Macronutrient Values of Local Meals of Some Cameroonian Traditional Communities Living in Yaounde

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Abstract: Background and objectives: This study aimed to evaluate the macronutrient values of some traditional meals consumed by some communities living in Yaounde. Methods: The study was carried out among six traditional communities living in Yaounde (Cameroon) (Mbo, Bamougoum, Eton, Bafia, Haussa and Dschang). This study was carried out in two different stages: a food survey and a food composition analysis. In the first stage: the food questionnaire was administered to 30 natives of each community to investigate local meals more and rarely consumed. After a data analysis of these questionnaires, the most consumed meals were selected for food composition analysis. A total of 41 most consumed meals were selected and prepared (Bafia community (06), Haussa community (09), Dschang community (06), Eton community (06), Mbo community (07) and Bamougoum community (07)). A portion of 100g of each was used to evaluate food composition (moisture, ash, water, proteins and lipids). Results: The results of this study show that the highest meals from Bafia, Dschang, Eton and Bafia communities presented the highest level of ash. The protein contents were acceptable for most dishes and were significantly (p<0.05) higher for meals from the Bafia community. Some exhibited high lipid contents with more than 70g/100gdw. Conclusion: The results of this study are essential for determining diet-disease associations and could also be extremely useful for nutrition education and dietary interventions, and are necessary for the successful dietary management of metabolic syndrome and his comorbidities in Cameroon.

Keywords: Macronutrient Values, Local Meals, Traditional Communities

1. Introduction

Throughout the world, nutrition-related diseases are a major public health problem. These diseases are the result of a nutritional imbalance either in favour of a deficit or an overload, better known as malnutrition [1].

Strategies for managing malnutrition and its associated comorbidities are essentially based on diet and lifestyle correction. The identification and promotion of local foods with specific nutritional and therapeutic qualities for the management of certain nutritional diseases are strongly encouraged as part of local resilience as advocated by the WHO [2].

Hence the importance of a comprehensive assessment of the nutritional value of local dishes commonly consumed in a community. Cameroon, like other developing countries, is not spared by the rapid emergence of nutrition-related diseases [3] Thus, many works have so far been carried out
to determine the nutritional value of certain traditional Cameroonian foods and meals. These include the vitamin C content of certain tubers and plantains before and after cooking [4]; the fatty acid composition of some dishes prepared in North Cameroon [5]; the composition of some dishes prepared traditionally in an urban area (Yaoundé) [6]; the chemical composition of some dishes prepared traditionally by the Bassa community [7]; the content of some important mineral salts in traditional sauces of the west province of Cameroon [8]; the nutritive value of some dishes consumed in some rural areas in the West province of Cameroon [9]; the protein and mineral contents of Cameroonian dishes [10]; the study of the nutritional potential of some traditional dishes consumed in a rural area in the far North province of Cameroon [11]; the methods of preparation and nutritional evaluation of dishes consumed in a malaria endemic zone in Cameroon (Ngali II) [12]; the nutritional composition of commonly consumed composite dishes from the Central Province of Cameroon [13]; the methods of preparation and nutritive value of some dishes consumed in the west region of Cameroon [14] and A review of composition studies of Cameroon traditional dishes: Macronutrients and minerals [3].

However, Cameroon is characterised by ethnic and cultural diversity, which implies a diversity of eating habits that is richness for its populations. Several studies in Cameroon highlighted a lack in knowledge of the composition of a healthy diet as a barrier to healthy dietary behaviours [15].

This study aimed to evaluate the nutritional values of some Cameroonian local meals consumed by some Cameroonian communities living in Yaounde.

2. Methodology

The work has been carried out in 2015. The study design a mix of food survey and the determination of the food composition of selected local meals.

2.1. Ethno – Food Survey

Study was carried out in six halogen ethnic communities randomly chosen among the most representative living in Yaounde, the political capital of Cameroon namely: Mbo (Littoral region), Bamougoum and Dschang (from West region), Eton and Bafia (from Center region), Haussa (Adamawa Region). An ethno-food questionnaire was administered to a subset of 180 households randomly selected, i.e. 30 per community.

After a clear description of the purposes of the study to the household, and their approval to participate to the survey, a food survey questionnaire was administered to the person in charge of the family’s nutrition. The frequency of consumption of traditional meals were recorded and their occasions of consumption were also investigated. An appointment was then made with her to attend the cooking of the traditional dishes. During cooking demonstration, the different cooking steps, duration and ingredients were well recorded. After data analysis, some meals were selected for the nutritional values assessment.

2.2. Nutritional Value of Some Local Meals Consumed

41 meals were selected because their high frequency consumption and distributed as follows: Bamougoum ethnic group (07 local meals), Eton ethnic group (06 local meals), Mbo ethnic group (07 local meals), Haussa ethnic group (09 local meals), Dschang ethnic group (06 local meals) and Bafia ethnic group (06 local meals).

The meals selected after ethno-food survey have been prepared in the kitchen of the Department of Home Economics, Higher Teacher's Training School for Technical Education, University of Douala, using the ingredients for the traditional recipes described in visited household. Ingredients used for the preparation of the meals were purchased from five of the most popular markets of the city of Douala (Bepanda, Makepe-Missoke, and Central market) and were mixed for a representative sampling. All the ingredients were weighed and each meal was prepared three times. After cooking, the samples were packed in plastic bags of which the opening was sealed using a lighted candle, labelled and transferred to a deep freeze (−20°C). Water contents of meals were determined immediately after cooking.

100 grams of each selected meal were taken to the CRAN/IMPM/MINRESI for analysis. The different samples of meals were then lyophilized, incinerated and analyzed. All the analyses were done in triplicate.

2.3. Moisture Determination and Chemical Analysis [16]

Moisture content was determined by drying samples to constant weight in an electric oven at 105-110°C.

Ash content was determined by incineration in a muffle furnace at 550°C for 48h.

Proteins were determined by nitrogen determination using the Kjeldahl micro-method and conversion of nitrogen to proteins by the factor 6.25.

Total lipids by extraction in a Soxhlet apparatus for 6h using petrolleume the ras solvent.

2.4. Statistical Analysis

The means and standard errors of the data were calculated. They were then analysed by the analysis of variance (ANOVA) and Post Hoc test (Least Significance Difference) and significance judged at p < 0.05 using IBM SPSS (Statistical Package of Social Science) software version 22.0. equations.
3. Results

3.1. Description of Some Cameroonian Local Meals

Table 1. Description of some traditional Cameroonian meals of Bamougooum and Dschang ethnic groups (West region).

| Name of meals (common and local names) | Carbohydrates staples | Form of the foods | Coded meal | Ingredients | Scientific names of main ingredients |
|----------------------------------------|-----------------------|------------------|------------|-------------|--------------------------------------|
| Bamougooum ethnic group                |                       |                  |            |             |                                      |
| Yellow soup (pêna’achi)/pounded cocoyam| Pounded cocoyam       | Light sauce      | TSJ        | Palm oil + spices + dried fish + chilli pepper + salt + cocoyam | Colocosiasp |
| Yellow soup and okra/fufu corn (messanna’a’techuren) | Fufu corn             | Light sauce      | CSJ        | Palm oil + spices + dried fish + chilli pepper + salt + okra | Hibiscus esculentus |
| Yellow soup and elephant/Fufu corn grass (messanna’a’techusisson) | Fufu corn             | Light sauce      | CSSL       | Palm oil + spices + chilli pepper + salt + elephant grass | Capsicum annuum |
| Peeled dried maize and huckleberry leaves (chou’ouguessandjap) | Peeled dried maize    | Paste            | PML        | Huckleberry leaves + palm oil + salt + chilli pepper | Solanumnigrum |
| Black soup and okra/Fufu corn (messanna’a’tech/e) | Fufu corn             | Light sauce      | CSN        | Okra + spices + salt + chilli pepper | Hibiscus esculentus |
| Yellow soup and eggplants/pounded cocoyam (na’a’tchuchehouou) | Pounded cocoyam       | Light sauce      | TSJA       | Palm oil + spices + eggplants + chilli pepper + salt | Solanummelonenga |
| Banana stew (kentiè tam)               | Unripe banana         | Piece            | BM         | Banana + groundnut + palm oil + dried fish + chilli pepper | Musa paradisiacal and Arachis hypogea |
| Dschang eth. group                     |                       |                  |            |             |                                      |
| Fresh peanut with huckleberry/banana (Mebou’oh) | Unripe banana         | Paste            | MALB       | Huckleberry + fresh groundnut + salt | Arachis hypogea, Solanumnigrum |
| Crush Irish potatoes with dried yams (Nquin) | Irish potatoes / Dried yams | Paste          | PPIS       | Irish potatoes + dried yams + palm oil | Solanumbarossum, Dioscoreasp |
| Yellow soup with sissongo leaves/cocoyam (Apa’a’techouchoun) | Cocoyam               | Thick soup       | TSJS       | Sissongo + natron + dried fish + palm oil + spices | Pennisetumpurpureum |
| Yams stew                              | Yams                  | Piece            | IM         | Yams + palm oil + dried fish + garlic + onion + Ricinodendron | Dioscoreasp |
| Pounded cocoyam with Roasted vegetables (Kwa – ndzak) | Pounded cocoyam       | Paste            | MPLS       | Macabo + huckleberry + onion + tomato + salt + palm oil | Xanthosomasp, Solanumnigrum |
| Banana cake with chili leaves (Menda’ah) | Banana                | Paste            | GBFP       | Banana + chili leaves + salt + palm oil | Musa sapientum, Capsicum annam |

Table 2. Description of some traditional Cameroonian meals of Bafia and Eton ethnic groups (Center region).

| Name of meals (common and local names) | Carbohydrates staples | Form of foods | Coded meal | Ingredients | Scientific names of main ingredients |
|----------------------------------------|-----------------------|--------------|------------|-------------|--------------------------------------|
| Bafia ethnic groups                    |                       |              |            |             |                                      |
| Young cocoa fruits sauce/Fufu corn (kakaceadeukepenkibi) | Fufu corn          | Thick sauce  | CCM        | Young cocoa fruits + dried fish + dried crayfish + palm oil + chilli pepper + onion + tomato + salt | Theobroma cacao |
| Melon with eggplants (meringdaeteréé) | Melon                | Thick sauce  | MA         | Melon + eggplants + salt + palm oil + dried fish + onion + chilli pepper + dried crayfish | Cucurbitasp, solanumnemelona |
| Young palm leaves/Fufu corn (ndooingeukepenkibi) | Fufu corn          | Thick sauce  | PCM        | Young palm leaves + dried fish + chilli pepper + salt + palm oil + onion | Elaeisguineensis |
| Young sissongo leaves/Fufu corn (marchongchongdakeukepenkibi) | Fufu corn          | Thick sauce  | SCM        | Young sissongo leaves + dried crayfish + palm oil + dried fish + salt + chilli pepper + Egusi | Pennisetumpurpureum |
| Huckleberry leaves/Fufu corn (Bitosodsakeukepenkibi) | Fufu corn          | Thick sauce  | BCM        | Huckleberry leaves + chilli pepper + salt + palm oil | Solanumnigrum |
| Roasted caterpillar/cassava tubers (goundoukeukidekekeudoun) | Cassava tubers     | Piece        | CTM        | Caterpillar + salt + onion + chilli pepper + palm oil | Embressaiyemensis |
| Eton ethnic groups                     |                       |              |            |             |                                      |
| Melon leaves/Cassava tubers (Midjen)   | Cassava tubers       | Thick sauce  | FMM        | Melon leaves + palm nut pulp + groundnuts | Curritasp |
| Pai leaves/Cassava tubers (Pai)        | Cassava tubers       | Thick sauce  | PM         | Pai (vegetables) + salt + groundnut + palm oil | Pai |
| Termites dishes/Bundle cassava (n-kongi – sili) | Bundle cassava   | Paste        | MTBM       | Crushed termites + salt + chilli pepper + local spices | Macrotermessubhyalimus |
| Saka’a leaves/Cassava tubers           | Cassava tubers       | Thick sauce  | SM         | Saka’a leaves + groundnuts + palm oil | Hilarialatifolia |
| Young sissongo sprouts/Cassava tubers (Misson) | Cassava tubers       | Thick sauce  | JPSM       | Young sissongo sprouts + palm nut pulp + chilli pepper + salt + dried fish + onion + tomato + local spices | Pennisetumpurpureum |
| Eggplants puree (Ipirikzon)            | Cassava tubers       | Puree        | PAM        | Eggplants + groundnut + onion + salt + palm oil | Solanumnemelona |
3.2. Nutritional Values of Local Meals

The analysis of local dishes has made it possible to highlight the contents of dry matter, ashes, proteins and lipids.

The table 5 below shows the nutritional value of the local meals of the Bamougoum Dschang communities.

For the Bamougoum local meals, it appears that the protein and ash contents are significantly higher with the yellow sauce (pêna’atchu) (8.66±0.08g/100g) and (3.94±0.07g/100g) while the lipid contents are significantly higher with the yellow sauce and elephant grass (messanna’atchusisson) (93.86±0.31g/100g) (table 5).

For the Dschang community, the dried matter, ashes and the lipid contents are significantly higher with the Banana cake with chilli leaves (Menda’ah) (35.55±0.12g/100g dw; 2.87±0.05g/100g dw and 53.72±0.11g/100g dw) while the proteins contents are significantly higher with the Yellow soup with sissongo leaves (Apa’ahchouchoun) (8.46±0.04g/100gdw) (table 5).

### Table 3. Description of some traditional Cameroonian meals of Mbo community (Littoral region).

| Name of meals (common and local names) | Carbohydrates staples | Form of the foods | Coded meal | Ingredients | Scientific names of main ingredients |
|---------------------------------------|-----------------------|------------------|------------|-------------|--------------------------------------|
| Koki cowpea beans (Ekokikeun)         | Cocoyam leaves        | Paste            | KN         | Vouandzou nuts + palm oil + macabo leaves + salt + chilli pepper + water | Vignaunguisala |
| Koki dried maize (Ekokimbé)           | Corn                  | Paste            | KMS        | Dried maize + macabo leaves + palm oil + salt + chilli pepper + water | Zea mays |
| Koki dried plantain (Ekokimpouh)      | Plantain             | Paste            | KPS        | Dried plantain flour + macabo leaves + palm oil + salt + chilli pepper + water | Musa paradisiaca |
| Koki fresh maize (Ekokietombé)        | Corn                  | Paste            | KMF        | Fresh maize + macabo leaves + palm oil + salt + chilli pepper + water | Zea mays |
| Koki sweet potato (Ekokialang)        | Sweet potatoes        | Paste            | KP         | Potatoes + macabo leaves + palm oil + salt + chilli pepper + water | Ipomeabatatas |
| Koki macabo (Ekokialang)              | Cocoyam              | Paste            | KMA        | Macabo + macabo leaves + palm oil + salt + piment + water + dried fish | Xanthosomasp |
| Green soup (Essouba)/pounded cocoyam  | Pounded cocoyam       | Thick sauce      | TPSV       | Cocoyam + salt + chilli pepper + cocoyam young leaves + palm oil + water + dried fish | Colocassiap |

### Table 4. Description of some traditional Cameroonian meals of Haussa community (Adamawa region).

| Name of meals (common and local names) | Carbohydrates staples | Form of foods | Coded meal | Ingredients | Scientific names of main ingredients |
|---------------------------------------|-----------------------|--------------|------------|-------------|--------------------------------------|
| Baobab soup -beef meat/Fufu rice       | Fufu rice             | Thick soup   | CRSB       | Powder of baobab leaves + garlic + onion + peanut oil + salt + tomato + beef meat | Adansonia digitata |
| Fresh okra – beef meat/Fufu cassava    | Fufu cassava          | Thick soup   | CMGF       | Okra + garlic + onion + peanut oil + salt + tomato + beef meat | Hibiscus esculentia |
| Soye/Fufu cassava (touhongourkasoye)  | Fufu cassava          | Thick soup   | CMSO       | Tomatoes + garlic + onion + tomato + peanut oil + salt + ginger + water + beef meat | Lycopersicum esculentia |
| Folere – beef meat/Fufu rice           | Fufu rice             | Thick soup   | CRFO       | Folere + garlic + onion + tomato + crushed + paprika + salt + oil + beef meat | Hibiscus sabdariffa |
| Baobab soup – beef meat/Fufu corn      | Fufu corn             | Thick soup   | CMAIBA     | Powder of baobab leaves + tomato + garlic + onion + peanut oil + salt + beef meat | Adansonia digitata |
| Dried lalo – beef meat/Fufu corn       | Fufu corn             | Thick soup   | CMAILS     | Powder of Lalo leaves + garlic + onion + tomato + peanut oil + salt + beef meat | Corchorus litorius |
| Fresh lalo – beef meat/Fufu rice       | Fufu rice             | Thick soup   | CRLF       | Fresh Lalo leaves + garlic + tomato + onion + peanut oil + salt + beef meat | Corchorus litorius |
| Dried lalo – beef meat/Fufu rice       | Fufu rice             | Thick soup   | CRLS       | Powder of Lalo leaves + garlic + onion + tomato + peanut oil + salt + beef meat | Corchorus litorius |
| Dried okra – beef meat/Fufu corn       | Fufu corn             | Thick soup   | CMAIGS     | Powder of okra + garlic + onion + peanut oil + tomato + salt + beef meat | Hibiscus esculentia |

### Table 5. Macronutrient values of local meals of Bamougoum Dschang communities (West region).

| Name of traditional dishes (common and local names) | Dried matter (g/100g dw) | Ash (g/100g dw) | Proteins (g/100g dw) | Lipids (g/100g dw) | Moisture (g/100g fw) |
|-----------------------------------------------|--------------------------|----------------|----------------------|-------------------|----------------------|
| Bamougoum community                           |                           |                |                      |                   |                      |
| Yellow soup (pêna’atchu)                      | 27.06±0.05                | 3.94±0.07      | 8.66±0.08            | 83.47±0.04        | 72.94±0.05           |
| Yellow soup and okra (messanna’atchuregane)   | 22.40±0.07                | 2.35±0.05      | 5.49±0.06            | 91.37±0.30        | 77.60±0.07           |
| Yellow soup and elephant grass (messanna’atchusission) | 15.74±0.04                | 2.10±0.01      | 0.94±0.01            | 93.86±0.31        | 84.26±0.04           |
| Peeled dried maize and huckleberry leaves     | 45.43±0.21               | 2.01±0.02      | 3.70±0.08            | 89.68±0.24        | 54.57±0.21           |
| Black soup and okra (messanna’atché’e)       | 19.55±0.11                | 1.83±0.03      | 5.81±0.08            | 88.29±0.08        | 80.45±0.11           |
| Yellow soup and eggplants (na’atchuchéchoou)  | 12.36±0.07                | 2.06±0.05      | 1.81±0.05            | 85.23±0.09        | 87.64±0.07           |
| Banana stew (kentié tam)                     | 26.73±0.19                | 2.21±0.07      | 2.06±0.06            | 47.76±0.21        | 73.27±0.19           |
| Dschang community                            |                           |                |                      |                   |                      |
| Yellow soup (pêna’atchu)                      | 27.06±0.05                | 3.94±0.07      | 8.66±0.08            | 83.47±0.04        | 72.94±0.05           |
For each column, values followed by different superscripts are significantly different (p < 0.05).

The table below shows the nutritional value of the local meals of the Bafia and Eton communities.

For Bafia community, it appears that Young cocoa fruits sauce (kakacadaeukepenkibazi), Young palm leaves (ndoongdaeukepenkibazi), Huckleberry leaves (Bitossodaeukepenkibazi) and Roasted caterpillar (gououdaeukidjanekibeudoun) have significantly contents in ashes (2.46±0.12g/100g dw; 1.83±0.03g/100g dw; 2.72±0.01g/100g dw and 1.93±0.01g/100g dw respectively) (table 6).

Proteins contents are significantly higher with Young palm leaves (ndoongdaeukepenkibazi) (42.52±0.53g/100g dw), Young sissongo leaves (mechongchongdaeukepenkibazi) (50.48±0.42g/100g dw) and Roasted caterpillar (gououdaeukidjanekibeudoun) (53.53±0.42g/100g dw) respectively.

For local meals of Eton community, ashes contents are significantly higher with all dishes but contents are significantly higher with Saka’a leaves (4.16±0.14g/100g dw).

Proteins contents are significantly higher with Termites dishes (n-kongi – sil) (11.06±0.16g/100g dw) and Saka’a leaves (10.20±0.14g/100g dw) respectively.

Table 6. Micronutrient values of local meals of Bafia and Eton communities (Center region).

| Name of traditional dishes (common and local names) | Dried matter (g/100g dw) | Ash (g/100g dw) | Proteins (g/100g dw) | Lipids (g/100g dw) | Moisture (g/100g fw) |
|---------------------------------------------------|--------------------------|----------------|----------------------|-------------------|---------------------|
| Fresh peanut with huckleberry (Mebou’oh)          | 27.61±0.05               | 2.00±0.01      | 3.88±0.07            | 47.17±0.01        | 73.40±0.05          |
| Crush irish potatoes with dried yams (Nguin)      | 32.00±0.03               | 2.48±0.04      | 2.41±0.02            | 46.40±0.03        | 68.00±0.03          |
| Yellow soup with sissongo leaves (Apâ’akhirouhou)  | 28.40±0.07               | 2.38±0.04      | 8.46±0.04            | 47.90±0.01        | 71.60±0.07          |
| Yams stew                                         | 26.80±0.01               | 2.72±0.02      | 1.30±0.06            | 53.51±0.12        | 69.42±0.02          |
| Pounded cocoyam with Roasted vegetables (Kwa – ndzap) | 30.58±0.02             | 2.72±0.05      | 53.72±0.11            | 44.54±0.12        |                     |
| Banana cake with chili leaves (Menda’ah)          | 35.55±0.12              | 2.87±0.03      | 7.22±0.03            | 53.72±0.11        |                     |
| 61 Nyangono Biyegue Christine Fernande et al.    |

The table below shows the nutritional value of the local meals of the Mbo community that ashes contents are significantly higher (p<0.05) with Koki dried maize (Ekokimbè) (88.02±0.33g/100g dw) and Huckleberry leaves (Bitossodaeukepenkibazi) (88.02±0.33g/100g dw) respectively (table 6).

For local meals of Eton community, ashes contents are significantly higher with all dishes but contents are significantly higher with Saka’a leaves (82.74±0.02g/100g dw).

Table 7. Micronutrient values of local meals of Mbo community (Littoral region).

For each column, values followed by different superscripts are significantly different (p < 0.05).

The table below shows the nutritional value of the local meals of the Mbo community that ashes contents are significantly (p<0.05) high with Koki dried maize (Ekokimbè) (1.49±0.10g/100g dw) and Koki sweet potato (Ekokialang) (1.37±0.12g/100g dw) respectively. Proteins contents are significantly higher (p<0.05) with Koki fresh maize (Ekokietoumbè) (2.78±0.02 g/100g dw) and Koki dried maize (Ekokimbè) (2.48±0.02 g/100g dw) respectively.

For local meals of Eton community, ashes contents are significantly higher with all dishes but contents are significantly higher with Saka’a leaves (82.74±0.02g/100g dw).

Table 7. Micronutrient values of local meals of Mbo community (Littoral region).

For each column, values followed by different superscripts are significantly different (p < 0.05).
The table 8 below shows the nutritional value of the local meals of the Hausa community. That, ashes contents are significantly (p<0.05) high with Soye (touhongourkasoye) (0.94±0.026g/100g dw). Proteins contents are significantly higher (p<0.05) with Baobab soup – beef meat (touhon mascara/kouka) (2.95±0.03g/100g dw), Fresh okra – beef meat (touhongourka/coubewa) (2.90±0.03g/100g dw), Dried lalo – beef meat (touhon mascara/laloboucheche) (2.67±0.06g/100g dw) and Dried okra – beef meat (touhon mascara/coubewaboucheche) (2.08±0.04g/100g dw) respectively. Lipids contents are significantly higher (p<0.05) with Baobab soup - beef meat (touhonchincapa/kouka) (80.82±0.41g/100g).

| Name of traditional dishes (common and local names)                  | Dried matter (g/100g dw) | Ash (g/100g dw) | Proteins (g/100g dw) | Lipids (g/100g dw) | Moisture (g/100g fw) |
|---------------------------------------------------------------------|--------------------------|----------------|---------------------|-------------------|---------------------|
| Baobab soup – beef meat (touhonchincapa/kouka)                      | 16.29±0.05             | 0.59±0.01   | 0.49±0.01           | 80.82±0.41        | 83.71±0.05          |
| Fresh okra – beef meat (touhongourka/coubewa)                      | 21.52±0.03             | 0.49±0.02   | 2.96±0.03           | 56.57±1.31        | 78.48±0.03          |
| Soye (touhongourkasoye)                                            | 28.41±0.06             | 0.94±0.02   | 0.54±0.02           | 54.48±0.47        | 71.59±0.06          |
| Folere – beef meat (touhonchincapa/yakouwa)                        | 18.60±0.25             | 0.44±0.01   | 0.51±0.01           | 50.98±0.78        | 81.40±0.25          |
| Baobab soup – beef meat (touhon mascara/kouka)                      | 18.77±0.06             | 0.29±0.01   | 2.95±0.03           | 53.08±0.07        | 81.23±0.06          |
| Dried lalo – beef meat (touhon mascara/laloboucheche)               | 17.61±0.03             | 0.48±0.00   | 2.67±0.06           | 51.49±0.01        | 82.39±0.03          |
| Fresh lalo – beef meat (Touhonchincapa/lalo)                       | 13.90±0.11             | 0.62±0.01   | 1.98±0.06           | 50.21±0.52        | 86.10±0.11          |
| Dried lalo – beef meat (touhonchincapa/laloboucheche)              | 17.20±0.08             | 0.40±0.00   | 1.88±0.08           | 61.33±0.07        | 82.80±0.08          |
| Dried okra – beef meat (touhon mascara/coubewaboucheche)            | 19.14±0.12             | 0.19±0.01   | 2.08±0.04           | 60.29±0.05        | 80.86±0.14          |

For each column, values followed by different superscripts are significantly different (p < 0.05).

4. Discussion

There are little composition data available for composite meals in Cameroon and we have provided, for the first time, the nutritional composition of the most commonly consumed dishes in our study areas. Cameroon is made up of many tribes whose food habits are different from each other. In the Central, West, East, South and three Northern regions, ground nuts or melon seeds (providing fat and protein) are usually added to almost all soups and green cooked vegetables, whereas this practice is not common among the coastal/high -land zones [13, 17]. The use of palm nuts pulp in the place of palm oil is common among the Central region. However, the three Northern Provinces do not use palm oil or palm nut pulps but groundnut oils in all sauces and vegetables dishes. In west region, populations consume vegetables dishes. In our study areas. Cameroon is made up of many communities (more than 70g / 100g dw) could be explained by the nature of the raw material used to prepare the selected meals. Young vegetable leaves are the raw material used to prepare meals of different communities would be due to the fact that much water is used for their preparation.

In our study, the protein contents are high for most meals from different communities. But these protein contents are significantly (p<0.05) higher for meals from the Hausa community. This result could be explained by the nature of the raw material used to prepare the selected meals. Young vegetable leaves are the raw material used to prepare meals of Hausa community. [21] have shown that in young leaves, photosynthetic activity was high during maturity process of plants; this could explain the high content of proteins of young leaves. In general, the use of fufu corn like complements is a good culinary practice because corn is rich in methionin which is essential aminoacid.

The high lipid contents of certain meals from different communities (more than 70g /100g dw) could be explained by the use of palm oil during culinary preparations or the lipid composition of the raw material. Note that fat is an antioxidant that protects the body against cancer and infections [23]. This vitamin is an antioxidant that protects the body against cancer and infections [23]. However, findings of Domgang and Tchuinmogne showed that spices used to prepare meals had high contents of iron, calcium, magnesium and phosphorus [14]. This could be reduced risk of anaemia and hypertension in diabetic patients.

The nutrient composition of Cameroon local meals is influenced by ethnic belongings and dietary habits which define the nature and doses of ingredients. Hence, differences in preparation methods can have an effect on the energy and nutrient content of a dish [13]. Determining the nutritional composition of these composite dishes is of critical importance for defining average daily nutrient intakes, a step to enable studies of association between nutrient intakes and diet-related diseases [18]. The highest ash level found with meals from Bamougoum, Dschang, Eton and Bafia communities is due to the presence of spices in these meals. Theoretically, levels of ashes are proportional to the mineral salts values of the dishes [14]. Moreover, ash contents also depend on the type of spices used. Studies have shown that spices like Dichrostachys glomerata and Tetrapleura trepetera used in the preparation of certain dishes from the western regions had preventive effects on obesity, type 2 diabetes and metabolic syndrome [19, 20]. However, findings of Domgang and Tchuinmogne showed that spices used to prepare meals had high contents of iron, calcium, magnesium and phosphorus [14]. This could be reduced risk of anaemia and hypertension in diabetic patients.
5. Conclusion

This study broad macronutrients contents of some local meals. The results suggest that local meals of Bamougoum, Dschang, Eton and Bafia communities content high level of Ashes. Protein contents are significantly higher in local meals of Bafia community (young palm leaves, young sissongo leaves and roasted carterpillar). Certain meals of different communities content the high lipid contents (70/100g dw). This study is preliminary study. It would be important to complete this study by determination of aminoacids and fatty acid profile of these local meals.

The results of this study are essential for nutritional education and dietary interventions, and are necessary for the successful dietary management of nutritional diseases in Cameroon.

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