Government Area Oyo State Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Author ASA designed the study, performed the statistical analysis, wrote the protocol, wrote the first draft of the manuscript and managed the literature searches. Authors OOO and JOO managed the analyses of the study. All authors read and approved the final manuscript.

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ABSTRACT

The study assessed safety practices carried out in garri production among the cassava processors in Ido Local Government area, Oyo State, Nigeria. Purposive sampling technique was used in selecting 104 cassava processors from three (3) wards in the study area. Parameters examined are socio-economic characteristics of the respondents, respondents' knowledge of food safety practices, and the constraints encountered in the food safety practices in garri production among the respondents in the study area. A well structured-questionnaire with interview schedule was used for data collection in the study area. Both descriptive and inferential statistics like frequency distribution, percentages, Chi-square and Pearson product moment correlation were used in analyzing the data. Results show that majority of the respondents were female (70.2%), had age range of 31-40 (47.1%), married (72.1%), primary education (35.6%), and processing experience of 6-10 years (65.4%). Most of the respondents (53.7%) have sufficient knowledge of the food

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safety practices. Also, most of the respondents (63.4%) encountered little or no constraints in cassava processing into garri in the study area. The results further exemplified that there is significant relationship between constraints encountered in processing and respondents' knowledge of food safety practices among the cassava processors in the study area ($r = -0.194$, $p < 0.05$). This implies that there is little or no constraint for food safety practices but cassava processors' knowledge and their years of experience have positive influence on the production of garri in the study area. It is however recommended that government should deploy community health workers to monitor the processing activities of the cassava processors and to enforce adequate hygiene in safety practices in all the cassava processing units in the study area. The National Agency for Food and Drug Administration and Control, NAFDAC should also be mobilized to ensure that garri is free of cyanide acid content and fortified with vitamins before its distribution to the markets.

Keywords: Safety practices; garri production; cassava processors.

1. BACKGROUND INFORMATION

Cassava botanically known as *Manihot species* belongs to the family of euphorbiaceous [1]. It is one of the major food crops grown in the middlebelt and the southern part of the Nigeria. It originated from Brazil in South America from where it was introduced into Central Africa between the 18th and 19th century [2]. At present, it has become a very vital staple crop in Nigeria within the reach of the poor [3]. Nigeria today is ranked the highest producers of cassava in the world. [4] estimated the household consumption of cassava to be 30 million metric tons with a marketable surplus for industrial demand of about 10% of the total production. However, the poisonous nature of cassava product makes it unsafe for human consumption if not properly processed. The presence of cyanogenic glycosides mainly linamarin and its breakdown products in cassava and its processed products has been a source of concern from the view point of food safety. Almost all the tissue of cassava contains large amount of cyanogenic glycosides such as linamarin and lotoaustralin with linamarin accounting for 95% of the total cyanoglycoside in cassava [5]. Cassava, therefore can be processed into human food like garri, lafun (white cassava flour), and fufu (semi-solid fermented cassava product). The method of processing cassava focused mainly on how to get rid of cyanide acid content [6]. The methods of cassava treatment that reduce cyanide content in cassava and improve its quality are fermentation, boiling, drying, steaming, baking, blanching, frying and parboiling [7]. It is reported that large scale cassava processing could be harzardous both to the environment and human bodies due to the discharge of hydrocyanic acid which contaminate the atmospheric air and the consumption of residual cyanide in food [8]. Garri (also known as garry) is a popular West African food made from cassava tubers. The spelling "garri" is mainly used in Nigeria, Cameroon, Sierra Lone, Benin, Togo, but it is called "gari" in Ghana. Garri is a fine grain produced from cassava, a tuberous root with thick skin and dense flesh. According to [9], Garri is a gritty, starchy staple food with high energy content which is derived from cassava (*Manihot esculenta crantz*). It is a convenient product because it is stored and marketed in a ready-to-eat forms and can be prepared with hot or cold water depending on the type of meal [10]. Garri is the most common form in which cassava is sold in Nigeria and many other African countries [11]. Garri can be yellow (if fortified with palm oil) or white, although garri can also be processed from bio-fortified cassava for better shelf-life and organoleptic acceptability among the consumers [12]. An average family of six (6) consumes approximately 50kg of garri per month (this quality requires about 400 cassava roots). Traditional processing includes six (6) steps to achieving the final product of garri namely peeling, washing, grating, drying, sifting, and frying [13]. Hence, the essence of different methods is mainly to ensure that cassava processing is stress free. According to [14], based on the years of experience of the cassava processors in processing cassava into garri, it is important to know how informed and knowledgeable they are about safety practices in cassava processing. It is against this backdrop that this study seeks to assess safety practices in garri production among cassava processors in Ido Local Government Area, Oyo State, Nigeria.

2. METHODOLOGY

The study was carried out in Ido Local Government Area of Oyo State, Nigeria. The

population of the study was cassava processors. Purposive sampling procedure was used to select 104 respondents from three (3) wards comprising mainly Ilaju, Akufo, and Ido respectively. A well structured questionnaire with interview schedule was used to collect data from the respondents in the study area. Data collected was analyzed with descriptive statistics of frequency distribution and percentages whereas chi-square and pearson product moment correlation were the inferential statistics used..

3. RESULTS AND DISCUSSION

Table 1 revealed that majority of the respondents (70.2%) was female. This implies that female respondents are more involved in processing and male respondents are more involved in cultivation. This is in line with [10] who observed that women are more specialized in garri production among cassava processors. Most of the respondents (72.1%) are married. This implies that married women are involved in garri production than men. This is in line with [12] that married women are more involved in garri production among cassava processors. Majority of the respondents (65.4%) also have processing experience of 6-10 years. This agrees with the work of [15] that about 58.7% of the people involved in safety processing have over 10 years experience.

Table 2 showed that 54.8% of the respondents affirmed that sorting of cassava before peeling is a good safety practice, 98.1% of the respondents considered washing of cassava peel is one of the major safety practices which enhances quality and safety. The table further revealed that 85.6% of respondents considered lack of safety practices in cassava processing of unfermented cassava which is dangerous to health. These results implied that majority of cassava processors involved in garri production are highly knowledgeable in cassava processing safety practices. This result agrees with [16] that cassava processors have in-depth knowledge in cassava food safety practices.

The results in Table 3 showed that majority of the respondents (63.4%) have little or no constraints in carrying out the safety practices in cassava processing. This implies that majority of the respondents do not really experienced challenges in garri production among the cassava processors in the study area. This is in line with the work of [15] which revealed that most people involved in processing face little or no constraint in garri production among the cassava processors.

Table 4 revealed that majority of the respondents (37.5%) signified that they carried out sorting of good cassava root sometimes or always. This implies sorting might not have effect on the final product (garri) in the study area. This is in line with the submission of [16] which reveals that most people involved in cassava processing carried out sorting of cassava. Majority of the cassava processors are always involved in the following safety practices like peeling (81.7%), washing (58.7%), grating (78.8%), fermenting (75.0%), pressing (79.8%), sifting (58.7%), frying (71.2%). This implies that all these safety practices are necessary and must not be left undone.

Table 1. Socio-economic characteristics of respondents (n = 104)

Variables	Frequency	Percentage
Sex		
Male	31	29.8
Female	73	70.2
Age		
21-30	15	14.4
31-40	49	47.1
41-50	30	28.8
51-60	10	9.6
Marital status		
Single	12	11.5
Married	75	72.1
Divorced	8	7.7
Widow(er)	9	8.7
Education		
Informal education	31	29.8
Primary education	37	35.6
Secondary education	23	22.1
Adult education	13	12.5
Processing experience		
1-5	23	22.1
6-10	68	65.4
11-15	12	11.5
16 above	1	1.0

Multiple responses

3.1 Hypotheses Testing

Hypothesis 1: There is no significant relationship between the cassava processors' socio-economic characteristics and safety practices in garri production in the study area.

Table 5 reveals that there is no significant relationship between the cassava Processors' socio-economic characteristics and safety practices in garri production among cassava processors in the study area. This implies that the socio-economic characteristics of the respondents may not really have any effect on safety practices in cassava processing among cassava processors in the study area.

Hypothesis 2: There is no significant relationship between constraints encountered by cassava processors and knowledge of safety practices among in the study area.

Table 2. Distribution of respondents' knowledge of safety practices (n = 104)

Knowledge of Cassava Food Safety Practices	Frequencies	
	Yes	No
Sorting of cassava is not necessary	40 (38.5)	64 (61.5)
Sorting is a good practice	57 (54.8)	47 (45.2)
Peeling cassava lead to loss of edible tissue	18(17.3)	86 (82.7)
Washing of peeled cassava enhances garri quality	102 (98.1)	2 (1.9)
Grating reduces cyanide in cassava processing	100 (96.2)	4 (3.8)
Allowing the water to drain for 2-3 days before pressing is a good safety practice	82(78.8)	22 (21.2)
Environmental hygienic helps prevent contamination	83(79.8)	21 (20.2)
It is not hazardous to health if cassava is not well processed	5(4.8)	99 (95.2)
Cassava contains cyanide which is a poisonous substance	102 (98.1)	2 (1.9)
Cassava that does not pass through fermentation is dangerous to health or for consumption	89 (85.6)	15 (14.4)
Cyanide content varies with varieties	80 (76.9)	24 (23.1)

Multiple responses (percentage in parentheses)

Table 3. Distribution showing constraints encountered by cassava processors (n = 104)

Constraints	Frequency		
	Very severe	Severe	Not severe
Inadequate finance	80 (76.9)	20 (19.2)	4 (3.8)
Lack of processing facilities	18 (17.3)	64 (61.5)	22 (21.2)
Inadequate access to clean water	27 (26.0)	30 (28.8)	47 (45.2)
Inability to meet supply volume	25 (24.0)	45 (43.3)	39 (37.5)
Lack of credit facilities for production	75 (72.1)	20 (19.2)	9 (8.7)
Lack of disposal facilities	34 (32.7)	35 (33.7)	35(33.7)
Weak institutional support for extension	44 (42.3)	31 (29.8)	29 (27.9)
Categorizing the constraints			
HIGH	38 (36.6)		
LOW	66 (63.4)		

Multiple responses (percentage in parentheses)

Table 4. Distribution based on safety practices in garri production among cassava processors (n =104)

Safety practices	Frequency			
	Never	Rarely	Sometimes	Always
Peeling		16 (15.4)	3 (2.9)	85 (81.7)
Washing	10 (9.6)	23 (22.1)	10 (9.6)	61 (58.7)
Grating		18 (17.3)	4 (3.8)	82 (78.8)
Fermenting	3 (2.9)	20 (19.2)	3 (2.9)	78 (75.0)
Pressing		19 (18.3)	2 (1.9)	83 (79.8)
Sifting		22 (21.2)	21 (20.2)	61 (58.7)
Frying		28 (26.9)	2 (1.9)	74 (71.2)
Storing	8 (7.7)	31 (29.8)	42 (40.4)	23 (22.1)

Multiple responses (percentage in parentheses)

Table 5. Chi-square analysis of socio-economic characteristics of cassava processors and safety practices in garri production

Variable	χ2-value	p-value	Decision
Sex	4.092	0.129	NS
Age	9.699	0. 138	NS
Marital status	7.184	0.304	NS
Education	10.083	0.108	NS
Processing experience	5.763	0.450	NS

χ2 = chi-square, p = probability level of significance @ p ≤ 0.05,NS = Not significant
Source: Data analysis, 2014

Table 6. Pearson product moment correlation analysis of Constraint encountered by respondents and their knowledge of safety practices

Variable	r-value	p-value	Decision
Constraints versus Knowledge	-0.194	0.048	Significant

Source: Data analysis, 2014

Table 6 shows that there is significant dependency between the constraints encountered by the cassava processors and the knowledge of safety practices in the study area (r = -0.194, p < 0.05). This implies that the constraints encountered in garri production are correlated with the knowledge of cassava safety practices among cassava processors in the study area. It means that cassava processors have little or no challenges in processing of cassava into garri in the study area as a result of their knowledge of safety practices and long years of experience in cassava processing into garri product.

4. CONCLUSION AND RECOMMENDA-TIONS

In conclusion, majority of the respondents were female, married with the least level of education (primary education), and were active in age. The cassava processors had sufficient knowledge of food safety practices in garri production with little or no challenges encountered in the cassava processing. Nevertheless, in order to improve on the adequate food safety practices among the cassava processors in the study area, the following recommendations are made for policy consideration. The government should deploy community health workers to all various cassava processing units to ensure that adequate cassava safety practices are enforced and complied with. The National Agency for Food and Administration Control, NAFDAC, should be mobilized to enforce and ensure that garri is free of cyanide acid and fortified with vitamin A before its distribution into markets. Marketing organizations should also contribute to safety practices among cassava processors by creating awareness on packaging of garri for more profit to accrue to them.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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