FACTORS AFFECTING STAKEHOLDERS' PREFERENCES FOR COWPEA GRAINS IN SELECTED PARTS OF NIGERIA

Odogwu BA[1]*, Uzogara MO[2], Worlu H[2] and IO Agbagwa[1]

Blessing Odogwu

*Corresponding author email: blessing.odogwu@uniport.edu.ng

[1]Department of Plant Science and Biotechnology, University of Port Harcourt, Nigeria

[2]Department of Sociology, University of Port Harcourt, P.M. B 5323 Port Harcourt, Nigeria

ABSTRACT

Cowpea (*Vigna unguiculata* L.Walp) is an important food security crop. It provides food and income for many small-holder farmers in Africa. As a food source, the grains contain large quantities of protein, carbohydrates, vitamins, and fiber. In spite of the high nutritional value of cowpea, the crop is underutilized in most households and commercial eating houses in Nigeria. Several factors have been reported as constraints affecting the consumption and utilization of the crop in Nigeria, but have not been documented. This research was conducted to identify the factors affecting the utilization of the crop and determine the stakeholders' preferences that will increase the demand and consumption of cowpea grains in Nigeria. The study was carried out in Ibadan in Oyo State and Zaria in Kaduna State in Nigeria, with a total of 318 respondents. A descriptive research design was used to collect data which were analyzed using Statistical Package for Social Science (SPSS) IBM version 20 and Microsoft Excel spread sheet. From the social demography result, the respondents were from six different category of stakeholders in the cowpea value chain mainly from breeders (3.7%), farmers (36.0%), marketers (12.7%), food vendors (6.7%), nutritionists (2.6%) and consumers (38.9%). This implies that the respondents were knowledgeable about the factors affecting the cowpea utilization. The two factors identified to affect the utilization of cowpea were culinary qualities (63.0% of respondents) and removing dirt (37.0% of respondents). Among the culinary qualities, the major quality preferred was reducing the cooking time (42.9% of respondents), followed by improved taste (31.7% of respondents), and value added products such as cowpea in powdered form (19.0% of respondents), and canned cowpea (6.4% of respondents). A total of 47.2% of respondents preferred the duration for cooking cowpea for 21-30 minutes as against the 40-60 minutes most cowpea varieties cook for. These findings indicate that cooking time is still the major factor affecting the utilization of cowpea grains. Therefore, improving this quality and other utilization attributes will increase the demand and consumption of cowpea grains.

Key words: *Vigna unguiculata*, plant protein, stakeholders' preferences, utilization of cowpea

BACKGROUND

Cowpea (*Vigna unguiculata* L. Walp) is an important food security crop. It provides food and income for many smallholder farmers in Africa. As a food source, the grains contain large quantities of protein, carbohydrates, vitamins, and fiber. In areas where subsistence farming is practised, cowpea protein is cheaper than that obtained from animal sources and combines well with cereal grains in diets [1].

In Nigeria, cowpea commonly referred to as '*beans'* is one of the most economically important and versatile indigenous legumes, which is used for food, feed, soil fertility enhancement [2] and income generation for farmers and food vendors [3]. There are three popularly known varieties commonly consumed, which are the honey beans, brown beans, and iron beans [2]. Most of the cowpea grains produced are used for direct consumption [4]. The grains of cowpea can be consumed exclusively, as bean-staple mixes, or processed into flour for making steamed *moin-moin*, fried cowpea cake popularly known as *akara*, cowpea soup or for infant feeding [2, 5, 6].

As a result of research focused on supply-side factors, the share of cowpea production among various grain legumes in Nigeria has increased since 1988, making Nigeria the largest and leading cowpea producing country in the world [4], contributing about 58% of the worldwide production [7]. However, in recent times, it has been observed that the demand and consumption of the crop in the country has been low [2, 7] in most households and almost not served in commercial eating-houses in urban and semi-urban areas in Nigeria [8]. Several factors have been reported as constraints affecting the consumption and utilization of the crop in Nigeria [4]. The objective of this paper, therefore, was to identify these factors affecting the utilization of cowpea, and determine the stakeholders' preferences that will increase the demand and consumption of cowpea grains in Nigeria.

RESEARCH APPROACH

Study Area
The study was carried out in Nigeria, in Ibadan, Oyo State, and in Zaria, Kaduna State (Fig. 1). These locations were selected because the cowpea breeding programmes in Nigeria are situated at the International Institute of Tropical Agriculture (IITA), Ibadan and the Agricultural Research Institute at the Ahmadu Bello University, Zaria. Also, Zaria is one of the cowpea growing regions in Nigeria.

Figure 1: Map of Nigeria showing the study areas

Study population and sampling procedure
The study population was composed of key stakeholders in the cowpea value chain, who included cowpea breeders, farmers, traders, food vendors, nutritionists and consumers (Table 1). Two-staged sampling procedure was used for this study. The first stage comprised of purposive selection of Ibadan and Zaria. This was based on the fact that these two towns are where government programs for cowpea breeding and production are carried out in Nigeria. In the second stage, snowball sampling technique was used to identify key stakeholders in the cowpea value chain and their list compiled [9]. From this list, proportionate random sampling was used to select 318 respondents from the two selected towns for the study.

Questionaire design, data collection and analysis
For data collection, semi-structured questionnaires were developed by the research team, and used to gather information from the stakeholders [10]. The validity of the instrument was tested by a panel of expert scholars in social sciences and measurement techniques at the University of Port Harcourt, Nigeria. The panel of scholars recommended certain amendments, which were effected in the instrument before data collection. The questionnaires were used to collect data on socio-economic characteristics and factors affecting the utilization of cowpea grains. The survey was

17672

administered and the data collected were validated with information obtained via literature search. The utilization and non-utilization of cowpea grains by the value chain stakeholders served as the dependent variable, while the independent (explanatory) variables were gender, marital status, age, household size, level of formal education, religion, monthly income, number of times cowpea is eaten in a week and preferred form of cooking cowpea grains (Table 2).

The data collected from questionnaires were coded, entered into Microsoft Excel spreadsheets, and analyzed using SPSS IBM version 20. Results were summarized and presented using descriptive statistics. Since the aim of this exploratory study was to stimulate interest and further studies, this paper tends to lean heavily on descriptive statistics to report the factors that affect the demand and utilization of cowpea grains.

RESULTS AND DISCUSSION

Socio-economic metrics of the respondents

From the study, it was observed that of all the 318 respondents that were surveyed, 306 answered all questions leading to 96.2% completion rate. It has been recognized that the number of respondents adequate for a satisfactory factor analysis should be 300 and above [10]. Thus, the sample size used for the study met this requirement. The respondents' social demographic characteristics are presented in Table 3. The study showed that the respondents were from six different categories of stakeholders in the cowpea value chain [11], mainly from breeders (3.7%), farmers (36.0%), marketers (12.7%), food vendors (6.7%), nutritionists (2.6%) and consumers (38.9%). This could be an advantage in the respondents' interests and understanding of the factors affecting cowpea utilization.

It was observed that 66% of respondents in this study were males. Similar findings have been reported in other perception studies of cowpea [10, 12]. The reason for the high percentage of the respondent being males has been attributed to the fact that more men are involved in cowpea value chain than women [10]. More so, 62.4% of the respondents in this study were of the Islamic faith and practise purdah, which is the requirement of women to avoid mingling with men other than their husband or close relative [10]. This may also be the reason why there were more males in this study, especially in Zaria.

Also, from the study, it was observed that the ages of the respondents spread across all the age brackets considered with 55.9% of the respondents falling within the age bracket of 18-28years old. Similar age brackets have been reported as the age of people who might have consumed more legumes and will likely be familiar with the factors affecting the consumption of cowpea grains [12]. It was observed that about 52.2% of the respondents were married. Since most households are men-led, this could have implications on the food choices of the household and thus, consumption of cowpea. Approximately 89.9% of the respondents had formal education with 41.8% of the respondents having at least a tertiary education. This shows that the respondents in this study were well educated and would provide the relevant information for the study. As regards the family size, and monthly income, majority of the respondents had family

sizes from 1-5 persons (48.7%) and 15 and above (7.8%), with over 36.8% of the respondents having low income of ₦1000 to ₦5000 (which is equivalent to $2.63 to $13.16 respectively). The level of consumption of cowpea has been reported to be determined by the income level of consumers, and the prices of cowpea and animal protein [5]. Considering the high prices of most foodstuffs in Nigeria and the average household sizes of five to seven persons, budgeting for an adequate diet and energy for food preparation would be very difficult for these low income families [1, 5]. These could have had an effect on the number of times cowpea is eaten each week. About 83.7% of the respondents ate cowpea between one to four times each week. The most preferred forms of cooking cowpea grains by the respondents were pottage (31.6%), followed by *moin-moin* (25.9%) with precooked and canned cowpea which was the least (1.3%). Cowpea (or beans) pottage is a bean mixed with staples like rice (*Oryza sativa*), plantain (*Musa paradisiaca*) or yam (*Dioscora sp*), and is a common and cheap way cowpea grains are prepared in Nigeria.

Factors affecting the utilization of cowpea grains
The result for the factors identified by the respondents as affecting the utilization of cowpea is presented in Fig. 2A. The two factors identified by all respondents were removing dirt (37%), and culinary qualities (63%). Although there are no recent consumption data available for cowpea in Nigeria, the only available information reported that the level of consumption of cowpea was determined by four major factors which are the income level of consumers, taste of the product, prices of cowpea and population level [5]. Culinary quality has been reported as a major factor affecting the utilization of cowpea grains [6, 13, 14, and 15]. In this study, culinary quality was selected by 63% of the respondents, indicating that this quality is still a major factor affecting the utilization of cowpea grains in Nigeria.
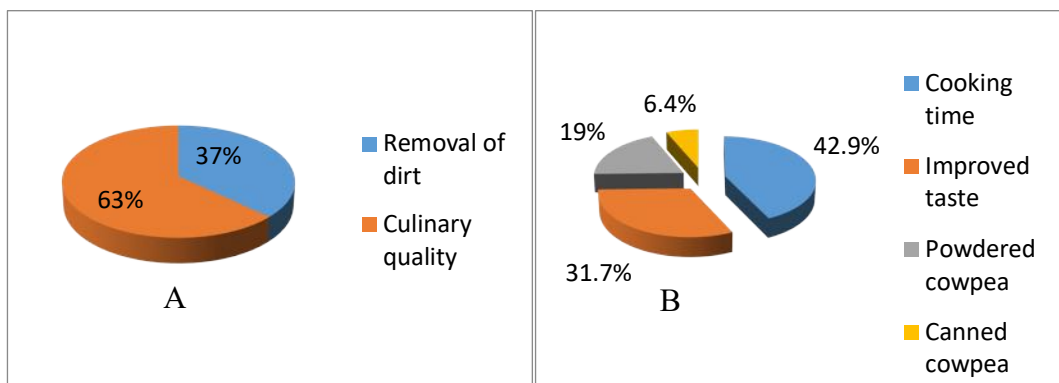

Figure 2: The factors affecting the utilization of cowpea grains:
A. The removal of dirt and culinary quality were identified and,
B. Four types of culinary qualities identified to increase utilization of cowpea

The result of the type of culinary qualities identified to increase utilization of cowpea is presented in Fig. 2B. The major quality preferred was cooking time (42.9%), followed by improved taste (31.7%), value addition products such as cowpea in powdered form (19%), and canned cowpea (6.4%). Cowpea has been observed to be underutilized in commercial eating houses in Nigeria due to the required long processing and cooking

17674

times [6,14] and relatively large amount of energy required to soften the grains [1, 15].
Long cooking time is a major limitation to the utilization of cowpea grains, especially
among the low- income and growing middle-income populations of Nigeria because
long periods of cooking cowpea grains lead to loss of nutrients, loss of useful time to
devote to other chores, and increased greenhouse gas emission through greater use of
firewood. However, Addy *et al*. [1] suggested that fast-cooking cowpea has the
potential to deliver highly nutritious food to the hungry within shorter periods,
encourage less use of firewood, and trigger an increase in demand and consumption for
cowpeas. In fact, the preference for reducing the cooking time was selected by 42.9%
of the respondents, while 47.2% of respondents preferred the duration for cooking
cowpea grains to 21-30 minutes as against the 40-60 minutes which most cowpea
varieties cook for [4, 16]. The three most popular varieties commonly consumed, honey
beans or *Oloyin* beans, brown beans, and iron beans, are reported to cook for 40
minutes or longer [15]. Sometimes to soften the beans as they boil and reduce the
cooking time to 20-25 minutes, it is recommended to add *Akaun* (edible potash) or
baking soda or use a pressure cooker [17]. However, these findings indicate that
cooking time is still the major factor affecting the demand and consumption of cowpea.
Therefore, there is a need to improve this quality in cowpea grains.

Figure 3: The result of the preferred duration for cooking cowpea

Also, in this study, 31.7% of the respondents identified the improvement of the *beanie*
taste as a factor that will increase the utilization of cowpea grains. The *beanie* taste is
an undesirable taste that has been reported to contribute to the infrequent preparation of
cowpea in many households [4, 6]. Although there are some cowpea programs for the
improvement of this attribute, the full impact of this new utilization technology is still
on-going [6]. A total of 25.4% of the respondents indicated that diversifying the value
addition products of cowpea will enhance their demand and utilization. This is similar
to the suggestions by AATF and CANR [18, 19]. However, 19% of the respondents
indicated that powdered or flour cowpea was more preferred to canned cowpea. A

survey showed that consumption of cowpea in Nigeria more than doubled in areas where village mills were installed for processing cowpea grains to flour, even when the price for dry milling increased to 500 percent [20]. This is because the processing of cowpea flour greatly simplified the task of paste preparation by eliminating the soaking, dehulling and wet milling steps. However, this was not well received by consumers due to the poor performance of the paste when developing some products [14, 21]. Taiwo *et al*. [22] has suggested that pre-cooking and canning of cowpea grains will increase the crop demand and utilization. Canning of cowpea grains has proven to heighten retention of nutrients, effectively reduced the use of energy, increased shelf-life of cowpea grains, reduced post-harvest storage losses and created potential for the international export markets [21, 22, 23]. According to Taiwo *et al*. [24], the production of commercially sterile whole cowpea seeds in tomato sauce was introduced to the Nigerian market as processed mashed *jollof* beans and a substitute for the ready-to-eat canned baked beans. Unfortunately, the product did not have good consumer acceptance and was subsequently withdrawn from the market because the grains were fragmented [24]. Although the variety IFE-BPC was identified to have good canning quality and recommended for industrial use [25], there is no canned cowpea grain product available in the Nigerian market. However, from the study, there was low preference for canned cowpea grains by the respondents (6.4%). This may be because there are no canned cowpea products available or that Nigerians have developed a taste for the imported canned kidney beans instead [25]. However, there is potential in improving this quality in cowpea grains to enhance the consumption of cowpea grains especially in the urban areas of Nigeria.

CONCLUSION

In this paper, the factors affecting the perception and preferences for cowpea grains were investigated. Culinary quality was identified as one of the major factors affecting the demand and consumption of cowpea in Nigeria. Among the three culinary qualities identified, reduction of the cooking time of cowpea grains and the undesirable *beanie* taste of the grains were the two important factors that if improved would increase the demand for cowpea grains. However, among the value addition products, the powdered form of cowpea grains was preferred over canned cowpea grains. Nevertheless, there is potential in improving canning quality of cowpea grains to enhance the consumption of the grains especially in the urban areas of Nigeria.

Table 1: The value chain stakeholders, location and number of the selected stakeholders used in the perception study

S/N	Location	Value chain actor	Location	Number selected stakeholders
1		Breeder	IITA-Ibadan	20
2		Trader	Bodija market- Ibadan	20
3	Ibadan	Food vendor	Ibadan	10
4		Nutritionist/dietician	University College Hospital, Ibadan	04
5		Consumer	Eating houses-Ibadan	30
6			Households Ibadan	30
7		Farmer	ARI-ABU, Zaria	110
8		Trader	Samaru market-Zaria	20
10	Zaria	Food vendor	Zaria	10
11		Nutritionist	University Teaching Hospital, Zaria	04
12		Consumer	Eating housed-Zaria	30
13			Households Zaria	30
Total				318

Table 2: List and description of variables used in the study

Description	Variable type	Units
Dependent variable		
The use of cowpea grains by the stakeholders	Dummy	1=yes, 0=no
Independent variable		
The sex of the stakeholders	Dummy	0=male, 1=female
The religion practiced by the stakeholders	Dummy	0=Christian, 1=Islam, 3=traditional religion, 4=atheist
The age of the stakeholder	Years	Continuous
The marital status of the stakeholder	Dummy	0=single,1=married, 2=divorce,3=widowed
The level of education of the stakeholder	Levels	Continuous
The size of the stakeholder's household	Persons	Continuous
The monthly income of the stakeholder	Naira	Continuous
The number of times the stakeholder eats cowpea grains in a week	Dummy	Continues
The preferred form of cooking the cowpea grains	Dummy	Continuous

Table 3: The respondents' social demography metrics

Variables	Sub-variable	Frequency		Total/percentage
		Ibadan	Zaria	
Category of Stakeholder	Breeder	10	0	10(3.7%)
	Farmer	0	110	110(36.0%)
	Marketer	20	20	39(12.7%)
	Food Vendor	10	10	20(6.7%)
	Nutritionist	4	4	8(2.6%)
	Consumer	59	59	119(38.9%)
Gender	Male	79	126	202(66%)
	Female	35	69	104(34.0%)
Religion	Christianity	22	89	111 (36.3%)
	Islam	87	104	191(62.4%)
	African traditional religion	1	0	1(0.32%)
	Atheist	3	3	6(2.0%)
Age	18-28	49	113	162(52.9%)
	29-38	26	35	61(19.9%)
	39-48	29	23	52(17.0%)
	49 and above	7	24	31(9.2%)
Marital status	Single	39	89	128 (40.5%)
	Married	66	99	165 (52.2%)
	Divorced	3	3	6 (1.9%)
	Widowed	3	4	7(5.4%)
Education level	No formal education	10	20	30(9.8)
	Primary education	31	32	63(20.6)
	Secondary education	32	52	84(27.5)
	Tertiary Education	37	91	128(41.8)
Family size	1 to 5	44	105	149 (48.7%)
	6 to 10	30	42	72 (23.5%)
	11 to 14	30	31	61(19.9%)
	15 and above	7	17	24 (7.8%)
Monthly Income (Naira)	1,000-5000	35	76	111(36.3%)
	6000-20,000	29	45	74(24.2%)
	21,000-50,000	11	44	55(18.0%)

	51,000-100,000	26	30	56(18.3%)
No. of times Cowpea I eaten in a week	1-2 times	46	99	145(47.4%)
	3-4 times	48	63	111(36.3%)
	5-6 times	0	3	3(0.9%)
	7-8 times	17	30	47(15.3%)
Preferred form of cooking cowpea grains	Pottage	24	90	114(31.6%)
	Moi-moi	41	39	80(25.9%)
	Plain with stew	20	46	66(25.0%)
	Akara	23	19	42(14.2%)
	Precooked and canned	3	1	4(1.3%)

REFERENCES

1. **Addy SN, Cichy KA, Adu-Dapaah H, Asante IK, Emmanuel A and S Offer** Genetic studies on the inheritance of storage-induced cooking time in cowpeas [*Vigna unguiculata* (l.) Walp]. *Frontiers in Plant Sciences*, 2020; **11**:444.

2. **Agriculture Nigeria.** Cowpea (*beans*) trending, 2018; retrieved from www.agriculturenigeria.com *Accessed 30/10/2019.*

3. **Boukar O, Fatokun CA, Huynh B-L, Roberts PA and TJ Close** Genomic Tools in Cowpea Breeding Programs: Status and Perspectives. *Frontier Plant Science*, 2016; **7**:757.

4. **Kormawa PM, Chianu JN and VM Manyong** Cowpea demand and supply patterns in West Africa: the case of Nigeria, 2002; Retrieved from https://www.researchgate.net/publication/237536245 *Accessed 30/10/2019.*

5. **King J, Nnanyelugo DO, Ene-Obong H and PO Ngoddy** Household consumption profile of cowpea (*Vigna unguiculata*) among low-income families in Nigeria. *Ecology of Food and Nutrition*, 1985; **16(3)**: 209-221.

6. **Gómez C** Cowpea: Post-Harvest Operations. Edited by Mejía, D. Food and Agriculture Organization of the United Nations (FAO), 2004; Rome, Italy. Pp. 25-31.

7. **Giginyu IM** Nigeria leads in cowpea production, deficit in consumption. Daily Trust Newspaper, March 10, 2017. Retrieved from www.dailytrust.com.ng *Accessed 30/10/2019.*

8. **Obasi NE, Unamma NC and GE Nwofia** Effect of Dry Heat Pre- Treatment (Toasting) on the Cooking Time of Cowpeas (*Vigna unguiculata* L. Walp). *Nigerian Food Journal*, 2014; **32(2):**16 – 24.

9. **Cohen N and T Arieli** Field research in conflict environments: Methodological challenges and snowball sampling. *Journal of Peace Research*. 2011; **48(4)**:423-35.

10. **Saba BM, Ishiyaku FM, Tongoona BP, Gracen V, Daniel KD, Muhammad LU and U Sulaiman** Farmers' knowledge, perception and use of phosphorus fertilization for cowpea production in Northern Guinea Savannah of Nigeria. *Heliyon*, 2020, e05207.

11. **Mishili FJ, Fulton J, Shehu M, Kushwaha, S, Marfo K, Jamal M, Chergna A and J Lowenberg-DeBoer** Consumer preferences for quality characteristics along the cowpea value chain in Nigeria, Ghana and Mali. *Purdue University Working Paper*, 2007; #06-17.

12. **Lucier G, Lin BH, Allshouse J and LS Kantor** Factors affecting dry bean consumption in the United States. *Small*, 2000; **19**:2-5.

13.   **Abiose S** Assessment of the extent of use of indigenous African foods, introduced foods and imported foods in hotels and other commercial eating-places in southwestern Nigeria. 1999 Retrieved from www.uni.edu/inra/pub/bforson/chiz-p50-52.pdf *Accessed 30/10/2019*.

14.   **Phillips DR, McWatters KH, Chinnan MS, Hung Y, Beuchat LR, Sefa-Dedeh S, Sakyi Dawson E, Ngoddy P, Nnanyelugo D, Enwere J and NS Komey** Utilization of cowpeas for human food. *Field Crops Research*, 2003; **82 (2003)**:193–213.

15.   **Yeung H, Ehlers JD, Waniska RD, Alviola JN and LW Rooney** Rapid screening methods to evaluate cowpea characteristics. *Field Crops Research*, 2009; **112**:245-252.

16.   **Weil A** Cooking with legumes: Black-eyed peas, 2017; Retrieved from www.drwell.com *Accessed 30/10/2019*.

17.   **Ologhobo L** Nigerian beans porridge, 2017; Retrieved from www.yummymedley.com *Accessed 30/10/2019*.

18.   **Lete N** How to cook perfect Nigerian plain beans, 2019; Retrieved from www.nigerianfoodtv.com *Accessed 30/10/2019*.

19.   **AATF.** Report of Small Group Meeting (SGM) on Constraints to Cowpea Production and Utilization in Sub-Saharan Africa. African *Agricultural Technology Foundation Report*, 2003; Pp. 15-18.

20.   **CANR.** Bean/cowpea CRSP: Contribution to agriculture in developing countries. CANR International News, 2001; Michigan State University.

21.   **Afoakwa EO, Yenyi SE and E Sakyi-Dawson** Response surface methodology for optimizing the pre-processing conditions during canning of a newly developed and promising cowpea (*Vigna unguiculata*) variety. *Journal of Food Engineering*, 2006; **73**: 346–357.

22.   **Taiwo KA** The potential of cowpea as human food in Nigeria. *Food reviews international*, 2009; **14(4)**:1998. https://doi.org/10.1080/87559129809541168

23.   **Miller S and B Knudson** Nutrition and Costs Comparisons of Select Canned, Frozen and Fresh Fruits and Vegetables. CMI_MSU analysis Final. 2012; 1-35.

24.   **Taiwo KA, Akanbi CT and OO Ajibola** Establishing processing conditions for canning cowpea seeds in tomato sauce. *International Journal of Food Science and Technology*, 1997a; **32:**313–324.

25.   **Taiwo KA, Akanbi CT and OO Ajibola** The Effects of Soaking and Cooking Time on the Cooking Properties of two Cowpea Varieties. *Journal of Food* Engineering, 1997b; **33:** 337-346.