
**CONSUMER PERCEPTION OF GARI PROTOTYPES AND PROSPECTS
FOR IMPROVEMENT AND MARKETING IN THE SOUTH WEST
REGION OF CAMEROON**

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ABSTRACT

Gari enjoys the advantage that when steeped in cold water it can be consumed as a snack or as fufu when warm water is used. Due to this multiple usage, gari is gradually gaining grounds in the international food market. There are several indices used by consumers and producers to characterise quality gari. We have conducted this survey to identify the various prototypes of gari found in Cameroon and their preferred usage.

More than 95% of the respondents could identify at least two types of gari that they have been consuming it for more than five years. Thirteen gari prototypes were identified by consumers. Consumer preference was for Muyuka, Bamenda and Mamfe be it for snack or fufu, with the most preferred being the Muyuka prototype. There was a significant difference both in the consumption of fufu over snack and in the frequency of consumption per week of both products. Though respondents affirmed that gari packaging should be improved, 70% rejected the idea to package with sugar for snacks. The respondents (95%) equally admitted that gari has a bright future.

Keywords: Gari, prototype, Muyuka, fufu, snack

INTRODUCTION

Cassava (*Manihot esculenta* Crantz) is an annual crop of the Euphorbiaceae family. It is grown principally for its swollen roots. Cassava leaves are also eaten in some parts of Africa (Makanjuola *et al.*, 2012) and in the South and Eastern regions of Cameroon it is widely consumed as a vegetable. Cassava is the fourth most important staple food in the world after rice, wheat and maize (IFAD/FAO, 2000) and the most important root crop in Africa (Nweke *et al.*, 2002). It provides a lot of energy for more than 500 million people in tropical and sub-tropical Africa (El-Sharkawy, 2004) due to the large amount of carbohydrates accumulated in its roots (Nweke *et al.*, 2002; Beeching *et al.*, 2002; Awah and Tumanteh, 2001). Cassava is cultivated chiefly as a monoculture and is a food source for about 700 million people in Asia, Africa and Latin America (UNCTAD, 2012).

Cassava root is highly perishable and undergoes post-harvest physiological deterioration within three days after harvesting (Karim *et al.*, 2009). This is due to the high water content, rich store of carbohydrates, presence of degradation enzymes in the tissues (Beeching *et al.*, 2002; Osei *et al.*, 2013) followed by microbial deterioration 3-5 days thereafter (Karim *et al.*, 2009). This restricts the marketing and transportation options for fresh roots and it is therefore important to process cassava into dry forms that could be conserved for longer periods (Osei *et al.*, 2013).

Several processing methods have been proposed for cassava roots transformation and they have as principal goals the reduction of water and cyanide content. The major operations involved in these processing steps include peeling, washing, boiling, chipping, soaking, grating, dewatering, fermenting and drying. Several combinations of these steps improve shelf-life, palatability and reduction in cyanide content (Arisa *et al.*, 2011). While all these methods reduce the cyanide level, the reported loss in cyanide content differs considerably due to type and combination of analytical methods and extent to which the processes are carried out (Arisa *et al.*, 2011). In view of these, processing of the harvested roots into forms that are less perishable is an important solution to the high post-harvest losses. These factors coupled with increasing consumers' demand for more options, quality, diversity, consistency and value (Mylene and Kirsten, 2001) led to the introduction of a value added product, Gari Mix, on the Ghanaian market.

Cameroon produced about 4.6 million tons of cassava in 2013 and this placed her 16th on the world ranking with its contribution of about 1.7% of the world production (FAO, 2014). In Cameroon, several recipes are used to process cassava into close to 40 different products with gari being the most consumed and traded of all food products made from cassava roots in Africa (Oluwole *et al.*, 2004; Sanni *et al.*, 2009; Adebayo *et al.*, 2012). Gari competes well with rice in convenience and price in urban and rural markets (Sanni *et al.*, 2009).

Quality gari can be produced from fresh cassava roots following the production pathway as in Fig. 1. It has also been reported that gari of acceptable quality can be produced from dried cassava chips (Ekwu and Ehirim, 2008) and when properly stored, it has a shelf life of six months or more (Sanni *et al.*, 2008).

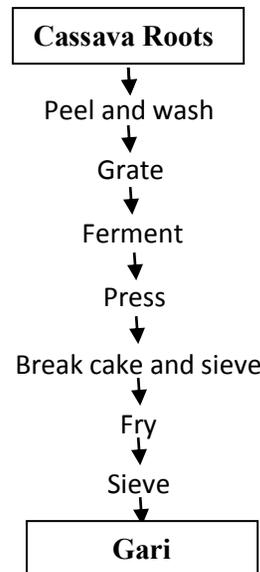


Figure 1: Flow diagram of gari production pathway

Gari is a creamy-white (or yellow, if made from yellow-fleshed roots or fortified with red palm oil during frying), partly gelatinized, roasted, free flowing granular flour with a slightly fermented flavour (Sanni *et al.*, 2009). It enjoys the advantage that when steeped in cold water it can be consumed as a snack or as fufu when warm water is used. In areas where energy to cook is expensive, *gari* (not requiring extensive cooking before it is ready for the table) enjoys some advantages over cereals, such as maize, sorghum, millet, and imported rice that may require cooking for a relatively long time before consumption (Sanni *et al.*, 2009). Due to this multiple usage, *gari* is gradually gaining grounds in the international food market (Adebayo *et al.*, 2012).

There are some indices by which consumers and producers will use to characterise quality *gari*. These include taste (acidity or sourness), swelling capacity, colour, texture, crispiness, and absence of foreign matter (cleanliness) (Adebayo *et al.*, 2012). The product must not be too acidic, but should have a high swelling capacity, and must be of a definite colour— either yellow or cream. Sometimes the uniformity and brightness of the colour is considered more important than the colour itself. With respect to texture, *gari* with a smooth texture is preferred. *Gari* must

be crispy or very crispy and should have no sand particles, black specks, or residual peels in it. Gari is a good source of energy and dietary fibre though other nutrients are also present in marginally nutritional significance (Ikegwu *et al.*, 2009).

It has been established by Oduro *et al.* (2000) and Udofia *et al.*, (2011) that sensory attributes of gari is determined by level of fermentation, frying temperature, quantity of palm oil added, post-harvest storage of cassava tubers before processing, method of grating, and rate of dewatering of cassava mash during fermentation. Other factors include age of cassava plant at harvest, cassava variety, soil quality of location of farm and storage condition of gari before consumption.

Based on these indices, several prototypes of gari have been identified in Cameroon. Production of these prototypes is confined to particular geographical locations and are preferred for specific usage, either as snack or for fufu. We have conducted this survey to identify the various prototypes of gari found in Cameroon and the preferred usage of these prototypes by gari consumers.

METHODOLOGY

This survey was carried out in Buea Sub-Division of Fako Division of the South West Region in Cameroon. Buea is a cosmopolitan town with a diverse population and two major food markets at Muea and Molyko-Checkpoint.

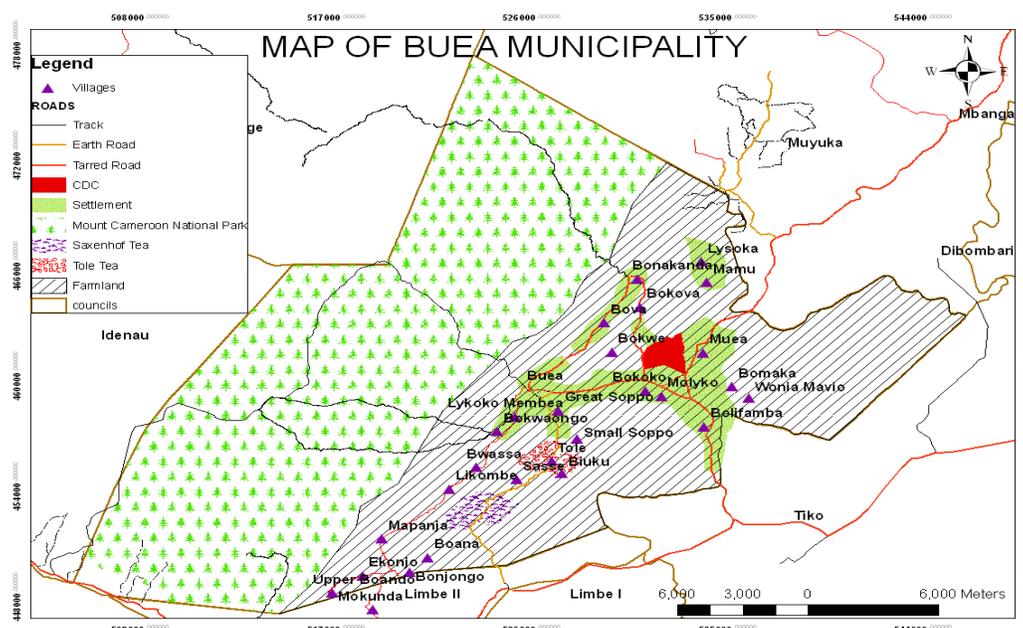


Figure 2: Map of Buea Municipality

These markets receive foodstuffs from all over the region and gari especially comes from all the major production basins. The town has many primary, secondary and higher institutions that receive students from all over Cameroon and neighbouring countries. It also lies at the crossroad linking the other Divisions of the region to Douala, the Economic Capital of Cameroon. This diverse population makes Buea an ideal area to conduct such a survey.

Survey was done following the methods by Levai *et al.*, 2015. Thirty (30) persons from each of the 10 neighbourhoods (Bokwango, Great Soppo, Checkpoint, Ekona, Buea Town, Molyko, Mile 17, Bonduma, Mile 16 and Muea) were randomly enrolled and each of them was administered a semi-structured questionnaire in the language they best understood. Respondents were asked how they principally consume gari, how often, whether they think the packaging can be improved, could other items be added in the package and whether it can be flavoured. These questions helped made sure that the respondents consumed and knew gari, before we asked them whether they could identify the different prototypes in the market and which type they preferred for snack and/or fufu and why these preferences.

The responses were keyed in an MS excel spread sheet and analysed using the Statistical Package for Social Sciences, SPSS software. Results have been presented as frequency and percentages in tables and figures. A two-sided p-value < 0.05 was considered significant for all analyses.

RESULTS AND DISCUSSIONS

Demographic description of respondents

Based on the responses, a demographic distribution (Table 1) shows that more than 80% of the respondents were adults above 20 years and have at least completed primary education. Forty-five percent were into business and thirty percent were students. The business persons included hawkers, mechanics, shop owners, hairdressers and buyam-sellams who frequent consume gari. At least 95% of the respondents could identify at least two types of gari and have been consuming it in any form for more than five years.

Table 1: Demographic description of respondents

Characteristics	Category	Frequency	Percentage
Sex	Male	31	14.8
	Female	121	85.2
Marital status	Married	70	49.3
	Single	72	50.7
Age group (years)	< 20	19	13.4
	20 - 29	46	32.4
	30 - 39	44	31.0
	> 40	33	23.2
Level of education (Years of School)	< 7	22	15.5
	7-11	34	23.9
	12-16	66	46.5
	> 16	20	14.1
Occupation	Business	65	45.7
	Civil Servant	15	10.6
	Farming	09	6.3
	Food Seller	07	5.0
	Housewife	04	2.8
	Student	42	29.6
How long have you been eating gari	< 5	04	2.8
	5-10	15	10.6
	> 10	123	86.6
How many gari-prototypes of gari can you distinguish	1	2	1.4
	2	50	35.2
	3	55	38.7
	4	20	14.1
	5	15	10.6

Identification of gari prototypes

Gari from different production basins (prototypes) stand out and are distinguishable in markets. In our study, 13 gari prototypes have been identified by consumers. Consumer preference was for 03 of the identified prototypes (Muyuka, Bamenda and Mamfe) be it for snack or fufu, with the most preferred being the Muyuka prototype (Figure 2a, b and c), which is significantly different from the rest.

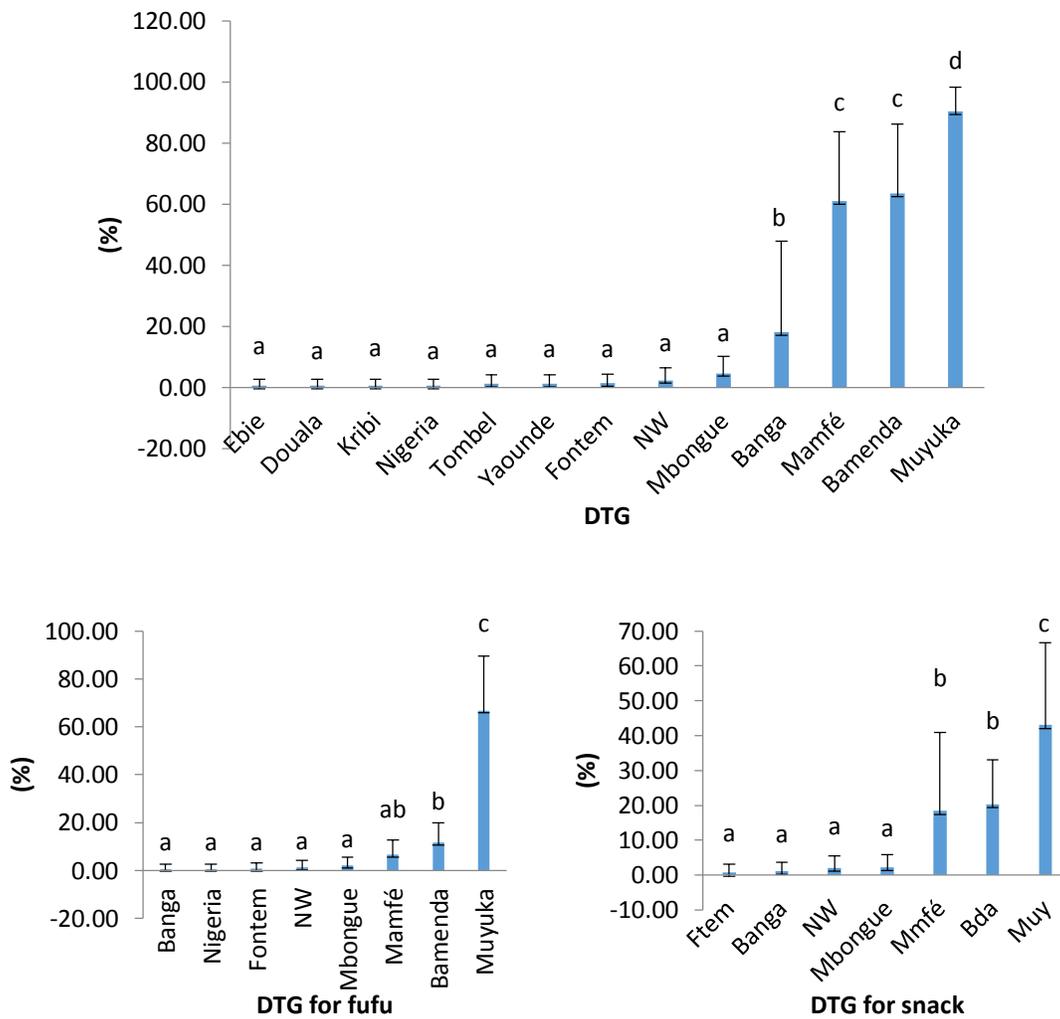


Figure 2: Different types of gari (DTG) prototypes present in the market and their preferred uses

Consumers have described the Muyuka prototype as being fine with uniform particles, very attractive, looking clean and brightly coloured, gels well when cooked. It equally does not easily go soft as a snack. It has a good swelling capacity as snack and fufu and is not too sour to the taste.

Use of gari

Contrary to popular opinions that gari is chiefly consumed as a snack, our study has shown that 68% of respondents in this study area will prefer gari as fufu (Figure 3). They explain that as fufu, gari is more satisfying, can be used to accompany most African soups and vegetables, it is easy to cook and handle, easily digested, the hot-water used in its preparation helps pasteurise it and has no effect on eyes unlike snacks. In their study, Yusuf *et al.* (2013) concluded that there is high prevalence of visual defects among the consumers of gari. The 30% of respondents who prefer gari as a snack do so because it is easy and fast to prepare and pleasurable to consume (Adeniyi, 2014) and rapidly quenches thirst and hunger.

Gari is mostly consumed as fufu when steeped in boiled water and eaten with different kinds of soups and vegetables or as a snack steeped in cold water with added sugar or groundnuts or milk or all of these items depending on the individual. Whichever way is adopted, gari is usually accompanied with other products that complement its poor nutrient status.

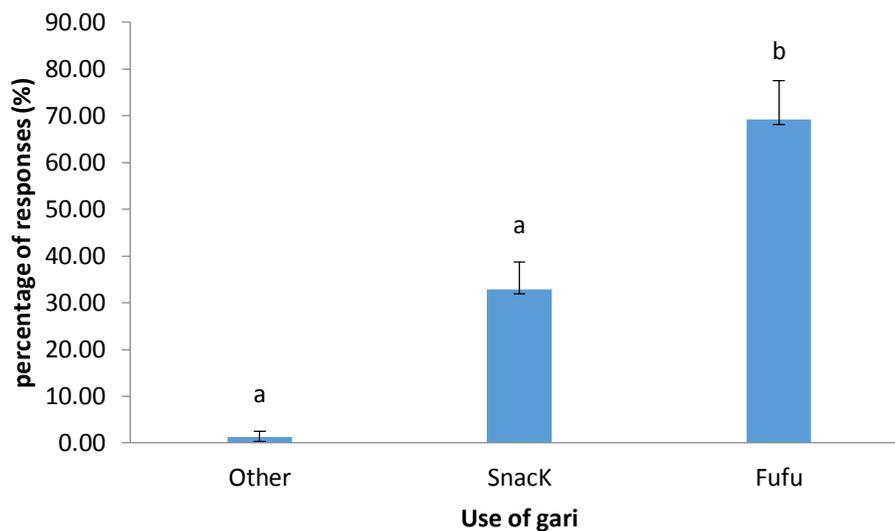


Figure 3: Use of gari

There is now a growing use of gari by tyre repairers who use it in the patching of tires and to properly fit tyres onto the wheel drums. They use leftovers of fufu especially to fit tyres on defective wheel drums of cars and moto-bikes. This is now a popular practice in garages in Cameroon and this accounts for 2% of gari use in this area.

Frequency of gari consumption

Though pleasurable and the fact that it rapidly quenches thirst, most people will consume gari as a snack once a week while fufu can be eaten twice a week as shown on Figure 4. Most respondents affirm that excessive consumption as a snack can affect eyesight. These results have the same trend with those of Yusuf *et al.*, 2014 who concluded in their study that majority of respondents only consume gari once in several days and that excessive consumption affects eyesight. In Nigeria, studies it has been reported that tropical ataxic neuropathy (TAN) or similar degenerative neuropathies that causes poor vision occurs amongst older people who have consumed cyanide mainly from gari over many years (Oshuntokun, 1994; Nhassico *et al.*, 2008).

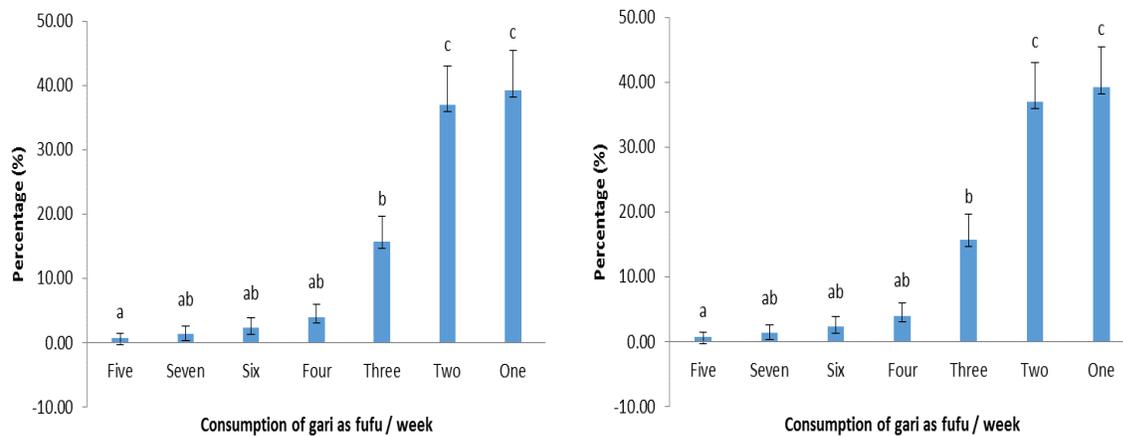


Figure 4: Percentages of weekly consumption of gari as fufu (left) and as snack (right)

Appropriate preservation and packaging techniques have to be employed for gari. Presently, gari is sold in buckets or basins and exposed to the environment. This exposes gari to moisture and contamination with dust particles from the atmosphere. As such, the product shelf-life is greatly reduced. Respondents think that all these can be improved if gari is packaged in 1kg, 5kg, 10kg and 25kg bags. Such packaging should equally permit that the bags are properly labelled. These bags should be airtight just like those used to package other flours. However, a few think that gari should be sold the way it is done now because they will like to taste it dry before buying. Apart from these respondents at checkpoint as shown on Figure 5, all others believe that the present way gari is packaged should be improved.

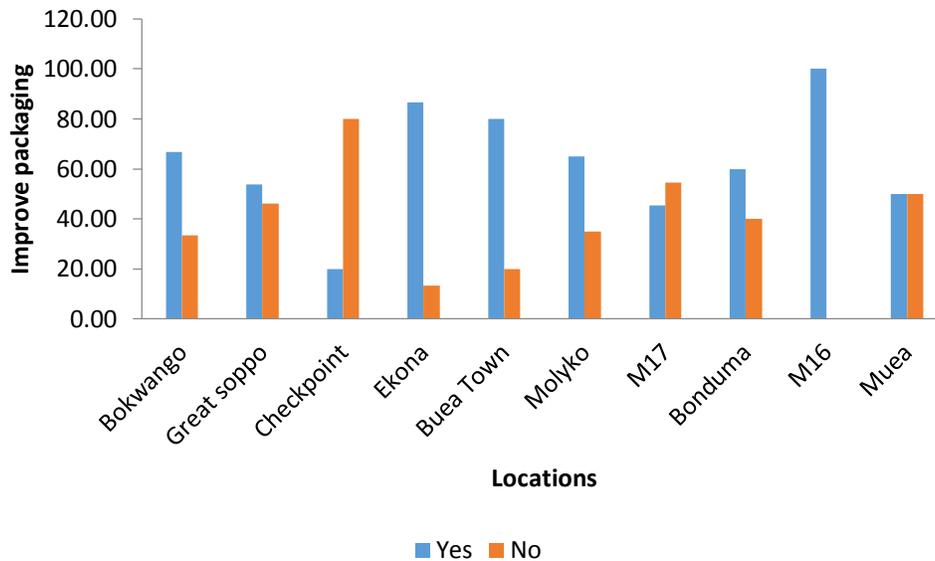


Figure 5: Frequency of responses on whether gari packaging should be improved per location

When respondents were asked whether sugar should be included in the snack package or product be flavored, they significantly said no (Figure 6). They justified that many people are cautious when sugar is mentioned and there is too much variation with regards to taste and that if flavored, gari will lose its identity.

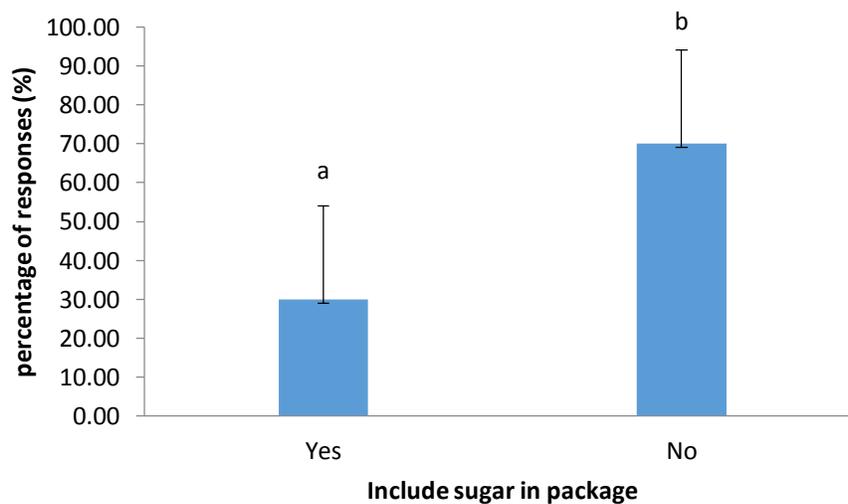


Fig 6: Percentage responses as to whether sugar should be included in package

A significant majority as shown on Fig. 7 affirmed that gari has a bright future all along the value chain. Being a cheap meal with a high source of energy (Apea-Bah *et al.*, 2011), families are increasingly turning to consuming gari, provoking a steady high demand coupled with the fact that it is a snack allowed for most students in dormitory schools. These factors have positively affected the prices and they are getting better by the day. The market now is even bigger as gari from Cameroon has a high demand in neighboring countries like Nigeria, Gabon and Equatorial Guinea. This makes gari production and selling a source of livelihood for many families. The few who disapprove of the future of gari think that if government policy is not properly enacted, gari may disappear someday. They suggest that procedures for gari production be standardized and quality of gari that gets into the market be harmonized. Similar concerns have been raised in Nigeria, as explained by Adeniyi (2014) who propose that the National Agency for Food and Drug Administration and Control (NAFDAC) and Standard Organization of Nigeria (SON) should promote, tasty, hygienic and attractively packaged gari to be able to compete with other food stuffs internationally. A platform has been organised within the C2D/PAR Cassava project in Cameroon to harmonise and standardise production protocols for gari but work is still on-going.

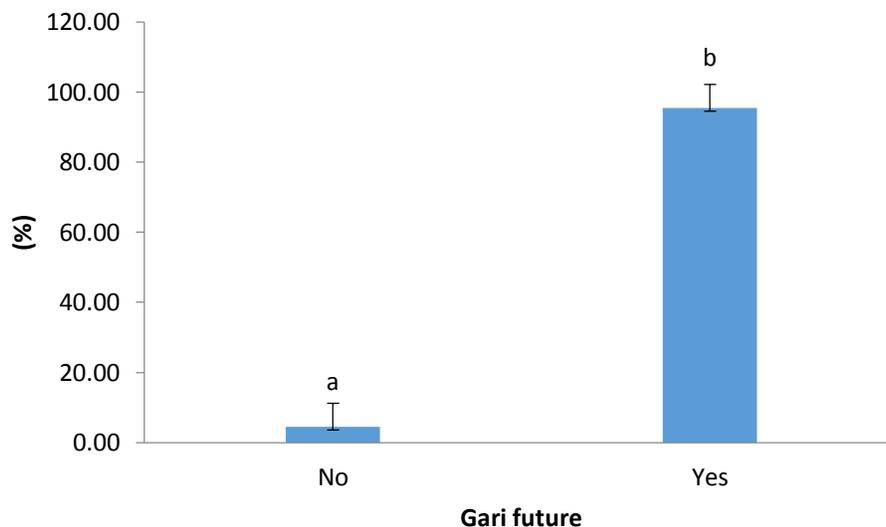


Figure 7: Percentage of responses to the whether there is any future for gari

There are three attributes that contribute to quality of gari; particle size, colour and aroma. Particle size is one of the major attributes that determine the quality and use of gari and in West Africa, the preference is generally for fine particles (Akingbala *et al.*, 2005). Colour of gari on the other hand is important in assessing quality and affects price (Ezedinma and Nkang, 2008).

Though some consumers prefer gari with a white colour, most consumers readily identify with gari having a creamy to slightly yellow colour (Oduro *et al.*, 2000; Ezedinma and Nkang, 2008). Aroma of gari is contributed by the natural aroma of the root, which may vary from one variety to another. The aroma of gari also depends on the aroma developed by the activities of *Corynebacterium manihot*, *Geotrichum candida*, *Lactobacillus* and *Streptococcus spp.* *Aspergillus flavus*, *Fusarium*, *Oligosporium*, *Saccharomyces cerevisiae* and *Rhodotorula minuta* during fermentation of the cassava mash (Okafor and Ejiofor, 2008).

CONCLUSION

As opposed to popular opinions, we have been able to establish that more people eat gari as fufu than as a snack. There are 13 prototypes distinguishable in the market with Muyuka, Bamenda and Mamfe being outstanding for use both as fufu and as a snack. Gari of premium quality should be properly fermented and fried to dryness, be bright in color with uniform fine grains. It should equally be attractive especially the yellow color, not too sour, well dried and free from foreign particles.

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COMPETING INTERESTS

The authors declare that they have no competing interests.

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