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Dietary Diversity Score and Health Status of Apparently Healthy Civil Servants in Formal Sector in Abeokuta, Ogun State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author NSS designed the study, performed the statistical analysis, wrote the protocol, wrote the first draft of the manuscript and managed literature searches. Authors OCB, OB and AOA supervised the research. All authors read and approved the final manuscript.

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ABSTRACT

Aim: Health is wealth and to achieve this goal, good nutrient intake should be vigorously pursued, as, poor nutrition produces indolent work force in a nation. No nation could achieve its cardinal objectives without considering the health of the populace. Yet little or no information is available on dietary diversity score and health status of civil servants in the state. The purpose of this paper is to assess the dietary diversity pattern and health status of apparently healthy civil servants.
Study Design: A cross sectional study was carried out among randomly selected civil servants in

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Abeokuta Ogun state.
Place and Duration of Study: The study was carried out among randomly selected 202 male and 298 female civil servants in Abeokuta Ogun state between January 2012 to February 2013.
Methodology: Information on dietary diversity score (DDS) was obtained using Food and Nutrition Technical Assistant (FANTA) Project Questionnaire. Anthropometric measurements and used to classify subjects' nutritional status. Fasting blood sugar (FBS) were determined from collected blood samples of selected 44 male and 56 female.
Data collected were analysed using Statistical package for social science version 17.1.
Values were reported in mean and standard deviation; percentages. Multiple regression analysis was employed to determine the relationships of various factors to the nutritional status of the subjects. Analysis of variance (ANOVA) was used to evaluate the significant differences in food and nutrient intake and nutritional status.
Results: The DDS representing food groups consumed over 24- hour showed that men and women scored 7.99±2.4 and 6.77±2.8 respectively. The BMI showed that 4% were underweight, 54% had normal weight, 26% were overweight and 16% were obese. The mean energy intake of men and women were 3942±38 kcal and 2791±3 kcal respectively. The haematology result revealed that 47% of the subjects had low packed cell volume.
Conclusions: The civil servants had medium dietary diversity score and some were mal nourished. There is need for nutrition education and dietary interventions to assist the malnourished workers.

Keywords: Dietary diversity pattern; apparently healthy; haematology; civil servants; malnourished.

1. INTRODUCTION

Consumption of a variety of foods in the diet is essential to ensure an adequate intake of diverse nutrients. Dietary diversity can be used as a proxy measure of the nutritional quality of the diet and for the access dimension of household food security [1]. A low dietary diversity is associated with stunted growth in children [1-2] and a higher probability of metabolic syndrome and cardiovascular risk factors in adults [3,4]. Undernutrition in developing countries has been called the 'silent emergency', which has recently gained attention from international donors and national policymakers [5]. The World Health Organization defines quality of life as the living conditions associated with the corresponding goals, expectations, standards, and concerns of each individual living in different cultural systems [6]. Urbanization is associated with a number of unhealthy dietary changes such as increased consumption of saturated and trans fats, sugars, salt and processed foods. These dietary changes are occurring at a rapid rate in developing countries and at earlier stages of economic and social development, and as a result the global burden of obesity and other non-communicable diseases is shifting towards the poor [7]. Dietary quality in particular has therefore become a very important health issue in the context of rapid urbanization [6]. Urban planners and policymakers prioritise issues concerning unemployment, overcrowding, decaying infrastructure and declining services, as these remain the more visible dimensions of the development needs of cities [6,8]. This reflects a poor understanding of the critical role of nutrition for health and development and its potential role to lift African cities out of a spiral of poverty [9]. The nutrition transition underpinned by dietary changes in the urban context and associated challenges posed by undernutrition has occurred in the context of massive rural–urban migration and rapid urbanization across the continent [10-11]. This poses a major threat to public health with impacts on the poor in the society [11].

Civil service can be regarded as purely government work, different from private enterprises or those that are self-employed. Significant role played by civil servants in the government, can predispose them to stress such as poor remuneration, delay in payment of salary, delay in promotion and down-sizing and rank sizing of civil servants and retirement policy [12].

Health is wealth and to achieve this goal, good nutritional intake should be vigorously pursued, as, poor nutrition produces indolent work force in a nation. No nation could achieve its cardinal objectives without considering the health of the populace [13]. This study aimed at determining the dietary quality and health status of civil servants in Nigeria.

2. METHODOLOGY

2.1 Sample Selection

A simple random sampling method was used to select Five hundred (500) willing and ready participant for the study. The respondents were selected according to gender ratio in respective study locations.

2.1.1 Exclusion criteria

Participation was excluded under the following conditions;

a. Were pregnant or breastfeeding
b. Had chronic renal failure
c. Were not civil servants
d. IF they have any known or diagnosed diseases
e. If they were less than 20 years or older than 60 year.

3. METHOD OF DATA COLLECTION

3.1 Ethical Clearance

Individual consent was sought from the subjects and Ethical Committee of Civil Service Commission and Ogun State Ministry of Health. A structured pre tested questionnaire was used to obtain information from Five Hundred respondents.

3.1.1 Data collection tools

A structured pre tested structured questionnaire was used to obtain demographic and socio economic information from Five Hundred respondents.

3.2 Anthropometric Measurements

The Body Mass Index (BMI) Mid Upper Arm Circumference (MUAC) were determined using the method described by Gibson [14].

3.3 Waist/Hip Ratio

Waist to Hip ratio were determined using the method described by Caterson [15].

3.3.1 Urine determination

Diabetes mellitus, hematuria, glucosuria, and proteinuria were determined according to the method described by Fischbach [16].

3.3.2 24-hour dietary recall

Using interview method, subjects were asked to recall what meals and drinks they had taken for the previous 24-hour [14]. This information included details of amount of food consumed, which was estimated in household measures, estimated amounts, and other portion sizes of snacks consumed. The 24 hours dietary recall was carried out 3 times on two week days and one week end day.

3.3.3 Food intake data

Food intake data collected through 24-hour dietary recall was converted to nutrient intake using the food composition table by Oguntona and Akinyele [17], West African Food Composition table [18], Nigeria Food Consumption and Nutrition survey 2001-2003 food instruction booklet and USDA [19] table. Nutrient intake was calculated for the respondents and compared with the daily recommended allowance.

3.3.4 Dietary diversity pattern

To score the dietary diversity pattern eight [4] main groups of food were used i.e. cereals and grains, seeds, nuts and legumes, starchy roots and tubers, vegetables, fruits, meat and meat products, fish and sea foods, Oil/dairies as adapted from FANTA [20] with little modification. These main groups were divided into various groups according to Azadbakht et al. [4] with some modification as cereals and grains into refined bread, maize, millet, rice, wheat, sorghum, refined wheat. Legumes, seeds and nuts were divided into nuts, melon, locust beans and legumes, starchy roots and tubers were divided into cassava products, tubers, and starchy roots. Vegetables were divided into green vegetables, tomatoes, carrot, and vegetable products. Fruits were divided as berries, fruits, citrus and fruit juice. Meat and meat products were divided into (red meat, poultry, games, meat products). Oil/dairies were divided into milk, cheese, yoghurt, egg, oil. To be counted as a consumer for any of the food group categories, a respondent had to consume at least one – half serving as defined by the food guide pyramid quality criteria during one day. It did not need to be eaten all at once. Each of the eight broad food categories received a maximum diversity score of 2 out of 16 possible score points. For calculation of the score of each group, the number of sub group consumed was

divided by the total number of subgroups in each main group then multiplied by 2. For example, if a person consumed at least one serving from two of seven possible cereal and grain categories, he/she would receive a subgroup score of 2/7×2= 0.57 and if a person consumed at least one serving from two of four possible meat categories, he/ she would receive a subgroup score of 2/4×2=1. Within each of the food groups, the score reflects the percentage of possible maximum score [21]. Total score was the sum of the scores of the eight main groups.

3.4 Blood Sample Collection

Fasting blood samples of fifty six females (56) and forty four males (44) were collected by a nurse using the protocol described by Shirley [22]. The blood samples were carefully collected from individual subjects using sterile needles and syringes into 5ml capacity lithium heparin tubes. Blood samples were transferred immediately after collection to the laboratory and stored at -4 C prior to analysis.

3.4.1 PCV estimation

Out of the 5 ml blood sample collected, 1 ml was used for PCV estimation. The PCV levels obtained by measuring the packed cell volume (PCV) of the blood and values less than 35% were used as cut-off point to diagnose anemia [23]. The prevalence values were expressed in percentage. The packed cell volume or the haematocrits that represents the blood composed of red blood cells was determined by measuring the height of the cell component in microhematocrit tubes following centrifugation [22].

3.5 Sample Analysis

3.5.1 Sample preparation

The blood samples were transferred into centrifuge vials and centrifuged at the speed of 500 rpm for 5 minutes using a Gallenkhamp centrifuge. The supernatant, which is the serum, was collected in separate tubes for elements determinations.

3.6 Bochemical Assays

3.6.1 Determination of blood glucose concentration

Antecubial venus blood was collected from the volounteers with fluoride oxalate tube. The blood sample collected was centrifuged to obtain plasma. The plasma was analyzed using a spectrophotometer at 550 µm for glucose using glucose oxidase enzyme method (QCA glucose oxidase reagent kit, USA)

3.7 Statistical Analysis

Data collected were analysed using Statistical package for social science version 17.1.

Values were reported in mean and standard deviation; percentages. Multiple regression analysis was employed to determine the relationships of various factors to the nutritional status of the subjects. Analysis of variance (ANOVA) was used to evaluate the significant differences in food and nutrient intake and nutritional status.

4. RESEARCH RESULTS

4.1 Socio Demographic Characteristics

Figs. 1, 2 and 3, present the age, sex and marital status of the subjects. Most of the subjects were female (60%). Seventy six (76) percent of the subjects were between the age ranges of 20 – 40 years. Most of the subjects were married (64%), thirty five percent were single while one percent was divorced.

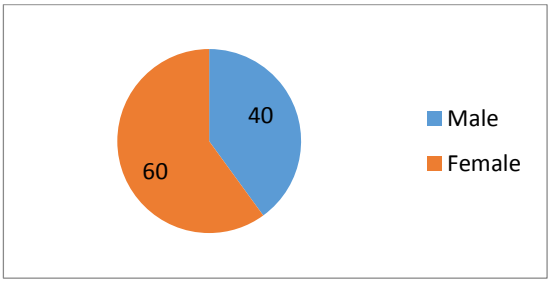

Fig. 1. Sex of the subjects (%)

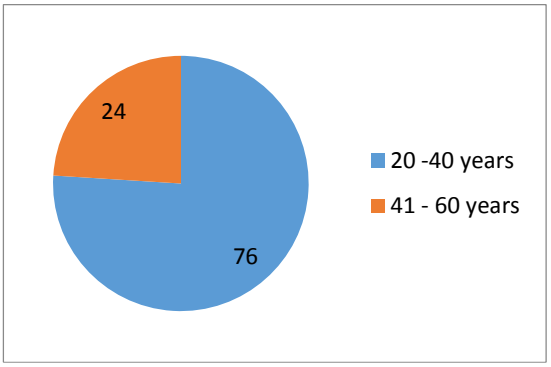

Fig. 2. Age of the subjects (%)

Table 1 presents the mean and standard deviation of weights.

The mean weight of the male and women were 68±44 kg and 69±33 kg respectively. The mean height of men and women was 1.61±0.1 m and 1.59±10 m respectively. Men were taller than women (P< 0.05), BMI was 26±75 kg/m^2 for men and 27.72kg/m^2 for women. Hip circumference for men was 89±9 cm while this value for female was 98.68±8 cm. The mean value of WHR for men was 0.96±48 while for females the value was 0.98±22. The mean of MUAC for men was 26.44±12 cm while for women the value was 28.23±11. The mean of waist circumference of men was 88.12±20 cm while for females the value was 95±32 cm.

4.2 Body Mass Index

Table 2 presents the body mass index of the subjects. Only 4% of the subjects were underweight (BMI<18.5), out of which 2% were female. Also, 54% of the subjects were of normal weight (BMI = 18.5-24.9), of which 32% were males. However, 42% of the subjects were either overweight (26%) or had grade I obesity (4%), grade II obesity (1%). The total number of female subjects that were overweight or obese was significantly (p<0.01) higher than for the males.

4.3 Waist – Hip Ratio and Mid Upper Arm Circumference

Table 3 presents the waist to hip ratio and mid upper arm circumference of the subjects. The results show that most (78%) of the subjects had normal waist to hip ratio and were at low risk of malnutrition, out of which 44% were female, twelve percent were overweight and were at moderate risk of malnutrition, 10% of the female were obese and had high risk of malnutrition. The result of mid upper arm circumference shows that 10% of the female had low MUAC and 11% of the male had low MUAC.

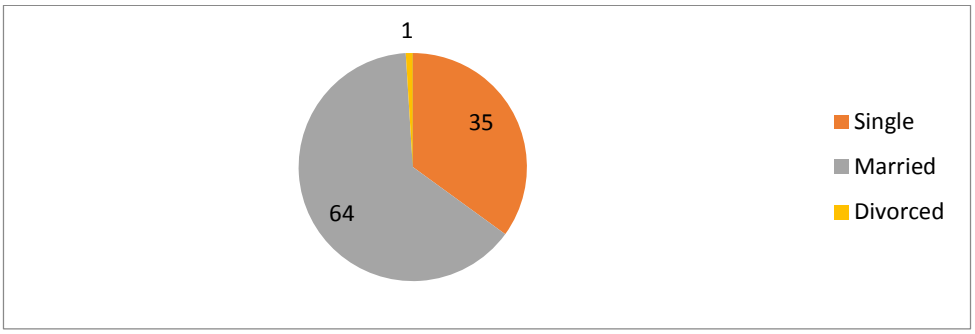

Fig. 3. Marital status of the subjects (%)

Table 1. Means of anthropometric characteristic of the subjects

Parameter	Men	Women	P value
Weight (kg)	68.44±14a	69±33a	0.4761
Height (m)	1.61±0.1b	1.59±10a	0.0001
BMI (kg/m^2)	26±75a	27.72±10b	0.05
Hip circumference (cm)	89±9a	98.68±8b	0.05
WHR	0.96±48a	0.98±22b	0.05
MUAC (cm)	26.44±12a	28.23±17b	0.05
Waist circumference (cm)	88.12±20a	95±32b	0.0001

Means with different letters along the row are significantly different at p < 0.05

Table 2. Body mass index

Variable	Men		Women	
BMI category	**Frequencies**	**(%)**	**Frequencies**	**(%)**
Underweight (<18.5)	10	(2)	11	(2)
Normal weight (18.5-24.9)	114	(23)	156	(32)
Over weight (25.0-29.9)	59	(12)	72	(14)
Obese (30.0-34.9)	15	(3)	39	(8)
Obesity grade 1 (35.0-39.9)	4	(1)	14	(3)
Obesity grade 2 (≥40)	NA	NA	6	(1)

Table 3. Waist – hip ratio and mid upper arm circumference

Parameter	Frequencies	%
Waist-Hip for female cohort		
Normal (Low risk) (<0.80)	217	44
Overweight (Moderate risk) (0.81-0.85)	30	6
Obese (High risk) (>0.85)	51	10
Total		
Waist-Hip for male cohort		
Normal (Low risk) (<0.95)	172	34
Overweight (Moderate risk) (0.96-1)	30	6
Obese (High risk) (>1)		
Mid Upper Arm Circumference (MUAC)		
Female		
MUAC<23.2	49	10
MUAC>23.2	249	50
Male		
MUAC<25.3	57	11
MUAC>25.3	145	29

4.4 Dietary Pattern

Figs. 4, 5 and 6 show the result of the dietary pattern of the subjects. The results revealed that majority of the subjects (59%) ate three times in a day, more than 50% of these were female, 35% ate twice in a day while only 6% ate four times in a day. Skipping of meals was done by 35% of the subjects and lunch was the frequently skipped meal (24%).

4.5 Dietary Diversity Score

The number of foods consumed across and within food groups over a reference period are reflected in this Table 4 revealed that consumption of cereals and grain group by men was 1.45±0.2 while women scored 1.5±0.2. Seeds, nuts and legumes consumed by men were 0.75±0.4 while women had score of 0.41±.4. Men consumed more seeds, nuts and legumes than women ($P < 0.05$). Mean score of starchy, roots and tubers consumed by men and women were 1.8±5 and 1.59±0.5 respectively. Men consumed more starchy roots and tubers than women ($P < 0.05$). The score for vegetables group for men was 1.22±4 while for women was 1.12±0.4. As for the fruits group men scored 0.45±0.2 while women scored 0.53±0.19. Out of the meat and meat products men scored 0.67±3 while women scored 0.36±0.4. Mean of the fish and sea foods intake shows that men scored 1.24±4 while women scored 1.09±0.3. Oil and dairy group shows that men scored 0.44±4 while women scored 0.17±0.4. The total dietary diversity score for men was 7.99±2.4 while women had a total score of 4.57±2.8. Dietary diversity score of men was significantly higher than that of women ($P < 0.05$). The dietary diversity terciles revealed that men and women's scores were within the medium tercile (5-9). There was a significant difference between men's tercile and women's tercile ($P < 0.05$).

4.6 Mean of Macronutrient Intake

The mean macronutrient intake by the subjects are presented in Table 5. The calculated mean energy intake of men and women were 3942±3 kcal/day and 2791±3 kcal/day. The protein intake of the subjects shared a wide variation. The mean Protein intake of men (65±49 g/day) was significantly higher than that of women (54.28±40 g/day) ($p < 0.05$). The fat intake of the men and women were 27.45±22 g/day and 24.75±70 g/day respectively.

The carbohydrate intake of men was 505±46 g/day and that of women was 368±80 g/day. The mean Polysaccharides intake for men and women were 285.97±15 kcal/day and 180.97±30 kcal/day. The mean fibre intake of men and women were 111±87 g/day and 73.60±40 g/day respectively. The mean fibre intake of men was significantly higher than that of women ($p < 0.05$). The cholesterol intake of men and women were 17.78±55 g/day and 14.06±44 g/ day respectively. The macronutrient intake of men was higher than women ($p < 0.05$).

4.7 Nutrient Intake

Table 6 presents the nutrient intake of the subjects. A higher proportion (59%) of the subjects had adequate energy intake within the range of recommended dietary Allowance (RDA), out of which higher percent were women (40%), 12% of women and 7% of men had energy intake below RDA. Fourteen percent of men and 8% women had energy intake above the RDA.

A greater proportion (53%) of the subjects had protein intake below the RDA, out of which 32% were women. Most of the subjects (74%) had fat intake below 30%. A higher percent (64%) had adequate dietary fibre intake out of which 46% were women. Majority (93%) of the subjects had low cholesterol intake.

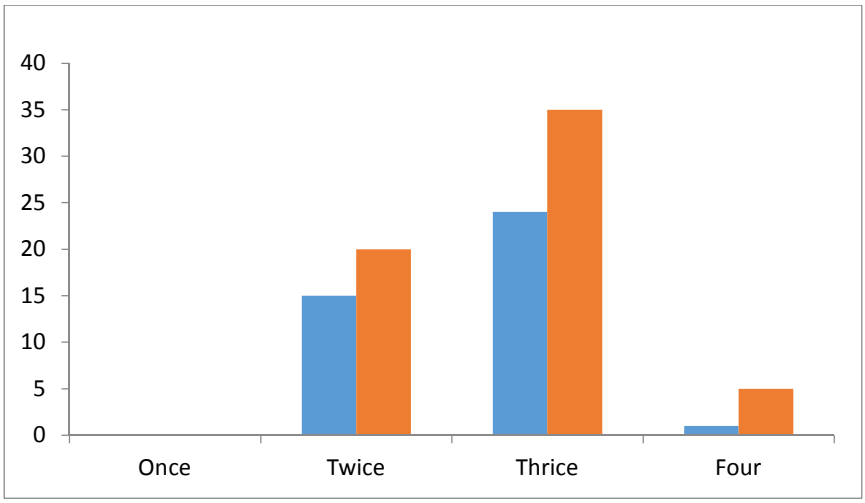

Fig. 4. Daily meal intake of the subjects (%)

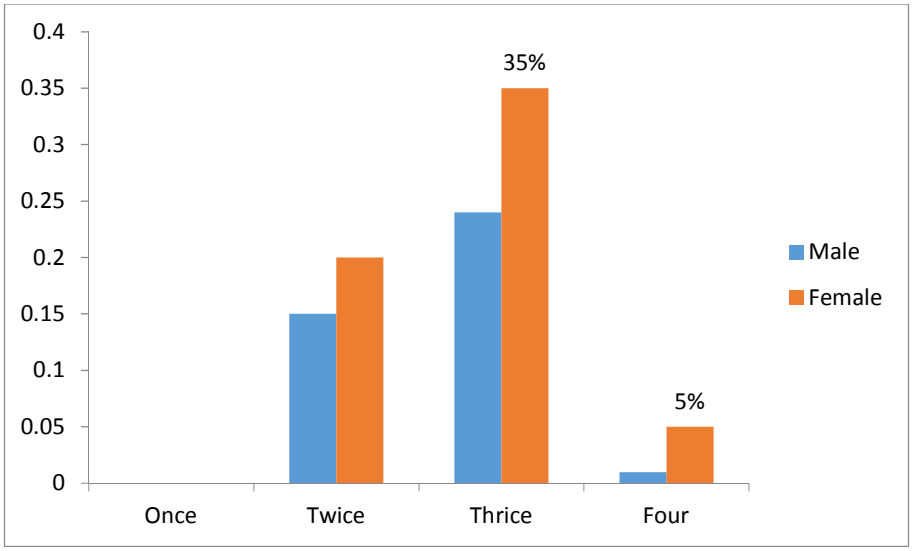

Fig. 5. Skipping of meals by the subjects per day

Table 4. Dietary score (mean values)

Food group	Men	Women	P value
Cereals and grains	1.45±0.2a	1.5±0.2a	0.14
Seeds, nuts and legumes	0.75±0.4b	0.41±0.4a	0.05
Starchy roots and tuber	1.8±0.5b	1.59±0.5a	0.05
Vegetables	1.22±0.4b	1.12±0.4b	0.05
Fruits	0.45± 0.2a	0.53±0.19b	0.001
Meat and meat products	0.67±0 .3a	0.36±0.4b	0.05
Fish and sea foods	1.21±0.1b	1.09±0.3a	0.05
Oil and daries	0.44±0.4a	0.17±0.4a	0.69
Total	7.99±2.4b	4.57±2.8a	0.04
Dietary diversity terciles			
Low (1-4)	NA	NA	
Medium (5-9)	7.99±2.4b	4.57±2.8a	
High (10-14)	NA	NA	

Means with different letters along the row are significantly different at $p < 0.05$

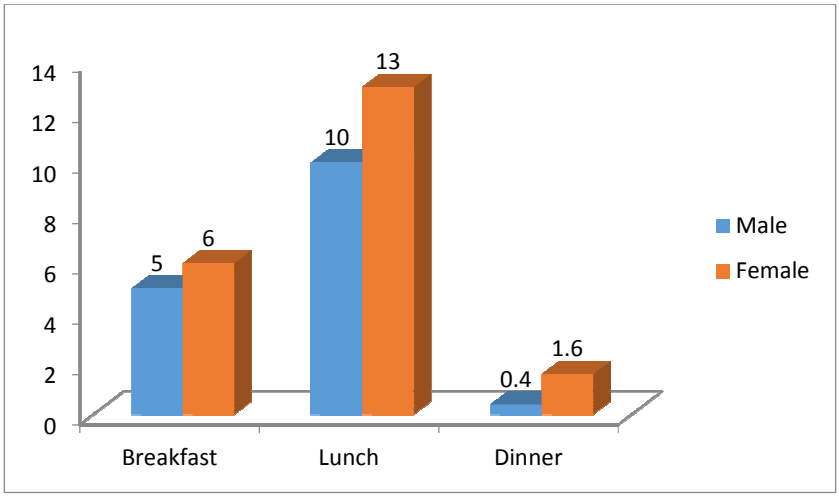

Fig. 6. Meal skipped by the subjects

Table 5. Daily mean intake of macronutrient intake by subjects

Food	Men	Women	P value
Energy (kcal)	3942±38a	2791±3a	0.18
Protein (g)	65±49b	54.28±40a	0.01
Fat (g)	27.45±02a	24.75±07a	0.50
Carbohydrate (g)	505±46a	368±80a	0.15
Polysaccharides (g)	285.97±15a	180.97±30a	0.45
Fibre (g)	111±87a	73.60±40a	0.04
Cholesterol (g)	17.78±55b	14.06±44a	0.05

Table 6. Nutrient intake of the subjects

Nutrient	Men (%)	Women (%)
Energy		
< RDA	7	12
Within RDA	19	40
> RDA	14	8
Protein		
< RDA	21	32
Within RDA	15	20
> RDA	4	8
Fat		
<30	29	45
> 30	11	15
Dietary fibre		
< RDA	20	13
Within RDA	18	46
> RDA	2	1
Cholesterol		
< RDA	34	59
Within RDA	6	1
> RDA		

4.8 Urinary Status of the Subjects

Fig. 7 presents the urinary status of the subjects. Most (92%) of the subjects had normal urine excretion out of which 56% were women, 8% had abnormal urine, out of which 2% of men had proteinuria, 1% of women had hematuria and 2% of women had glucosuria.

4.9 Selected Biochemical Serum Indices of the Subjects

Table 7 shows the selected biochemical serum indices of the subjects. The table also shows that 47% of the subjects had low packed cell volume, of which 22% were men while 31% of female subjects had normal PCV. Only 3% of the subjects had higher blood sugar than normal.

Table 7. Selected biochemical serum indices of the subjects

Packed cell volume %		
Low	22	25
Normal	22	31
Fasting blood sugar		
Normal	42	55
High blood sugar	2	1

Means with different letters along the row are significantly different at p < 0.05

4.10 Energy Expenditures of the Subjects

Table 8 presents the mean of energy expenditure of the subjects. The mean of the Basal metabolic rate (BMR) were 3005±203 kg/hr and 2497±101 kg/hr for men and women respectively. There was a significant relationship between the BMR of men and women ($P < 0.05$). The total energy expenditure for men was 3049±235 kcal while for women it was 2709±706 kcal; men had higher energy expenditure than women ($P< 0.05$). The physical activity level for men was 1.7±0.4 while women were 1.67±0.2.

4.11 Correlation between Dietary Diversity Pattern and Nutrient Intake

Table 9 shows the correlation between dietary diversity pattern and lipid profile. There exist a positive significant correlation between seeds, nut and legumes and cholesterol, seed nut and legumes, fats seeds, nuts and legumes and cholesterol, starchy root and tuber and cholesterol, starchy root and tuber and triglycerides, starchy root and tuber and Low density lipoprotein, fruits and cholesterol There exist negative correlation between cereals and grains and cholesterols, cereals and grains and cholesterol, seeds, nuts and legumes and cholesterol, starchy roots and tuber and cholesterol.

Table 8. Mean of physical activity level and basal metabolic rate

Parameter	Men	Women	P value
BMR (kg/hr)	3005±203a	2497±101b	0.05
TEE (kcal)	3049±235b	2709±706a	0.63
PAL (kcal)	1.7±0.4a	1.67±0.2a	0.01

Means with different letters along the row are significantly different at p < 0.05, BMR: Basal metabolic Rate, TEE: Total energy Expenditure PAL: Physical Activity Level

5. DISCUSSION

The study was undertaken among civil servants in Abeokuta, Ogun state. Majority of the subject had tertiary education. Also, a higher proportion of the subjects were senior staff who were married. This finding is similar to the observation of Awobusuyi et al. [24] in a similar study who observed similar findings in a related research on civil servants in Ekiti state.

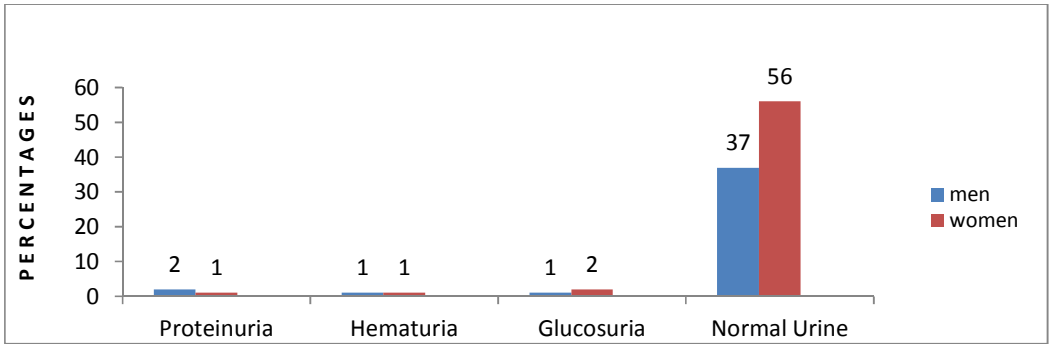

Fig. 7. Urinary status of the subjects

Table 9. Correlation between dietary diversity pattern and lipid profile

	Cholesterol	fats	Protein	Oil
Cereals and grains	-0.42	-0.04	0.11	-0.01
Seeds, nuts and legume	0.02	0.03	0.02	-0.02
Starchy roots and tuber	0.01	0.02	-0.03	0.02
Vegetables	-0.09	-0.06	0.04	-0.03
Fruits	-0.04	-0.04	0.01	-0.01
Meat and meat products	0.02	0.03	-0.06	0.03
Fish and sea foods	0.05	-0.08	0.01	-0.01
Oil and dairies	0.81	0.05	0.14	0.02

P is significant at 0.05

Nutritional anthropometric indicators provide a reflection of the nutritional status of the community and hence complement the information obtained by other approaches [6]. The prevalence of overweight and obesity in this study was higher among women (P<0.05) than men. Overweight and obesity have been recognized as major modifiable risks factors for chronic disease, and public health problems which require both preventive and therapeutic measures. This finding is similar to that reported by other researchers in Nigeria in similar studies carried out in hospital settings [25-26]. The study showed significant correlation between body mass index and cholesterol level ($p < 0.05$). This indicates that as the BMI increases the cholesterol level also increases ($p< 0.05$). This observation is in conformity with the result of Achidi and Tangoh [27] who observed similar correlation in a related research work in Cameroon. The incidence of overweight and obesity could be attributed to the high consumption of high carbohydrate and energy given foods. The study showed a significant correlation between carbohydrate intake and serum triglycerides ($p < 0.05$).

Abdominal obesity determined by waist to hip ratio of the subjects was higher in women than men ($p < 0.05$). The abdominal obesity recorded in the study was slightly higher than what was recorded in another study conducted in Nigeria [26]. This may suggest the emergence of this risk factor in the study population. The study also revealed that there is a significant correlation between Waist to Hip ratio and dietary cholesterol, cardiovascular risk and low density lipoprotein ($p < 0.05$). This indicates that increase in abdominal obesity is associated with high risk of developing cardiovascular disease and increased level of bad cholesterol which are low density lipoprotein and cholesterol.

The dietary pattern of the subjects revealed that a small proportion of the civil servants skipped meal especially lunch. These dietary patterns appear quite common among young people in developing countries. This finding is similar to the observations of Olumakaiye et al. [28] that young people skipped meals in Nigeria. The skipping of lunch observed among the subjects might be due to their tight work schedule. Dietary diversity scores are promising measurement tools in industrialized as well as developing countries and several studies indicated that they are good proxies of overall dietary adequacy of children and adults [28-30]. The dietary diversity scores revealed that the major source of energy were starchy root and tubers. Male subjects consumed higher quantities of starchy roots and tuber foods than females ($p< 0.05$).

Cereals and grains also were another source of energy consumed by the subjects. This observation could be due to the fact that the majority of foods available in the study population were either starchy root and tubers or cereals.

The study also revealed that men had a better consumption of seeds, nuts and legumes than women (P<0.05) while women consumed more cereal than men ($p < 0.05$). The dietary diversity score of vegetables intake revealed that the subjects had a relatively fair intake of this group while the subjects' fruit intakes were poor. There is no significant differences between men and women consumption ($p>0.05$) of this item. This observation is similar to the report of Sanusi [31] on dietary diversity scores of Nigerians. This study also revealed that civil servants had low intake of oil and dairies, this observations could be as a result of low consumption of food high in fat as reflected by the dietary recall. The study also revealed that there was a significant correlation between 24- hour dietary recall and the dietary diversity score ($p<0.05$). Previous studies on rural women in Nigeria have shown lower dietary diversity in the lower living standard measure [31-32], reflecting poor people's ability to access a large variety of foods. Temple and Steyn argued that most South Africans cannot afford a healthy diet, as it costs on average 69% more than the unhealthy food choices they make presently [33]. As a result of the cost of healthy foods, lower socio-economic groups drift towards poor quality, energy-dense but cheap food, Vorster et al. [34] argued that the reliance on available and affordable staple foods and energy-dense but nutrient-poor foods, snacks and beverages contributes towards the increased vulnerability to the nutrition transition in Africa [35]. Other studies have shown that lower calorie, nutrient-dense, less-processed foods such as fruits and vegetables generally do cost more, and that cost is a barrier to the urban poor masses [36]. Less healthy foods also tend to cost less, which was confirmed by a study of food prices in fourteen towns in the Western Cape in South Africa that compared the prices of six commonly consumed foods with healthier versions of those foods [37].

Most of the subjects (59%) consumed adequate amount of carbohydrate. This observation could be as a result of the availability of carbohydrates foods in the study population. The study revealed that the subjects were not consumers of cholesterol high foods. This observation could be as a result of the low level of exposure of the civil servants to westernized diet as confirmed by low percentages of subjects that consumed high fat foods, if they consumed high western diets, they would consume more cholesterol. This observation is similar to a research work carried out in Ekiti state in Nigeria by Awobusuyi et al. [24] which stated that cholesterol intake of the study subjects was low. This is in conformity with other research work carried out on nutrient intake in south west Nigeria [26].

It is disheartening to discover that high percentage of the subject had low packed cell volume which is an indication of anaemia. The low packed cell volume was observed to be more common among women. This might be due to the monthly loss of blood during the menstrual period.

Protein or blood should not be found in the urine of an apparently healthy subjects used. However, the study found incidence of urinary abnormalities among the civil servants. Certain percentages (2%, 1% and 2%) of the subjects had proteinuria, hematuria and glucosuria respectively. These findings may indicate a gradual increase in the prevalence of nephritis among the subjects as traces of proteinuria, hematuria and glocusuria observed in their urine are indicators of gradual damage of the kidney. This observation was similar to the findings of Awobusuyi et al. [24] in a study carried out on indices of kidney damage in Iloye Ogun state on healthy adults.

The Prevalence of diabetes mellitus observed was higher than the report of Awobusuyi et al. [24] who reported 0.9% of participants with diabetes but lower than 1.65%–6.8% that has been generally reported by other investigators [38-39] in PortHacourt Nigeria. The prevalence of diabetes is perceived to be increasing in the country [38].

6. CONCLUSION

The civil servants had medium dietary diversity score and some were mal nourished. There is need for nutrition education and dietary interventions to assist the malnourished workers.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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