DIETARY (NUTRIENT) INTAKES OF NIGERIAN PEASANTS LIVING IN A SEMI-ARID ZONE

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ABSTRACT

Eighty-two adults (42 males, 40 females) randomly selected from a village in the semi-arid zone of Nigeria have been surveyed for dietary intakes. The technique used was a combination of 24-hour recall and weighed intake over 7 days.

Overall, men ate more food and drank much more than women. Males had significantly ($p < 0.05$) higher energy and protein intakes than females. Females on the other hand had significantly ($p < 0.05$) higher Vitamin C intake than males. Intakes of other nutrients did not vary widely among the sexes and quantities eaten, rather than quality, were largely responsible for variations in intakes observed. Mean energy intakes were 2191 KCals (9J6MJ) for males and 1980KCals (8. 28MJ)for females. Calculated total protein intakes were 57.9 $\pm$ 1.7g and 50.4:1:: 2.0g per day for males and females, respectively.

The foods that appear to have the greatest potential for contributing to the intake of energy, animal protein, calcium, vitamin A and vitamin C are cereals, fish and the guava fmit (Psidium guajava).

INTRODUCTON

There are very few detailed, published studies of nutrient intakes by peasants in the semi-arid region of Nigeria. The data that is available for this area (I), for the whole of Nigeria, indeed for most developing countries in the tropics, however, indicate intakes of nutrients below recommended levels (2,3).

The seasonal availability of foods in large quantities is more pronounced in dry-land subsistence farming areas and the extent to which this affects nutrients' intakes of peasants in this area is not well known. The phenomena of seasonal weight losses among peasants in this areas sporadically reported in the literature (4, 5, 6) for example, may be a reflection of nutrients' intake variations.

For the provision of adequate food, nutrition and therefore health for all, the nutrients' intakes of these peasants must be quantified and major contributors indentified to facilitate their provision. The present study is, therefore, undertaken as an attempt to quantify intakes of selected major nutrients (energy, ' protein, calcium, iron, vitamin A and vitamin C) in Nigerian peasants and to identify the food componets that supply or have the potential of supplying large proportions of these nutrients with the hope that efforts can be concentrated on their production and general availability for the better nutrition and health of these peasants.

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METHODS AND SUBJECTS

Mairi is a village on the outskirts of Maiduguri town, the capital of Borno State of Nigeria. Dorno state lies in the far North-eastern corner of Nigeria in the interface between the Sudan and Sahel Savanna zones. At the time of the survey this village was inhabited mostly by peasants and other low income earners and had only one primary school. There was no clinic and the inhabitants had to travel to Maiduguri (Yerwa) township (5 kilometers away) to get to a Government Hospital or Clinic. The population at the time of the survey was about 4,000, with 667 tax payers. The majority of the inhabitants were farmers and others included crafts men, traders, dependent employees and koranic malams. The main ethnic group is Kanuri but other tribes of Northern Nigeria such as the Hausa, Dura, Shuwa and Fulani are represented. Also present are some Yoruba and Margi.

The village had earlier been the site an adolescent anthropometric survey and the register of about 200 households m that survey provided the sampling frame for random selection of 100 adults. Each of the household selected was visited I the purpose and scope of the study I explained and consent obtained. The subjects were divided into six groups and for convenience one group was ..eyed for 7 days in one month. The survey lasted from July to December/9. Prior to the experimental week, subjects were visited and the technique explained to both the subject and the use in the vernacular. The day before !Surements began was used for lonstration and actual test run for jects With difficulty.

For the weighed intake records, a modition of the method of Widdowson (7) used. The whole meals was served on regular household dishes incorporated .the top of a large capacity scale (Avery Ltd, Birmingham, U.K.). The cumlative weights of the food portions added and records of plate wastes were le. As every subject had to be assisted flis exercise by one of the investigators rained assistants, it was only possible :onduct weighed intakes for 2 out of 7 days. For this purpose each group divided into two, the first having :hed intakes measure on Sunday and Thursday and the second having their on ;day and Saturday. During the rest he week, the 24, hour dietary recall methods was used. Subjects were asked to describe the food and the amount eaten. re samples wete still available, weighed portions were taken. The same nique was used to solicit information on foods eaten outside the home through- out the week. The number and types of drinks taken were also recorded. A peculiar problem encountered regularly was that of group feeding where two or more adults normally ate from the same bowl. In order to prevent upsetting normal eating habits, this practice was accommodated and adjusted for by assuming that equal amounts of food were taken by each of the group feeders. This situation was encountered in 41.6% of the weighed intakes while it was 44.2% for the whole of the test period. The largest number of people encountered per group was three.

Out of the 100 subjects initially selected,94 consented to participate at the commencement of the study, 5 more were dropped because they were considered to belong to a significantly higher social class from the rest of the subjects. During the experimental week seven more subjects withdrew. The 82 subjects (42 men, 40 women) that participated to the end belonged to families of manual workers and peasants and were similar in age (29-50 years) and socio-economic class.

Nutrients' intakes were calculated using standard food composition tables and other available published data (8). Results are expressed as mean standard deviation.

RESULTS

Food Eaten: The average number of meals per day for all subjects was 2.44 ± 0.7. There were no significant differences between the sexes in the number of meals taken per day (Table 1) and the types of foods eaten show remarkable similarity both in quality and quantity between the sexes. Thus the total number of food items used by subjects during the mopths of July and August was exactly the same (26 items) in all cases, while from September to November, when more foods were available, the average rose to 34.3 ± 3.2 and then to 50.8 ± 6.7 during December. This seasonal availability of foods resulted in considerable monthly differences in intakes of nutrients by the subjects (Table 2).

Energy Intake: Table 3 shows the mean energy and other nutrient intakes by the subjects investigated. futake of energy was below FAO/WHO rec- ommended levels (10) for all the subjects. The mean ±SD for the entire group was 2004.8 :t 150.2 KCal. The mean energy intake for males was significantly higher than that of females ($p < 0.01$, observed t value = 3.26). Energy intakes for males was 73.0% of the FAO/WHO recommended level while females had 90% of the level suggested as appropriate for moderately active individuals. The difference in average energy intake of the 33 males who constituted the 29-39 year age cohort (2201.3 ±106.6 KCals, 9.21 MJ) was not significantly different from that of the 40-50 year males (2176.8 ± 93.5 KCals 9.10 MJ). Average energy intake was also similar for the 24 females between 29-39 years old and the 40-50 year old female subjects, being 2022 : ±64.6 KCals (8.46 MJ) and 1958.8 ±50.7 (8.20 MJ), respectively. Alcohol consumption was not encountered in any

Table 1. Average Number of Meals and Daily Consumption (g) of Foodstuff by Nigerian Peasants

	No. of meals	Cereal and Products	Root and tubers	Beans and products	Groundnuts and Legumes	Leaves vegetables	Seeds	Fruits	Milk and products	Meat Fish poultry	Water* and drink
Male	2.78 ± 0.66	1080	359	60	133	387	2	106	133	134	1514
Female	2.21 ± 0.83	879	200	71	129	600	18	201	140	90	1111
All	2.44 ± 0.70	910	303	66	130	495	9	151	136	110	1300

*Excludes milk and milk drinks.

Table 2. Seasonal Variation of Nutrients Intake in Nigerian Peasants (Monthly Means ± SD, a1l subjects)

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	July	August	September	October	November	December	Mean
Energy (Kcal)	1861.2 ± 90.2	1901.2 ±101.4	1941.8 ±61.5	1944.8 ±77.4	2179.1 ±111.3	2201.3 ±131.5	2004.8
Total Protein (g)	32.9 ± 5.5	35.4 ±4.1	44.3 ±6.6	60.4 ±8.1	71.3 ±6.7	70.2 ±4.2	53.1
Fat (g)	11.7 ±0.7	8.8 ±1.0	15.3 ±1.4	21.6 ±3.1	31.0 ±2.6	34.1 ±2.5	20.4
Calcium (mg)	386.6 ±46.5	389.3 ±61.3	404.5 ±28.6	450.5 ±33.4	560.5 ±66.3	573.0 ±65.7	460.8
Iron (mg)	3.1 ±0.2	3.0 ±0.2	3.0 ±0.2	5.8 ±0.3	8.0 ±0.5	8.7 ±0.4	5.4
Vitamin – A (ug)	201.2 ±12.6	204.3 ±12.0	259.6 ±10.1	280.1 ±7.6	350.1 ±16.3	367.3 ±23.1	277.1

Ascorbic acid (mg)	3.3 ±0.4	6.1 ±0.5	8.8 ±2.3	12.1 ±3.0	18.6 ±8.0	15.3 ±6.6	10.7

Table 3. Energy and Nutrient httakes of Nigerian Peasants Living in Semi-arid Zone (Mean Values and Standard Deviations)

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	Male		Female		All Subjects	
	Mean	Sd.	Mean	Sd.	Mean	Sd.
Energy (Kcal)	2190.0	200.1	1980.8	122.4	2004.8	150.2
(MJ)	9.16	6.0	8.29		8.39	
Total Protein (g)	57.9	6.2	50.4	5.7	53.1	6.0
Animal Protein (g)	13.1	3.3	9.8	1.2	12.0	2.8
Fat (g)	21.1	1.9	20.1	3.3	20.4	2.0
Calcium (mg)	500.3	61.2	444.4	28.7	460.8	40.3
Total Iron (mg)	6.0	1.7	5.0	2.0	5.4	1.8
Heme Iron (mg)	0.3	0.001	0.1	0.001	0.2	0.001
Vitamin A (ug)	267.3	39.5	290.5	37.8	277.1	38.2
Ascorbic acid (mg)	8.1	3.1	14.7	10.4	10.7	6.5

of the subjects surveyed, a fact that is probably due to the strong Islamic influence in the village. For all subjects, energy intake during November and December was significandy higher ($p < 0.05$) than during July and August (Table 2).

Protein and Fat Intakes: Intakes of total crude protein and fats (Table 3) show the same pattern as the energy intakes for males, below FAO/WHO recommended levels. Again the total protein intake of men was significandy higher ($p < 0.05$, t value = 2.05) than that of women although men had only 93.4% of recommended intakes and females had 105% of intakes suggested as appropriate. Neither in the male, nor in the female subjects differences between the mean intake for 29-39 year olds were statistically significant from the older 40-50 year cohort. As a whole 77.3% of the total protein was obtained from plant sources, mostJy cereals and legumes. Animal protein provided 22.6% of the total protein intake of male subjects whereas female subjects had only 19.4% of the total protein intake from animal sources.

Intake of fat was similar for all groups of subjects with a mean ±SD of 50.4g :I: 2.33. The bulk of this were
obtained from the oil used to fry legume products and fish.

Calcium and Iron Intakes: The mean intake of calcium by male subjects was not significantly different ($p < 0.05$) from that of female subjects (Table 3). Mean intake of this mineral by the subjects met the FAO/WHO recommended levels of 4-5g for males and females.

Dietary levels of iron did not meet FAO/WHO recommendations: in the case of male subjects, mean intake was approximately 66% of the 5-9mg. recommended. Compared with FAO/WHO recommendation of 28mg. for women, iron intakes by female subjects were very inadequate. None of the women survyed consumed more than 50% of this recommended level. Also, the contribution

of calculated heme iron (Table 3) to the total iron intake was negligible, being 3.7% for all subjects and 2.0% for female subjects.

Vitamin A and Vitamin C intakes: The total vitamin A intakes of females was not significantly less than that of the males (Table 3), and both male and female subjects had intakes that were far below recommended amounts. Males had 36% and females had 39% of the recommended amounts, respectively. The small amount of fish consumed contributed mainly to the calculated vitamin A intake. No attempt was made to include the retinol equivalent of beta carotene which, no doubt, was consumed in abundant quantities.

Total vitamin C intakes were significantly lower in the male than in the female (Table 3, 8.1 :t 0.77, 14.7 :t 1.14, $p < 0.05$). Neither group had calculated vitamin C intake up to the recommended daily level of 30mg., males had 27% while females had 49%. Fruits contributed the largest vitamin C intake in all subjects and guava (Psidium guajava) consumption among the female subjects was particularly important in this respect.

DISCUSSION

The difficulties with nutrient intake measurements are well known and where possible the weighed inventory technique is generally acknowledged to provide one of the most accurate methods (9). Cooperation rate in the present technique has been high and we believe that the combination of weighed intake and 24 hour dietary recall provides, in the circumstances of the survey location, nutrient intake data whose accuracy is not compromised.

The results show low intakes of many nutrients by Nigerian peasants living in a semi-arid area. The extent to which the low intake of energy observed in this survey is characteristic o f other categories of the project area population is not known; although it is in agreement with results of similar studies conducted in developing countries in general (2, 3). The main source of energy intake was cereal staples. This was followed in importance by cassava (Manihot utillisima) and yams (Dioscora spp.). Most of the peasants grew their own cereals, and cassava was consumed mostly by those who grew them.

Overall, the protein intake was low especially the proportion (22.7%) supplied by animal sources. Groundnuts (Arachis hypogea) were cultivated by all the families of the subjects surveyed and along with cereals provided substantial proportion o f the plant protein, especially immediately after the harvest periods in October, November and December. Families of only two of the subects had milk cows, milk therefore also contributed greatly to the animal protein intake of these subjects. Fish contributed to the animal protein intake to about the same extent as meat 31.4% and 33.8%, respectively. Besides, fish was cheap and the meats purchased were not of very good quality. Fish was consumed whole, mainly in the form of dried Lake (C had) fish, and some deep-fried. A higher comsumption of these products would have resulted in considerable higher intakes of not only good quality protein but also of fat free (from the cooking fat), valuable minerals like calcium, phosphrus, iron and vitamin A. In the case of Vitamin C, the highest proportion was supplied by fruits, especially the guava fruit. Intake of vitamin C by the only subject with guava fruit trees in the compound was much higher (162%) than the next highest individual intake. Most

subjects obtained the bulk of their vitamin C (and mineral) supplies from fresh vegetables, mostly obtained from garden patches in their back yards.

It appears, therefore, that the intakes of the major nutrients by Nigerian peasants living in semi-arid areas are inadequate when compared with FAO/WHO recommended levels. The qulk of energy , portein, macrominerals, vitamins A and C are provided by a few dietaries such as cereals, pulses, fish and the guava fruits. This is not the most ideal situation to meet the recommended nutrient intakes of peasants in this area, but can be achieved by the agricultural procurement and Extension agencies concentrating their short term efforts on the availability of these few items. The staple cereals and the crops usually cultivated now provide the bulk of the energy intake of the peasants and are likely to continue to do so for a long time to come. If a higher level of fish consumption is encouraged, it has the potential of supplying the protein, calcium, phosphorus, vitamin A and micro mineral requirements of the peasants. The planting of the guava fruit trees and back yard gardens, for example, appear to be capable also of ensuring adequate intakes of vitamin C and perhaps other water soluble vitamins.

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