A COMPARAIVE STUDY OF THE NUTRIENT COMPOSITION OF SOME COMMON NIGERIAN SOUPS

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ABSTRACT: Ten common types of Nigerian soup combinations were collected and analyzed both within urban and rural areas. They were analyzed for their nutrient contents and evaluated for their contributions to the daily nutrient requirements. Soups are consumed about twice a day with an average consumption of approximately 150 gms per person. The percentage contribution to the daily requirement ranges from 24.9- 41% calories, 14.4- 28.7% protein, 39- 94.7% fat. The mineral contribution ranges from 5.6- 21.5% calcium, 9.4- 48.8% phosphorus, 30- 119.6% iron and 3.9 - 21.6% zinc. The vitamin contribution ranges from 1 -7.7% riboflavin and 3.7 -7.6% ascorbic acid. It was also found that variations in the recipe, the preparatory procedure and the length of cooking period have direct effect on the ultimate value of the nutrient quality.

INTRODUCTION

Soup and stew have often been perceived as identical as they are both made from a mixture of meat or fish and vegetables. The only difference is that soups are cooked with a more intensive heat and for a shorter period as compared with stews which are cooked under a reduced heat intensity and for a longer time. The ingredients that make up soups/stews allover the world are influenced by many factors, ethnicity and culture, availability of raw materials, and the economic power of the individual. For Caucasians, soups are served at the beginning of meals in which two or more courses follow. Such soups may be clear or thick (1). This is unlike the non-Caucasians, whose meal pattern entails just the main course and the soup serves as an accompaniment usually eaten along with the staple.

On the whole, soups are supposed to stimulate the apetite and aid the acceptability of some other food materials particularly the carbohydrates (2). The amount of soup served at a sitting varies from about one-quarter to one-half pint (4). Except for soups that are thickened with flour or whose basic ingredient contains appreciable amounts of carbohydrate plus fat and protein foods, the caloric value is negligible. There are hundreds of different soups and they are classified into a few distinct groups. A few examples are broths, clear soups, puree thickened soups, cream soups, peppery soups, etc. In Nigeria, any food cooked in oil or water into which fish, meat and other ingredients are added is called soup, the basic ingredients and the quantity varied according to tradition. In typical African soup, the basic ingredients that form the soup-base are onions, tomatoes, peppers, melon seeds, cow pea, locust beans, red palm oil and a variety of vegetables. The variety of ingredients makes the soups a very rich source of minerals and some vitamins. Hence, soups are likely to contribute appreciably to the daily nutrient requirement of people consuming considerable quantities and good quality soups. Oyenuga (3) showed an average consumption of vegetable soup to be 100.4 .:t. 14.24 gm per adult. A standard diet in the tropics is bulky and it is principally made up of die stable which is high in carbohydrates but low in other major nutrients (2). These starchy staples are usually eaten with soups. The nutrient qualities of such soups need to be examined since die supply of such nutrients from die soup will determine die quality of die food consumed.

METHODOLOGY

A representative sample of the ten commonest soups was collected from randomly selected households during die two major seasons of die year (i.e. wet and dry seasons), from three different localities each with an urban and rural area in Oyo State. The rural areas represent die place of production of most food materials and die urban areas are die major consumer. Hence, food is cheaper and within easier reach of the rural than the urban inhabitants.

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The soup samples were collected as eaten from households at each season and were analyzed in triplicate for their nutrient contents. Nutrients tested for included: energy value using the Gallenkamp Ballistic Bomb Calorimeter; and total starch value which is determined as % glucose using die AOAC (5) procedure. Fat extraction was by using ether and ethanol, while the crude protein value was by using the Kjeldhal method estimating die nitrogen content as in AOAC (5). Similarly, the ash and mineral contents were determined by die Lanthanum method, ascorbic acid by die titration method, and riboflavin by die fluorometric method as in
AOAC (5). A recovery test was done to evaluate the mineral content of a representative sample of each food material for die purposes of dependency on die analytical method which is rated at between 90-96% .A questionnaire was also designed to establish die recipe of these soups in both die rural and urban areas. These ten soups are as follows:

Soup 1: Mixture off okra, artichoke (Ewedu) and melon seed soup. (Hibiscus esculentus linn, Cochorus Olintorus linn and Citrullus wlgaris schard).
Soup 2: Cow pea soup (Gbegiri). (Vignaunguiculata subsp). .
Soup 3: Okra soup. (Hibiscusesculentus linn).
Soup 4: Okara with melon seed soup. (Hibiscus esculentus linn with citrullus vulgaris schrad).
Soup 5: Green leaf vegetable soup. (Celosia agentia linn).
Soup 6: W~-leaf (Gbure) with melon seed soup. (falinum triangulare wild with Citrullus Vulgaris Schrad).
Soup 7: Artichoke (Ew~u) soup. (Cochorus olintorus linn).
Soup 8: Okra with artichoke soup. (Hibiscus esculentus linn with Cochorus olitorus linn).
Soup 9: Artichoke with melon seed soup. (Cochorus olintorus linn with citrullus vulgaris schrad).
Soup 10: Plain melon seed. (Citrullus vulgaris schrad).

RESULTS

The recipes of the basic food materials of the soup from the different areas were similar although the quantity of ingredients differ, resulting in the rural soups have a higher fat content while the urban soups having a higher protein content.

The Nutrient Content of Rural Soups

In Table 1, the moisture content of rural soup ranged from 68.2-90%, in cowpea soup (unguiculata) and pure artichoke soup (Corchorus Qti1Qw), respectively. Bean soup is the highest in energy content with 787 kilo calories/l00 gm. This is the result of the fat used in making the soup plus the high fat content of beans. The fat contents are, therefore, influence by the recipe. The crude protein is also determined by the quantity and quality of the ingredients used in the individual soup. Soups

with melon seed, which is a rich vegetable protein source, have high crude protein content. Soup 9 has the highest with 20.93%.

Vitamins

The only two vitamins determined were vitamin B2 (riboflavin) and vitamin C (ascorbic acid). All the soups were poor sources of these vitamins. Despite the abundance of vitamin C in fresh vegetable (1,3), the preparatory procedure of these soups account~ for the low content of these vitamins, (table 1). The highest riboflavin level was found in Soup 2 (plain bean soup) with 0.17 mg /l00 gm. The highest recorded level of ascorbic acid is 3.9 mg 1100 gm in artichoke soup (Soup 7).

With an average daily consumption of soup being about 150 gm, Table 2 shows the mean nutrient content of the mixture of soups from urban and rural dwellers. The caloric contribution to the daily recommendation ranged from24.9% to 41.0%, while the protein contribution ranged from 14.4% to 28.7%, and the fat contribution ranged from 39.0% to 94.7%.

The mineral contribution to the daily recommendation ranged from 9.4%-48.8% for calcium, phosphorus ranged from 30.0%-119.6%, and iron contributed from 1.0%-7.7%.

The vitamin contribution to daily recommendation ranged from 3.7%-7.6% for ascorbic acid and 1.0%-7.7% for riboflavin.

Minerals

Calcium, phosphorus, iron, zinc and cooper were the minerals evaluated. Calcium was the highest in Soup 5 (spinach variety soup) with 95gm. Phosphorus, zinc and iron were the highest in Soup 10 (plain melon seed) with 454.26mgll00 gm, 1.90 mg/l00 gm and 6.2 mg/l00gm, respectively.

Urban Soup Nutrient Content

In Table 2, the moisture content of urban soups ranged from 66.6% in Soup 10 (plain melon seed) to 92% in Soup 3 (okra soup). The energy value ranged from 357 kcal in Soup 3 (okra soup) to 871 kcal in the melon seed soup. The crude protein was the highest in Soup 1(okra and artichoke and melon soup) with20.3Ig1100gm and the fat content is highest in Soup 10 (plain melon seed) with 62g1100gm. The carbohydrate content ranged from 0.23gm in Soup 1 to 9.3gmll00gm in Soup 8 (okra/ artichoke soup).

Mineral Content

Calcium was the highest in Soups 1 and 5 with 135mg/100gm. The phosphorus content was the highest in water-leaf soup (Soup 6) with 294.8 mg/100gm. Iron was the highest in the okra/artichoke soup (Soup 8) with 20.8mg/- 100gm. Zinc value was the highest in soup 10 with 1.18mg/100 gm, (table 2)

DISCUSSION

From the questionnaire, it was observed that there are variations in the recipe (i.e., the quantity of the ingredients) and even innovations in preparing these soups, especially in the urban areas. Comparing the soups themselves, some are richer in some nutrients than others. On the whole, all soups containing melon seed and artichokes are found to be rich in all nutrients analyzed. The low

values in the others can in part be attributed to the method of preparation, or length of cooking period, or the type of heat treatment and cooking utensils. Other reasons that can be considered are the quantity of the ingredients, the volume of water used during cooking and probably the chemical reactions between reducing sugars and amino acids when foods are cooked.

The moisture content of the soups from both the rural and urban areas showed very little difference. This can be attributed to the cultural patterns of accepted thickness of soup within the community.

However, it may be difficult to change the preparatory methods and the quantity of soup consumed so as to reflect an appreciable nutrient increase. Also incorporating many ingredients into the recipe of the soups will further increase the nutrient quantity of the soups. The addition of melon seeds into nearly all the soups should be encouraged. This will be beneficial to the young children, especially during weaning.

Table 1. Nutrient composition of soups from osegere village (rural)

Nutrient	Soup 1	Soup 2	Soup 3	Soup 4	Soup 5	Soup 6	Soup 7	Soup 8	Soup 9	Soup 10
Moisture %	88.2 ± 9.1	68.2 ±6.6	87.8 ±10.8	82.2 ±5.8	73.0 ±7.3	77.0 ±9.1	89.4 ±11.1	90.0 ±5.0	85.8 ±3.3	68.6 ±5.2
Ash %	6.0 ± 0.4	1.0 ±0.0	5.0 ±0.6	5.0 ±0.3	2.0 ±0.0	7.0 ±0.7	8.0 ±1.0	9.0 ±1.1	5.0 ±0.0	6.0 ±0.2
Energy kcal %	719.4 ± 31.9	787.40 ±16.2	605.12 ±21.3	766.32 ±40.0	911.40 ±51.2	834.52 ±23.7	617.52 ±18.7	620.00 ±23.5	781.20 ±19.4	828.32 ±27.3
Carbohydrate gm%	1.16 ±0.0	4.30 ±0.1	4.88 ±0.0	5.58 ±0.1	2.91 ±0.0	1.74 ±0.0	9.54 ±0.3	3.49 ±0.0	3.26 ±0.0	2.33 ±0.0
Fat gm %	36.00 ±1.0	46.33 ±0.9	37.50 ±1.7	45.00 ±1.7	63.20 ±5.2	53.67 ±4.9	36.50 ±2.8	20.50 ±1.8	46.50 ±3.6	57.60 ±4.4
Crude protein gm %	8.04 ±0.9	8.9 ±0.9	9.06 ±1.0	12.62 ±0.8	8.90 ±1.1	14.18 ±1.9	15.28 ±1.0	12.68 ±0.9	20.93 ±1.9	15.62 ±1.7
Calcium mg/100 gm	90.00 ±5.1	17.80 ±2.0	23.00 ±0.9	60.00 ±2.2	95.00 ±2.7	45.00 ±1.3	60.00 ±2.0	60.00 ±2.1	75.00 ±3.1	45.00 ±2.6
Phosphorum mg/100 gm	97.02 ±7.3	82.00 ±5.4	39.94 ±0.9	144.06 ±11.9	70.76 ±5.7	237.18 ±41.7	60.98 ±3.9	113.64 ±7.5	180.90 ±10.1	454.26 ±50.5
Iron mg/100 mg	0.60 ±0.0	0.40 ±0.0	1.20 ±0.0	2.40 ±0.0	2.00 ±0.0	1.20 ±0.0	17.00 ±1.2	1.20 ±0.0	1.00 ±0.0	6.20 ±0.0
Zinc mg/100 gm	0.40 ±0.0	0.26 ±0.0	0.50 ±0.0	1.02 ±0.0	0.42 ±0.0	0.76 ±0.0	0.50 ±0.0	0.28 ±0.0	0.58 ±0.0	1.90 ±0.0
Copper mg/100gm	0 ±0	0 ±0	0 ±0	0 ±0	0 ±0	0.10 ±0	0 ±0	0 ±0	0 ±0	0.26 ±0
Ribflavin mg/100gm	0.40 ±0	0.089 ±0	0.052 ±0	0.385 ±0	0.010 ±0	0.109 ±0	0.077 ±0	0.049 ±0	0.0388 ±0	0.040 ±0
Ascrobic acid mg/100 gm	1.63 ±0	1.18 ±0	2.54 ±0	2.99 ±0	3.45 ±0	3.17 ±0	3.45 ±0	2.99 ±0	1.63 ±0	1.18 ±0
Amount consumed/head	161.59	130.37	149.66	160.46	120.98	103.50	188.17	217.37	160.78	63.68

Table 2. Nutrient composition of soups from Osegere village (rural)

Nutrient	Soup 1	Soup 2	Soup 3	Soup 4	Soup 5	Soup 6	Soup 7	Soup 8	Soup 9	Soup 10
Moisture %	85.6 ±4.1	74.0 ±4.7	92.0 ±3.3	87.8 ±5.8	74.0 ±4.4	75.2 ±3.9	86.2 ±4.9	90.8 ±5.1	80.0 ±4.4	66.6 ±3.8
Ash %	3.5 ±0.0	2.0 ±0.0	5.5 ±0.2	2.5 ±0.0	5.0 0±.2	3.0 ±0.0	5.5 ±0.9	13.0 ±1.2	3.5 ±0.0	2.5 ±0.0
Energy kcal %	613.80 ±19.0	679.52 ±26.3	357.12 ±11.9	558.0 ±41.3	716.72 ±50.1	750.20 ±28.7	791.12 ±30.3	536.92 ±11.7	722.92 ±30.8	871.72 ±41.1
Carbohydrate gm%	0.23 ±0.0	4.77 ±0.7	5.23 ±1.0	3.72 ±0.0	3.49 ±0.0	1.15 ±0.0	6.05 ±0.2	9.30 ±1.0	2.91 ±1.9	2.33 ±1.7
Crude protein gm %	20.31 ±2.1	16.56 ±2.0	8.50 ±0.9	15.31 ±1.9	9.09 ±1.7	19.53 ±3.6	13.04 ±1.1	10.00 ±1.0	17.57 ±1.9	13.62 ±1.7
Fat gm %	30.67 ±3.1	33.00 ±2.7	21.00 ±1.3	33.67 ±4.6	56.33 ±9.9	48.00 ±4.0	53.00 ±4.3	23.67 ±1.3	45.67 ±4.6	62.00 ±5.5
Calcium mg/100 gm	135.00 ±10.2	85.00 ±5.8	25.80 ±1.3	115.00 ±9.2	135.00 ±9.9	115.00 ±7.3	22.0 ±1.1	22.80 ±2.1	95.00 ±6.3	17.80 ±1.1
Phosphorum mg/100 gm	216.06 ±11.0	122.62± 12.2	113.24 ±9.8	147.4 ±10.3	91.12 ±7.1	294.80 ±22.8	37.52 ±3.1	46.24 ±2.9	237.86 ±13.8	159.46 ±8.9
Iron mg/100 mg	1.0 ±0	2.00 ±0	3.20 ±0	9.80 ±0	5.2 ±0	2.00 ±0	7.80 ±0	20.80 ±0	3.20 ±0	10.40 ±0
Zinc mg/100 gm	0.32 ±0	0.38 ±0	0.38 ±0	0.56 ±0	0.54 ±0	0.68 ±0	0.48 ±0	0.52 ±0	0.68 ±0	1.18 ±0.2
Copper mg/100gm	0 ±0	0 ±0	0 ±0	0 ±0	0 ±0	0 ±0	0 ±0	0.16 ±0	0 ±0	0 ±0
Ribflavin mg/100gm	0.071 ±0	0.166 ±0	0.090 ±0	0.046 ±0	0.022 ±0	0.054 ±0	0.082 ±0	0.063 ±0	0.065 ±0	0.060 ±0
Ascrobic acid mg/100 gm	2.09 ±0	1.18 ±0	2.09 ±0	2.54 ±0	2.72 ±0	2.27 ±0	3.90 ±0	2.54 ±0	1.81 ±0	2.09 ±0
Amount consumed/head	127.24	106.00	112.02	115.59	119.54	108.37	114.17	109.15	125.33	127.85

Table 3. Mean nutrient content of soups according to a daily Consumption of approximately 150 gm/day

Soup No.	Caloric	Protein (gm)	Fat (gm)	Calcium (gm)	Phosphorus (gm)	Iron (gm)	Zinc (gm)	Riboflavin (gm)	Ascrobic Acid (gm)
1	850±20	18.4±1.1	45.3±3.7	172.3±10.0	230.3±10.0	3.0±0.1	0.6±0.0	0.07±0.00	2.2±0.1
2	874± 33	17.4±1.0	42.8±4.0	48.2±5.5	125.5±9.0	4.3±0.0	0.7±0.0	0.12±0.01	2.2±0.0
3	672±19	10.8±0.8	44.6±3.2	25.7±3.1	75.3±5.1	3.1±0.0	0.8±0.0	0.10±0.01	3.4±0.1
4	819±29	18.5±1.1	44.5±3.0	112.1±6.6	164.7±10.1	7.2±0.9	1.0±0.2	0.21±0.01	3.7±0.0
5	1064±34	11.1±0.6	77.7±6.1	104.9±5.8	90.0±7.2	6.0±0.9	0.7±0.0	0.02±0.00	4. ±60.1
6	981±28	19.9±1.0	61.1±5.0	89.3±4.0	271.9±10.3	5.8±0.7	1.1±0.1	0.09±0.00	3.1±0.0
7	844±30	16.3±0.9	56.3±4.1	61.1±6.0	83.2±5.8	13.0±1.0	0.7±0.0	0.10±0.00	4.9±0.5
8	744±15	15.0±0.8	31.2±3.0	73.8±5.2	118.4±9.9	12.0±1.1	0.6±0.0	0.07±0.00	3.4±0.1
9	942±33	21.5±1.2	55.9±4.0	114.2±6.8	242.1±10.2	10.2±0.9	1.3±0.1	0.61±0.00	2.7±0.0
10	1106±32	19.2±1.1	75.8±6.0	44.8±3.0	390.7±12.1	8.4±0.8	1.9±0.0	0.06±0.00	2.4±0.0

Table 4. % nutrient contribution to the daily requirement with the consumption of 150 gm of ten common soups.

Type of soup	Caloric			Crude Protein			Fat^{o} (gm)		
	Caloric value value	RDA*	% of RDA Met	Crude Protein value	RDA*	% of RDA Met	Fate value	RDA*	%of RDA Met
1	800	2700	31.5	18.4	75	24.5	45.3	80	56.5
2	874	2700	32.3	17.4	75	23.2	42.8	80	53.5
3	672	2700	24.9	10.8	75	14.4	44.6	80	55.8
4	819	2700	30.3	18.5	75	24.6	44.5	80	55.6
5	1064	2700	39.4	11.1	75	14.8	77.7	80	97.2
6	981	2700	36.4	19.9	75	26.8	61.1	80	76.3

7	844	2700	31.2	16.3	75	21.7	56.3	80	70.3
8	744	2700	27.6	15.0	75	20.2	31.2	80	39.0
9	942	2700	34.9	21.5	75	28.7	55.9	80	70.0
10	1106	2700	41.0	19.2	75	25.6	75.8	80	94.7

* Source: USA, NRC (1980) (6) ºSource: USA, NRC (1980) (7)

Table 5. % mineral contribution to the daily requirement with the consumption of 150 mg of ten common soups.

Soup No.	Calcium (mg)			Phosphorus (mg)			Iron (mg)			Zinc (mg)		
	Calcium Value	RDA*	% Met	Phosphorus value	RDA*	% of RDA Met	Iron value	RDA*	%of RDA met	Zinc value	RDA*	% of RDA Met
1	172.3	800	21.5	230.3	800	28.8	3.0	10	30.0	0.6	15	3.9
2	48.2	800	6.0	125.5	800	15.7	4.3	10	43.2	0.7	15	4.3
3	25.7	800	3.2	75.3	800	9.4	3.1	10	30.8	0.8	15	5.2
4	112.1	800	14.0	164.7	800	20.6	7.2	10	72.3	1.0	15	6.6
5	104.9	800	13.1	90.0	800	11.3	6.0	10	59.8	0.7	15	4.7
6	89.3	800	11.2	271.9	800	34.0	5.8	10	58.2	1.1	15	7.4
7	61.1	800	7.6	83.2	800	10.4	13.0	10	130.4	0.7	15	5.0
8	73.8	800	9.2	118.4	800	14.8	12.0	10	119.6	0.6	15	4.1
9	114.2	800	14.3	242.1	800	30.3	10.2	10	102.2	1.3	15	8.7
10	44.8	800	5.6	310.7	800	48.8	8.5	10	87.7	1.9	15	21.6

*Source: USA NRC (1980) (6)

Table 6. % vitamin contribution to the daily requirement with the consumption of 150 gm of ten common soups

Soup No.	Riboflavin (mg)			Ascrobic Acid (mg)		
	Riboflavin value	RDA*	%Met	Ascrobic Acid vcalue	RDA*	%Met
1	0.07	1.6	4.5	2.2	60	3.7
12	0.12	1.6	7.7	2.2	60	3.7
3	0.10	1.6	6.1	3.4	60	5.6
4	0.21	1.6	13.3	3.7	60	6.2
5	0.02	1.6	1.0	4.6	60	7.6
6	0.09	1.6	5.4	3.1	60	5.2
7	0.10	1.6	5.9	4.9	60	8.1
8	0.07	1.6	4.5	3.4	60	5.7
9	0.61	1.6	3.8	2.7	60	4.4
10	0.06	1.6	3.5	2.4	60	4.0

*Source: USA NRC (1980) (6)

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