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## Pattern of dietary carbohydrate intake among urbanized adult Nigerians

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### Abstract

As the nutrition transition continues in Africa, it is crucial to identify population-specific dietary patterns. Healthy diets may then be promoted for prevention and alleviation of the chronic disease burden associated with nutrition. Using a semi-quantitative food frequency questionnaire, we conducted a cross-sectional study and computed the proportions of foods commonly consumed, and collected data on anthropometric characteristics. The median total energy intake per day from these carbohydrate sources was 1034 kcal (interquartile range (IOR) 621.5–1738.6 kcal). The main carbohydrate food eaten was rice (48.6%) followed by fufu (30.5%) and bread (13.1%). The prevalence of overweight and obesity was 63%, and 73% of the women in the study were either overweight or obese compared to 56% of men. Our study showed that parboiled long grain white rice is now the most commonly consumed carbohydrate by urbanized Nigerians. Other traditional carbohydrate foods are still consumed frequently and remain quite popular.

### Keywords

dietary intake; food frequency; obesity; fufu

### Introduction

Dietary intake in developing countries is undergoing transition from largely high fibre, calorie-sparse, low protein diets to low fibre, calorie-dense, high-protein diets (Popkin 2002). This changing pattern, particularly with respect to carbohydrate intake, is contributing to increasing prevalence of obesity, which is a major risk factor for many non-communicable diseases worldwide including hypertension, diabetes mellitus, cardiovascular disease, stroke and several cancers (Popkin 2006). In addition to improving socio-economic status (SES), it has been suggested that this transition has unique characteristics in Africa because of positive cultural attitudes towards obesity, the initial very low prevalence,

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possible genetic predisposition and high cause-specific mortality from obesity and associated conditions (Prentice 2009).

In sub-Saharan Africa, carbohydrate foods were typically based on a range of staple tubers and roots, especially cassava, yams and maize. Studies in Tanzania suggest that Ugali, a stiff porridge of maize, is the most common carbohydrate, whereas in South Africa, the most common carbohydrate foods are maize and bread (Hoffmeister et al. 2005; Labadarios et al. 2005; Mostert et al. 2005). In Nigeria by contrast, the major dietary carbohydrates are roots and tubers served as different types of 'fufu' or 'swallows' – a group of bolus meals such as eba, pounded yam, amala, semovita and tuwon (Oguntona et al. 1998; Oguntona and Akinyele 2002; Afolabi et al. 2004). In general, bolus meals are thick pastes made by adding boiling water to processed starchy vegetables or roots and consumed with a side dish of vegetables, animal proteins and oils. The plants used for these bolus meals include cassava, yam, plantain, corn, wheat and rice. Within Nigeria, there is some regional variation in the type of bolus meals consumed, with greater consumption of rice and maize-based meals in the north and consumption of yam and cassava-based meals in the south.

Recent observations in Nigeria suggest that the pattern of dietary carbohydrate intakes may be changing, due to increasing urbanization and adoption of a Western lifestyle. To address this, we conducted an observational study to investigate the nutrition transition in Nigeria, by evaluating the current dietary carbohydrate intake and the total calories obtained from these foods. We also estimated the prevalence of overweight and obesity in this population.

## Methods

### Study population

Between April 2010 and February 2011, we conducted a cross-sectional study on workers and visitors to the Federal Secretariat Complex, Abuja, Nigeria, which houses the offices of federal public sector workers in central Nigeria. Because it is a federal establishment, the staff distribution is representative of Nigeria's ethnic and cultural diversity. Research nurses approached Heads of Departments at the Secretariat and obtained permission to engage staff members. Once permission was obtained, all individuals aged over 18 years were approached to participate in the study.

### Demographic and socio-economic factors

To verify that we had sampled a diverse population, we collected data on ethnicity, religion, level of education and profession. To evaluate SES, we asked about household possessions including fan, refrigerator, television, bicycle, motorcycle, car, source of drinking water, type of sanitation, type of residence, home ownership, separate room for cooking, source of cooking fuel, respondent self-reported social class and interviewer-perceived social class.

### Food and beverage consumption pattern

Participants were asked questions about their demographic characteristics and dietary carbohydrate intake over the previous 1 year using a modified semi-quantitative food frequency questionnaire (FFQ). The FFQ collected information on 11 main foods and 7 beverages including alcohol. Participants were asked to report types of foods and beverages consumed; the frequency of consumption (number of times consumed daily, weekly and monthly) and the quantity consumed. Because there are no uniformly accepted portion sizes in Nigeria, we included pictures showing different portion sizes of some of the foods in comparison with popular and well-known fixed size items. The use of food photographs as a method of estimating portion sizes has been validated in previous studies in an African

population (Venter et al. 2000) and amounts of commonly eaten foods can be accurately estimated by observation (Gittelsohn et al. 1994).

All foods were described according to the method of preparation or modes in which they may be eaten. For example, yam included boiled yam, roasted yam, fried yam or pounded yam. To evaluate alcohol consumption, we asked our participants whether they had consumed a measure of alcohol in the past 5 years. A measure of alcohol was defined as a glass of wine (alcoholic or non-alcoholic), a pint of beer, a shot of 'hot drink' – a colloquial term which refers to different types of spirits and locally brewed gin. To evaluate sweetener consumption, we asked about addition of sweeteners to foods and drinks (type – sugar, saccharin, honey, artificial sweeteners such as aspartame; form of sugar – whether powder or cubes), quantity of sweetener added.

### **Anthropometric measurements**

Trained research nurses measured individual height, waist and hip circumferences in accordance to the World Health Organization (WHO) multinational monitoring of trends and determinants in cardiovascular disease criteria. Weight and body mass index (BMI) were estimated using the Omron body sensor (Omron HBF-510W Full Body Sensor Body Composition Monitor Scale) according to the manufacturer's instructions (Omron).

### **Statistical analysis**

Descriptive analyses were performed to characterize the sampled population. Our findings are presented as mean  $\pm$  SD. *t*-Tests were carried out to assess the significance of differences between groups in the distribution of continuous variables such as demographic characteristics and potential risk factors and  $\chi^2$  test used for categorical variables.

**Nutrient analysis**—The amount of raw ingredients in each food and the total amount of each recipe after cooking were weighed and recorded. Pictures of the cooked foods were taken, included in food photographs and used to estimate portion sizes of the consumed foods. We compiled a food composition database of foods and nutrients of interest from the West African Food Composition Table (Stadlmayr et al. 2012) and the Tanzanian Food Composition Table (Lukmanji et al. 2008). The energy composition of each recipe was obtained by calculating the calorific value of each raw ingredient and the sum of these values. To derive total energy intake from carbohydrate food sources per day, we conducted analysis with the compiled database for energy intake, the amount of each food and the total amount of each recipe, using SAS 9.2 for UNIX statistical software (SAS Institute, Gary, NC, USA). We present results of this analysis as the median with interquartile range (IQR) because of the skewness of the distribution.

**SES analysis**—In order to compute SES in a low resource environment, we generated a wealth index using the factor analysis (principal components) procedure and varimax rotation as previously described (Filmer and Pritchett 2001). We determined the principal component upon which wealth index is based on the following variables: ownership of fan, bicycle, television, fridge, motorcycle, car and home; type of residence: duplex, multiple bedroom apartment and studio; source of drinking water: dispenser, fetch, deep well, pipe-borne, surface water and borehole; source of cooking fuel: firewood, gas, kerosene and electricity; type of toilet: none, water cistern, pit toilet and aquaprivy; whether a separate room for cooking was available. The factor scores were calculated from the sum of the ownership of household items weighted by their factor loading. Each participant received a score for the identified pattern. The factor scores were linear combinations of the included variables that explained as much of the variations in the original variables as possible (Hatcher 1994). We examined the scree plot (mean and confidence interval (CI)) – looking

for values to retain at the break point between components with relatively large eigenvalues and those with small eigenvalues and interpretability of the factors. The first principal component had a comparatively high eigenvalue. We then sorted our data based on the first principal component and divided all respondents into three categories based on its value. We classified the lower 40% as having low SES, the middle 40% as having middle SES and the top 20% as having high SES. The validity and reproducibility of wealth index has been examined in previous studies and it correlates well with other measures of wealth in environments without reliable expenditure data (Filmer and Pritchett 2001).

## Ethics

The study was conducted according to the Nigerian National Code for Health Research Ethics and the Declaration of Helsinki. Ethical approval to conduct this study was obtained from our institution's health research ethics committee. Individuals were informed about the study and were requested to consent before participating in the study.

## Results

### General characteristics of the study population

Most (98%) of the individuals approached agreed to participate and gave informed consent, leaving 1058 respondents, consisting of 60% males and 40% females. The mean age and standard deviation (SD) of the participants was 41.3 (9.3) years; 76.5% were married and 77.3% have had more than 12 years of education. Table I describes the demographic characteristics of this population in total and by sex.

### Carbohydrate consumption

The main carbohydrate food eaten was rice, reported by 48.6% of the study participants, followed by bolus meals reported by 30.5%, bread 13.1%, yam 6.4% and other foods such as noodles and spaghetti constituted 1.4% (see Figure 1). Table II shows the frequency of consumption of carbohydrate foods in the last 1 year. The majority of participants (52%) ate white rice two to four times a week and 22% ate white rice at least once a day. Bread was consumed two to four times a week by 34% of the participants. About 20% eat bread at least once daily. Yam, regardless of preparatory method, was consumed two to four times a week by 34% of the respondents.

### Bolus meal consumption

Most (99.1%) of the participants ate bolus meals. The commonest type of bolus meals eaten by this population is semovita or semolina (86.4%), which is a wheat-based meal; followed by pounded yam (85.8%); eba and amala, which are cassava-based meals, consumed by 83% and 63% of the study population, respectively. Of the approximately 1% of the sampled population that do not eat bolus meals, the commonest reason for not eating it was that it was not convenient to prepare. Other reasons included not liking the taste and a feeling that bolus meals were not healthy.

### Rice consumption

Most (65%) of the participants usually consume rice on weekdays and 35% usually consume rice on weekends. Rice was typically consumed at lunchtime by 77% of the respondents; at dinner by 71% and at breakfast by 67%. Typically, rice is served with serving spoons measuring ~120 g (180 kcal or 750 kJ) of cooked rice. The quantity of rice consumed per meal is summarized in Table III. The commonest form in which rice is consumed is boiled white rice served with a side dish of sauce as reported by 68%, followed by jollof white rice (boiled rice, mixed with vegetable oils, spices, tomato and chili sauce) by 38% and fried

white rice (boiled rice, mixed with pan-fried vegetables) by 23%. Most respondents, 99.5%, consumed imported parboiled long grain rice and 0.5% consumed locally grown rice.

### Beverage consumption

Some 29% of respondents consume regular soda less than once a month and 10% consume regular soda at least once a day, whereas 88% consume diet soda less than once a month or never. About 47% of respondents consume sweetened juices less than once a month and 33% consume sweetened juice more than once a month but less than once a week. About 83% of respondents consume unsweetened juice less than once a month. About 21%, 9% and 7% of the respondents, drink tea, hot chocolate and coffee respectively, daily. Only 36% of the participants regularly drink alcohol. About 74% of the participants who drink alcohol regularly were males, whereas 26% were females. Table IV shows the beverage consumption of the respondents.

### Sugar consumption

Most respondents, 93%, add sweeteners to their foods, whereas 7% of the respondents do not add sweeteners to their foods. About 72% use sugar as the meal sweetener, 34% use honey, 16% use both sugar and honey, 2% use artificial sweeteners such as aspartame and 0.3% use saccharin. Of those who add sugar to their meals, 52% use powdered sugar, 47% use sugar cubes and 1% use either cubes or powder sugar.

### Dietary energy

The median total energy intake of these carbohydrate sources per day was 4326.3 kJ (IQR 2600.3–7274.3 kJ) or 1034 kcal (interquartile range (IOR) 621.5–1738.6 kcal).

### Anthropometric measurements, overweight and obesity

The mean BMI of the study population was  $27.1 \pm 6.0 \text{ kg/m}^2$  (women  $28.8 \pm 5.6 \text{ kg/m}^2$ ; men  $26.0 \pm 6.1 \text{ kg/m}^2$ ). Using the WHO BMI cut-off points, we found that only 1.6% of the study population were underweight whereas 35.6% were normal weight. The prevalence of overweight was 37.5% (women 31.5%; men 41.6%) and 25.2% were obese (women 41%; men 15%). The combined overweight and obese population comprise 63% of the study population. Table V shows the BMI categories by gender. The mean waist circumference was  $76.9 \pm 25.7 \text{ cm}$  (women  $81.6 \pm 23.0 \text{ cm}$ ; men  $74.0 \pm 26.9 \text{ cm}$ ) and mean hip circumference was  $87.4 \pm 29.4 \text{ cm}$  (women  $96.0 \pm 27.7$ ; men  $81.8 \pm 29.1$ ). The mean waist hip ratio was  $0.88 \pm 0.08$  (women  $0.85 \pm 0.08$ ; men  $0.91 \pm 0.07$ ). The mean body fat was  $31.2 \pm 11.6$  (women  $41.3 \pm 8.5$ ; men  $24.5 \pm 7.9$ ). The mean visceral fat was  $8.8 \pm 4.0$  (women  $7.9 \pm 3.2$ ; men  $9.4 \pm 4.4$ ). The mean skeletal muscle mass was  $30.9 \pm 6.6$  (women  $25.0 \pm 3.7$ ; men  $34.7 \pm 5.2$ ).

### Discussion

Our results showed that rice is now the major carbohydrate food eaten by urbanized adult Nigerians. We also found that almost everyone eats bolus meals and that semovita or semolina is the commonest type of bolus meal eaten, followed by eba (cassava meal) and pounded yam. Sweetened juices and regular soda were consumed more frequently than unsweetened juice and diet soda. Tea was consumed more often than hot chocolate and coffee. Less than half of the study population consume alcohol, whereas about 73% add sweeteners, usually sugar, to their meals. The majority of the study population were either overweight or obese.

The major carbohydrate food source of urbanized Nigerian has been changing due to rapid urbanization; increasing preference for the Western diet, social, economic and cultural

factors. About four decades ago, imported long grain parboiled rice was consumed at weekends, celebrations and parties by most Nigerians, whereas consumption of locally grown rice was more prevalent, albeit not as frequently as bolus meals. Our findings show that rice – particularly imported parboiled long grain variety – is now more often consumed on weekdays than on weekends with most respondents reporting eating at least three servings per meal. This trend has been strengthened by the introduction of fast food restaurants, whose major product offering is packaged chicken and rice meals (mrbiggs 2011).

Among the traditional carbohydrate foods, pounded yam, which also was hitherto consumed as a ceremonial/celebratory food, is now also consumed more frequently than before. This may be related to easier modes of preparation leading to reduced time required for its preparation and availability at fast food restaurants; nevertheless it remains the most expensive type of bolus meal available in Nigerian markets and restaurants [Food Agricultural Organization (FAO)].

Cassava, a starchy root tuber, introduced to West Africa during the 17<sup>th</sup> century by the Portuguese, is a major carbohydrate food and is consumed as different types of bolus meals, such as eba, akpu, amala and fufu (Okigbo, Debouck). Cassava is the highest producer of carbohydrates per weight among crop plants with the exception of sugarcane. It is reported to account for 39% of the dietary energy intake in Africa (Phillips 1974). Nigeria is the leading world producer of cassava, where it was the most common plant on which bolus meals are based (Martin). In the Western part of the country, cassava accounts for 41.5% of the food consumed as compared to 53% in the mid-west and 45% in the east central regions (Okigbo). It is less frequently consumed in the northern part of the country.

The second most common carbohydrate food on which bolus meals are based is yam. According to the FAO (Phillips et al. 2004), 48.7 million tons of yam was produced worldwide in 2005, and 97% of this was in sub-Saharan Africa with Nigeria alone accounting for nearly 75% of the total world production (Opara 2010). Yam-derived bolus meals include pounded yam and amala. Semovita and semolina are wheat-based bolus meals, which are increasingly popular and are the commonest bolus meal ever consumed by our respondents.

Nigerians consume different rice species, including the Asian rice (*Oryza sativa*), found in most rice-producing countries and the African rice (*Oryza glaberrima*), with origins in West Africa. Although Nigeria is the largest producer of rice in West Africa (Singh et al. 1997), rice imports, primarily from Asia, account for approximately one-third of Nigeria's rice supplies. Our study shows the types of rice and types of rice meals usually consumed, when these meals are usually consumed, the preferred modes of preparation and quantity consumed. The rice-based bolus meal – tuwon shinkafa – is popular in northern Nigeria. Our study shows that the consumption of sugar-sweetened beverages in Nigeria is low compared to Western populations with lower proportion of respondents reporting consumption of low calorie soda and beverages.

We found that the majority of urbanized Nigerians are now either overweight or obese and women are more likely to be obese, compared to men. This high proportion of overweight and obesity may be a reflection of the sedentary lifestyle, which is now prevalent in most urban cities in Nigeria. Many more adults now spend about 7 hours a day on desk jobs, drive or are driven to and from work. Although women return home and engage in household chores, men are more likely to participate in sports or engage in physical activity at health clubs. Weight gained during pregnancy may also explain the high proportion of obesity in women, compared to men. Also, women had more body fat on average than men, whereas



men had more skeletal muscle mass than women. The average body fat for both women and men in this study was relatively high and this may increase the risk of type 2 diabetes, metabolic syndrome and certain cancers in this population (Gallagher et al. 2000).

This survey of carbohydrate food sources of an urban adult Nigerian sample reflects the practices of diverse Nigerian ethnic and cultural groups. Our study population is, however, more educated than the average Nigerian population, but is similar to the typical urban population in Nigeria (NPC and ICF Macro 2009). Participants may have better recall of dietary intakes than the general population. Being mostly employed, they may also have more disposable income to spend on relatively expensive food items such as rice and prefer such meals because of its short preparation time and ready availability in Nigerian fast food restaurants. This may be one of the reasons for the high levels of rice consumption. Nevertheless, this represents a trend which may spread to the rest of the population as income levels rise.

Most of our respondents were older than 30 years and most were married. Younger individuals are more likely to adopt Western diets and lifestyle and may have a different dietary intake than described here. Single individuals, especially men, are also more likely to eat out than prepare their own meals at home. When most people buy meals from fast food restaurants, they are more likely to consume sugar-sweetened beverages and soda with their meal. We approached all individuals at the research site and had high participation rates, so the likelihood that obese or hypertensive individuals were more likely to participate is probably low.

Our study is limited by focusing on carbohydrate intake, without taking into consideration the characteristics of the whole diet; and we did not have adequate power to investigate the relationship between the types of carbohydrate intake and obesity. However, this study is the first to investigate carbohydrate dietary patterns with a semi-quantitative FFQ and estimate total energy intake in Nigeria.

In conclusion, our study showed that the main carbohydrate foods eaten by urbanized adult Nigerians is changing and majority of the population is now overweight or obese. Further studies on calorific content and glycemic index of traditional African diets should be conducted and interventions to re-direct the dietary preferences of urbanized Africans towards more healthy dietary choices are warranted.

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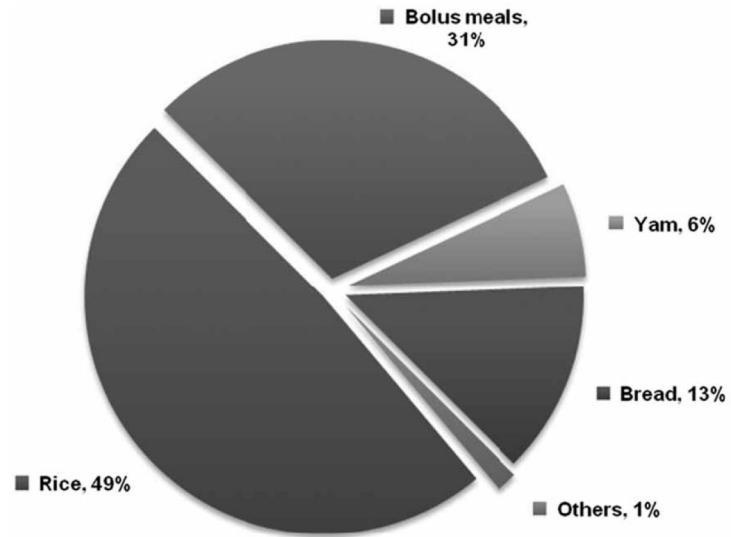
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**Figure 1.**  
Sources of individual carbohydrate intake in urbanized Nigerian adults.

Table I

Demographic characteristics.

Characteristics	Number (%) of participants					
	<i>N</i> = 1058, Mean ± SD	<i>N</i> (%)	Female ( <i>n</i> = 422), Mean ± SD	<i>N</i> (%)	Male ( <i>n</i> = 636), Mean ± SD	<i>N</i> (%)
Age (years)	41.5 ± 9.3		39.2 ± 9.6		42.9 ± 8.8	
Tribe						
Hausa		70 (6.6)		17 (4.0)		53 (8.3)
Yoruba		284 (26.9)		126 (29.9)		158 (24.8)
Ibo		217 (20.5)		123 (29.1)		94 (14.8)
Others		487 (46.0)		156 (37.0)		331 (52.1)
Religion						
Christianity		842 (79.6)		371 (88.0)		471 (74.1)
Islam		213 (20.1)		50 (11.8)		163 (25.6)
Others		3 (0.3)		1 (0.2)		2 (0.3)
Marital status						
Single		188 (17.7)		107 (25.4)		81 (12.7)
Co-habiting		4 (0.4)		1 (0.2)		3 (0.5)
Married		809 (76.5)		278 (66.0)		531 (83.5)
Divorced/separated		13 (1.3)		10 (2.4)		3 (0.5)
Widow/widower		43 (4.1)		25 (6.0)		18 (2.8)
Education						
None		4 (0.4)		1 (0.2)		3 (0.5)
<6 years (primary)		6 (0.6)		3 (0.7)		3 (0.5)
6–12 years (secondary)		230 (21.7)		78 (8.5)		152 (23.9)
>12 years (tertiary)		818 (77.3)		340 (80.6)		478 (75.1)
Occupation						
Unemployed		5 (0.5)		1 (0.2)		4 (0.6)
Household/domestic		8 (0.7)		4 (1.0)		4 (0.6)
Self-employed		6 (0.6)		5 (1.2)		1 (0.2)
Unskilled manual		76 (7.2)		28 (6.6)		48 (7.6)
Skilled manual		424 (40.0)		179 (42.4)		245 (38.5)
Professional/executive		532 (50.3)		203 (48.1)		329 (51.7)
Others		7 (0.7)		2 (0.5)		5 (0.8)

Table II

Frequency of consumption of various carbohydrate food sources ( $n = 1058$ ).

Food	Never or <1/mth	>1/mth but <1/wk	1/wk	2–4/wk	5–6/wk	1/day	2–3/day	4–5/day	6+ /day
White rice									
Frequency	24	36	113	552	104	166	52	6	5
Percentage	2.2	3.4	10.7	52.2	9.8	15.7	4.9	0.6	0.5
Brown rice									
Frequency	1028	10	4	9	2	1	0	0	0
Percentage	97.5	1.0	0.4	0.9	0.2	0	0	0	0
Bread									
Frequency	77	178	155	362	73	180	22	6	2
Percentage	7.3	16.9	14.7	34.3	6.9	17.0	2.1	0.6	0.2
Yam									
Frequency	145	255	217	355	27	46	7	0	0
Percentage	13.8	24.2	20.6	33.8	2.5	4.4	0.7	0	0
Eba (cassava-based stiff porridge)									
Frequency	178	240	197	361	26	48	5	0	0
Percentage	16.9	22.7	18.7	34.2	2.5	4.5	0.5	0	0
Amala (cassava or yam-based stiff porridge)									
Frequency	498	223	111	169	22	28	5	0	0
Percentage	47.2	21.1	10.5	16.0	2.1	2.6	0.5	0	0
Fufu (cassava-based stiff porridge)									
Frequency	604	191	83	123	15	33	6	0	0
Percentage	57.2	18.1	7.9	11.7	1.4	3.1	0.6	0	0
Semovita (wheat-based stiff porridge)									
Frequency	216	205	140	369	47	71	6	0	0
Percentage	20.5	19.4	13.3	35.0	4.5	6.7	0.6	0	0
Akpu (cassava-based stiff porridge)									
Frequency	746	115	73	83	7	23	2	1	0
Percentage	71.0	11.0	6.9	7.9	0.7	2.2	0.2	0.1	0
Plantain									
Frequency	945	57	23	21	3	2	1	0	0
Percentage	89.9	5.4	2.2	1.9	0.3	0.2	0.1	0	0
Corn									
Frequency	817	84	37	71	19	24	3	0	0
Percentage	77.4	8.0	3.5	6.7	1.8	2.3	0.3	0	0
Tuwon (rice-based stiff porridge)									
Frequency	730	103	73	115	13	18	1	1	1
Percentage	69.2	9.8	6.9	10.9	1.2	1.7	0.1	0.1	0.1

Note: wk, week; mth, month.

**Table III**

Meal time of rice consumption/quantity of rice consumed.

Meal time	Proportion of people (%) consuming specified rice quantities				
	<120 g	120 to 240 g	240 to 360 g	360 to 480 g	>480 g
Breakfast (67%)	1	14	28	24	33
Lunch (77%)	1	18	28	25	28
Dinner (71%)	1	16	30	24	29

**Table IV**

Frequency of consumption of various energy beverages.

Drink	Never or <1/mth	>1/mth but <1/wk	1/wk	2 – 4/wk	5 – 6/wk	1/day	2 – 3/day	4 – 5/day	6 + /day
Regular soda									
Frequency	301	271	143	216	22	86	13	3	1
Percentage	28.5	25.7	13.5	20.5	2.1	8.1	1.2	0.3	0.1
Diet soda									
Frequency	927	66	25	29	1	6	2	0	0
Percentage	87.8	6.2	2.4	2.7	0.1	0.6	0.2	0	0
Sweetened juice									
Frequency	496	346	97	82	10	19	4	2	0
Percentage	47.0	32.7	9.2	7.8	0.9	1.8	0.4	0.2	0
Unsweetened juice									
Frequency	874	87	35	33	10	12	1	0	0
Percentage	83.1	8.3	3.3	3.1	1.0	1.1	0.1	0	0
Tea									
Frequency	259	121	105	231	54	216	45	9	5
Percentage	24.8	11.6	10.0	22.0	5.2	20.7	4.3	0.9	0.5
Coffee									
Frequency	674	113	60	93	16	69	8	2	2
Percentage	65.0	10.9	5.8	9.0	1.5	6.7	0.8	0.2	0.2
Hot chocolate									
Frequency	137	98	45	119	15	41	3	0	0
Percentage	29.9	21.4	9.8	26.0	3.3	8.9	0.7	0	0

Note: wk, week; mth, month.



**Table V**

BMI categories by gender.

<b>BMI category</b>	<b>BMI cut-off point</b>	<b>Women (%)</b>	<b>Men (%)</b>
Underweight	<18.50	1.7	1.6
Normal weight	18.50–24.99	25.6	42.1
Overweight	25.00–29.99	31.5	41.6
Obese	30.00	41.2	14.7