

Original Research

Survey of the consumption of okra (*Abelmoschus esculentus* and *Abelmoschus caillei*) in a population of young people in Côte d'Ivoire

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ABSTRACT:

In order to have data on the consumption of okra in Ivory Coast, a survey was carried out in a school in the town of Adjame among young people aged between 15 and 35 years. The survey showed that all respondents knew okra 57.80% of respondents appreciate okra fresh, 39.20% dry and 03% do not appreciate at all the okra. It also showed that 18.60% of respondents appreciate the sauce gombo, 20.80% gouagouassou the sauce, the 13.80% Kopé sauce, 39.20% djoumblé the sauce, sauces made 0.8% made from sheets of okra. 06.80% do not like these sauces. All people surveyed know the varieties of "Gombo baoule" and "Gombo dioula." In conclusion, the existing prejudices about fresh okra are the dried okra is more popular among young people in Côte d'Ivoire.

Keywords:

Okra, Consumption, Ivory Coast.

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## INTRODUCTION

In sub-Saharan Africa and particularly in Côte d'Ivoire, most dishes are served with sauces. These sauces are usually made with vegetables, legumes, leaves and buds. Complemented or not to fish and / or meat, they bring nutrients unmet by cereals, roots and tubers. However, this region of Africa is increasingly affected by the problems of hunger and malnutrition (Schofield and Ashworth, 1996; Brabin and Coulter, 2003; FAO, 2004). The various reports and studies show that nutritional deficiencies remain a public health concern. These deficiencies are the basis of thousands of deaths of young children and women, a drastic reduction of intellectual potential of the new generations and huge economic losses present and future (Ntiru, 2003). National surveys conducted in 1997 by the National Institute of Public Health (INSP) and the Swiss Centre for Scientific Research notaient an overall prevalence of 20% of iron deficiency in Ivory Coast and a prevalence of endemic goitre 43.7% in the mountainous region (Biankouma) (Ntiru, 2003).

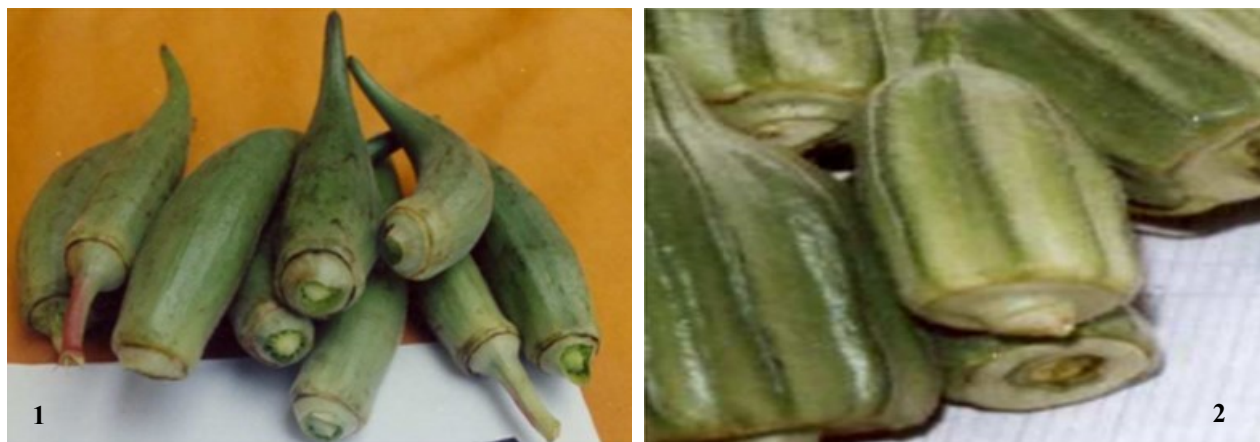
The problem of malnutrition is a paradox when one hand we know that the country's main development strategy is based on agriculture and secondly that all the ingredients that go into the composition of sauces consists of cultivated plants uncultivated and extensively distributed in the African sub-region. Among the crops, we can refer to okra. This plant is one of the most common and important ingredients that go into the making of sauces (Sorapong, 2012), populations including okra sauces (djoumglé, Kopé and others) (Anoman 2004; Koffi, 2005).

Okra, formerly attached to the genus *Hibiscus*, now constitute the kind *Abelmoschus*, in the mallow family (Nzikou *et al.*, 2006; Siemonsma 1982a, b; Bayer and Kubitzki, 2003; Naveed *et al.*, 2009; Farooq *et al.*, 2011).

World production of okra is of the order of 5 to 6 million tons per year, which represents approximately

1.5% of vegetable production (Daubrey and Pape, 1992). In West Africa, okra are in second place behind the vegetable production of tomatoes (Hamon *et al.*, 1983). They are characterized by a diversity of shape, color, fruit and stems (Sawadogo *et al.*, 2006). These are vegetables that can be found fresh in all markets during the rainy season and dry (slices, dried slices or powder) during the dry season (Sawadogo *et al.*, 2006). This is due to their richness in mucilage, their high value and its vital importance in the diet of urban and rural populations (Sawadogo *et al.*, 2006). In Ivory Coast, the production is estimated at 153,000 t in 2005 (7) for an area of 15300 ha (A noman E). okra are grown throughout the territory for its fruit and leaves. They are used in food preparation fresh or dried state (Kashif *et al.*, 2008; Hamon *et al.*, 1983). Okra are of considerable economic importance both for the farmer and the merchant (Hamon, 1987) and play an essential role in the nutritional balance of the rural population (Chevalier, 1940, Sawadogo *et al.*, 2006). Young fruits okra are generally marketed fresh and sometimes canned (USA, Greece). In arid regions like the Sahel and India, the fruits are sliced sun-dried and stored over long periods (Hamon *et al.*, 1987). This vegetable fruit enjoyed in many countries is used as a condiment or as a binder in sauces. It has an interesting nutritional supplement to an unbalanced diet (Hamon *et al.*, 1987). Okra is quite poor in vitamins but has an interesting nutritional value (Kouassi *et al.*, 2013a, b, c, d) but far behind the carrot in front of the tomato (Hamon *et al.*, 1987).

Despite the variety of sauces to fill gaps in protein and cereal minerals, malnutrition is still rampant in our developing countries. The reasons for this paradox are many. Among the non-availability and the cost of food (Sahn, 1994; Strauss, 1990), and especially the nutritional quality of the ignorance of these plants and the lack of making wise choices in diets. Indeed, in developing countries the food situation in difficulties related to incessant conflicts, persistent drought,



**Figure 1. View of fruit all Baoule okra (*Abelmoschus caillei*) (1) and Dioula (*Abelmoschus esculentus*) (2) (Fondio et al., 2011)**

pandemics (HIV), poor guidance agricultural policies, rampant and uncontrolled demographic etc., which will degrade year on year situation and permanently compromise the food and nutritional status of populations of this part of the African continent (FAO / SMIAR, 2004; SPLAR Foundation, 2012). Moreover, no study provides consumption statistics in Ivory Coast.

The general objective of this study is to conduct a survey on consumption of okra (*Abelmoschus esculentus* and *Abelmoschus caillei*) in a population of young people in Côte d'Ivoire; with the specific objectives of:

- Assess the level of consumption of fresh okra, dry okra and okra leaves youth in Ivory Coast (Figure 1).
- Determine the form of appreciation in young okra in Ivory Coast.
- Assess the level of appreciation of the different gumbo sauces youth in Ivory Coast.

## MATERIALS AND METHODS

### Equipment

This study incorporates collections of sufficient information through surveys of students of an institution of the municipality Adjamé. Thus, we used mainly to elaborate a survey sheet, taking into account the objectives we have set. This survey sheet was used as

objectives we have set. This survey sheet was used as study support.

### Sampling

The technique used is simple random stratified sampling design. Indeed, the Plan is a division of the study population into groups called strata, and then you select, within each stratum, independent samples. The selection of independent individuals is random. This technique has raised individual information.

### Data collection

Data collection is based on the method described by Tchiegang and Kitikil (2004). These authors conducted a study on leafy vegetables consumed in the locality of Bini-Dang, a village near the site of the University of Ngaoundere in Cameroon. Thus, for the harvest of our data, we interviewed 500 students. The data collection period was extended from September 2014 to February 2015, or 6 months. The respondents (n = 500) have an age range between 15-35 years.

### Survey processing

After the completion of any investigation, we divided the work in parts. The portions are themes or grouping of sub-themes of the survey form. Topic by topic or issue by issue, counting is done manually by sorting single flat after coding questions.

**Table 1. Sociological characterization of young people aged 15-35 in the town of Adjamé**

S. No	Sociological Characters	Percentage (%) populations
<b>Sex</b>		
1	Man	51.80
	Woman	48.20
<b>Origin</b>		
2	Aboriginal	04.40
	Allogeneic	83
	Foreigners	12.60
<b>Ages</b>		
3	15 to 35 years	100
4	<b>Marital status</b>	100 (single)
5	<b>Education levels</b>	80 (Secondary) and 20 (top)
<b>Knowledge okra</b>		
6	Variety Baoule	100
	Dioula Variety	100
<b>Appreciation okra to the state</b>		
7	Fresh	57.80
	Dry	39.20
	Nothingness	03.00
<b>Sauces okra</b>		
8	Okra	18.60
	Gouagouassou	20.80
	Kopé	13.80
	Djoumglé	39.20
	Leaves okra	0.8
	Nothingness	6.80

## RESULTS AND DISCUSSION

According to Table 1, the people surveyed in the Municipality of Adjamé consist of 51.80% men and 48.20% women. They are divided into 04.40% Aboriginal, 83% and 12.60% of non-native foreigners. The Ebré originating in the Abidjan area is the aboriginal population. The Senoufo, the Tagbanan the Djimini and Malinké from the northern regions of the country (Odiène, Korhogo, Ferkessédougou, etc.), the Baule from center areas (Bouaké, Yamoussoukro, Tiébissou, etc.), Agni, the Aboué, Koulango originating in the East of the country (Aboisso Bonoua, etc.), Attié, Adjoukrou, the Abbey, the Alladjan originating in the southern regions (Adzopé Akoupé, Dabou, Agboville, Jacquévillie) the Guérés the Wobe, Bete from western

regions of Côte d'Ivoire (Duékoué, Gagnoa, etc) are non-native. Foreign populations come from Burkina Faso, Mali, Togo, Nigeria, Niger, Benin, Ghana, Togo, Canada and the United States. All interviewees are between 15 and 35 and are all single. They are mostly educated (80% of secondary and 20% higher). The 500 respondents knew okra. 57.80% of respondents appreciate okra fresh, 39.20% dry and 03% do not appreciate at all the okra. This study also showed that 18.60% of respondents appreciate the sauce gombo, 20.80% gouagouassou the sauce, the 13.80% Kopé sauce, 39.20% djoumblé the sauce, sauces 0.8% made from the leaves of okra. 06.80% do not like these sauces. All people surveyed know the varieties of "Gombo baoule" and "Gombo dioula."

Fresh okra appreciated 57.80% can be explained by the fact that it is used to make different sauces in the Ivory Coast Kopé including sauces, gouagouassou, gombo. This level of assessment could also be explained by the prejudices that exist around fresh okra. According to some consumers and respondents, fresh okra would be responsible for hemorrhoid. This pushes the Ivorian population to move towards djoumblé sauce that is made from okra dried powdered hence this high percentage of 39.20%.

The djoumblé (or djoumblé) is an ingredient used in the composition of a sauce with the same name in the Ivorian kitchen. In the form of granules dark, almost black, with shades of dark brown, it comes naturally dried okra then pounded with time (in the tradition, this is done in a mortar with a pestle) or crushed. This therefore results in a dehydrated presentation (not really powdery) which promotes a very good and long shelf (Biarnes, 1974; Ken, 2011). Kopé the sauce is a sauce made of a mixture of okra and leaves Kplala (*Corchorus oltorius L*) (Biarnes, 1974; Ken, 2011). The sauce is a gouagouassou baoule term (ethnic Ivory Coast) designating mixing two sauces including okra and eggplant (Biarnes, 1974; Ken, 2011).

According to Koffi, Dioula and early varieties are more suited to the gouagouassou gbanmougou sauce and sauce that is popular among Malinke (ethnic group in Ivory Coast). Varieties Baoule, early and red Thiès would be more suited for Djoumblé sauce. This sauce is eaten with rice, bananas or yams foutou. Varieties Dioula, Baoule, Thiès red would be more suited for Kopé sauce. This sauce is eaten with placali (dishes with cassava), the Kabato (food made of corn flour), rice, bananas or yams foutou. These okra consumption patterns were also illustrated by Akassey (1992) and Collectif (1998).

According to Pineau (2004), sauces made from fresh okra have an energy value of  $271 \pm 92$  against  $355 \pm 37$  Kcal for sauces made from dried okra. The levels of protein, iron, bioavailable iron, zinc, vitamin A and zinc bioavailable sauces made from fresh okra are respectively  $34.1 \pm 15.4$  g / 100 g of dry matter;  $5.8 \pm 2.3$  mg / 100 g dry matter;  $0.60 \pm 0.57$  mg / 100 g dry matter;  $3.3 \pm 1.2$  mg / 100 g dry matter;  $1.00 \pm 0.36$  mg / 100 g dry matter;  $128 \pm 122 \pm 44.1$  µg ER against respectively  $26.9$  g / 100 g of dry matter;  $19.3 \pm 5.3$  mg / 100 g dry matter;  $2.30 \pm 0.82$  mg / 100 g dry matter;  $5.7 \pm 1.2$  mg / 100 g dry matter;  $1.71 \pm 0.36$  mg / 100 g dry matter;  $46 \pm 3$  µg ER for sauces dried okra.

## CONCLUSION

The survey conducted on consumer okra (*Abelmoschus esculentus* and *Abelmoschus caillei*) in a population of young people in Côte d'Ivoire revealed that 57.80% of respondents appreciate okra fresh, 39.20% dry and 03% do not appreciate at all the okra. She also indicated that 18.60% of respondents appreciate the sauce gombo, 20.80% gouagouassou the sauce, the 13.80% Kopé sauce, 39.20% djoumblé the sauce, 0.8% based sauces made leaves okra and 06.80% do not like these sauces. To bring the Ivorian population to consume this fruit rich in micronutrients and macronutrients, it would be interesting to assess the

effect of okra on the intestine in order to remove prejudices that exist around these fruits in Côte d'Ivoire.

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