

1 **ASSESSMENT OF SAFETY PRACTICES IN GARRI PRODUCTION AMONG**
2 **CASSAVA PROCESSORS IN IDO LOCAL GOVERNMENT AREA OYO STATE**
3 **NIGERIA**

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6 **ABSTRACT**

7 The study assessed safety practices **carried out in garri production** among the cassava processors
8 in Ido Local Government area, Oyo State, Nigeria. Purposive sampling technique was used in
9 selecting 104 cassava processors from three (3) wards in the study area. Parameters examined are
10 socio-economic characteristics of the respondents, respondents' knowledge of food safety
11 practices, and the constraints encountered in the food safety practices in garri production among
12 the respondents in the study area. A well structured-questionnaire **with interview schedule** was
13 **used for data collection in the study area**. Both descriptive and inferential statistics **like**
14 **frequency distribution, percentages, Chi-square and Pearson product moment correlation** were
15 used in analyzing the data. Results show that majority of the respondents were female (70.2%),
16 had age range of 31-40 (47.1%), married (72.1%), primary education (35.6%), and processing
17 experience of 6-10 years (65.4%). Most of the respondents (53.7%) have sufficient knowledge of
18 the food safety practices. Also, most of the respondents (63.4%) encountered little or no
19 constraints in cassava processing into garri in the study area. The results further exemplified that
20 there is significant relationship between constraints encountered in processing and respondents'
21 knowledge of food safety practices among the cassava processors in the study area ($r = -0.194$, p
22 < 0.05). This implies that there is little or no constraint for food safety practices but **cassava**
23 **processors' knowledge and their** years of experience have positive influence on the production of
24 garri in the study area. **It is however recommended that government should deploy community**
25 **health workers to monitor the processing activities of the cassava processors and to enforce**
26 **adequate hygiene in safety practices in all the cassava processing units in the study area**. The
27 National Agency for Food and Drug Administration and Control, NAFDAC should also be
28 mobilized to ensure that garri is free of cyanide acid content and fortified with vitamins before its
29 distribution to the markets.

30 **Key words:** Safety Practices, Garri Production, Cassava Processors

31 BACKGROUND INFORMATION

32 Cassava botanically known as *Manihot species* belongs to the family of euphorbiaceous [1]. It is
33 one of the major food crops grown in the middlebelt and the southern part of the country. It
34 originated from Brazil in South America from where it is introduced into Central Africa between
35 the 18th and 19th century [2]. At present, it has become a very vital staple crop in Nigeria within
36 the reach of the poor [3]. Nigeria today is ranked the highest producers of cassava in the world.
37 [4] estimated the household consumption of cassava to be 30 million metric tons with a
38 marketable surplus for industrial demand of about 10% of the total production. However, the
39 poisonous nature of cassava product makes it unsafe for human consumption if not properly
40 processed. The presence of cyanogenic glycosides mainly linamarin and its breakdown products
41 in cassava and its processed products has been a cause for concern from the view point of food
42 safety. Almost all the tissue of cassava contains large amount of cyanogenic glycosides such as
43 linamarin and lotoaustralin with linamarin accounting for 95% of the total cyanoglycoside in
44 cassava [5]. Cassava, therefore can be processed into human food like garri, lafun (white cassava
45 flour), and fufu (semi-solid fermented cassava product). The method of processing cassava
46 focused mainly on how to get rid of cyanide acid content [6]. The methods of cassava treatment
47 that reduce cyanide content in cassava and its quality are fermentation, boiling, drying, steaming,
48 baking, blanching, frying and parboiling [7]. It is reported that large scale cassava processing
49 could be hazardous both to the environment and human bodies due to the discharge of
50 hydrocyanic acid which contaminate the atmospheric air and the consumption of residual
51 cyanide in food [8]. Garri (also known as garry) is a popular West African food made from
52 cassava tubers. The spelling “garri” is mainly used in Nigeria, Cameroon, Sierra Lone, Benin,
53 Togo, but it is called “gari” in Ghana. Garri is a fine grain produced from cassava, a tuberous
54 root with thick skin and dense flesh. According to [9], Garri is a gritty, starchy staple food with
55 high energy content which is derived from cassava (*Manihot esculenta crantz*). It is a convenient
56 product because it is stored and marketed in a ready-to-eat forms and can be prepared with hot or
57 cold water depending on the type of meal [10]. Garri is the most common form in which cassava
58 is sold in Nigeria and many other African countries [11]. Garri can be yellow (if fortified with
59 palm oil) or white, although garri can also be processed from bio-fortified cassava for better
60 shelf-life and organoleptic acceptability among the consumers [12]. An average family of six (6)
61 consumes approximately 50kg of garri per month (this quality requires about 400 cassava roots).

62 Traditional processing includes six (6) steps to achieving the final product of garri namely
 63 peeling, washing, grating, drying, sifting, and frying [13]. Hence, the essence of different
 64 methods is mainly to ensure that cassava processing is stress free. According to [14], based on
 65 the years of experience of the cassava processors in processing cassava into garri, it is important
 66 to know how informed and knowledgeable they are about safety practices in cassava processing.
 67 It is against this backdrop that this study seeks to assess safety practices in garri production
 68 among cassava processors in Ido Local Government Area, Oyo State, Nigeria.

69 **METHODOLOGY**

70 The study was carried out in Ido Local Government Area of Oyo State, Nigeria. The population
 71 of the study was cassava processors. Purposive sampling procedure was used to select 104
 72 respondents from three (3) wards comprising mainly Ilaju, Akufo, and Ido respectively. A well
 73 structured questionnaire with interview schedule was used to collect data from the respondents in
 74 the study area. Data collected was analyzed with descriptive statistics of frequency distribution
 75 and percentages whereas chi-square and pearson product moment correlation were the inferential
 76 statistics used.

77 **RESULTS AND DISCUSSION**

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

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

88

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

89 *Multiple responses*

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

98 **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)

99 *Multiple responses (percentage in parentheses)*

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

106 **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)		

107 *Multiple responses (percentage in parentheses)*

108 Table 4 revealed that majority of the respondents (37.5%) signified that they carried out sorting
 109 of good cassava root sometimes or always. This implies sorting might not have effect on the final
 110 product (garri) in the study area. This is in line with the submission of [16] which reveals that
 111 most people involved in cassava processing carried out sorting of cassava. Majority of the
 112 cassava processors are always involved in the following safety practices like peeling (81.7%),
 113 washing (58.7%), grating (78.8%), fermenting (75.0%), pressing (79.8%), sifting (58.7%), frying
 114 (71.2%). This implies that all these safety practices are necessary and must not be left undone.

115 **Table 4: Distribution based on safety practices in garri production among cassava**
 116 **processors (n =104)**

117

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)

118 Multiple responses (percentage in parentheses)

119 **Hypotheses testing**

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

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

127 **Table 5: Chi-square analysis of socio-economic characteristics of cassava processors and**
 128 **safety practices in garri production**

Variable	χ^2 -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

129 χ^2 = chi-square, p = probability level of significance @ $p \leq 0.05$, NS = Not significant

130 Source: Data analysis, 2014

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

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

140 **Table 6: Pearson product moment correlation analysis of Constraint encountered by**
141 **respondents and their knowledge of safety practices**

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

142 Source: Data analysis, 2014

143 CONCLUSION AND RECOMMENDATIONS

144 In conclusion, majority of the respondents were female, married with the least level of education
145 (primary education), and were active in age. The cassava processors had sufficient knowledge of
146 food safety practices in garri production with little or no challenges encountered in the cassava
147 processing. Nevertheless, in order to improve on the adequate food safety practices among the
148 cassava processors in the study area, the following recommendations are made for policy
149 consideration. The government should deploy community health workers to all various cassava
150 processing units to ensure that adequate cassava safety practices are enforced and complied with.
151 The National Agency for Food and Administration Control, NAFDAC, should be mobilized to

152 enforce and ensure that garri is free of cyanide acid and fortified with vitamin A before its
153 distribution into markets. Marketing organizations should also contribute to safety practices
154 among cassava processors by creating awareness on packaging of garri for more profit to accrue
155 to them.

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