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Dietary habits and anthropometric indices of shift workers in Calabar, Cross River State, Nigeria

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ABSTRACT

The aim of this study was to assess the dietary habits and anthropometric parameters of shift workers in Calabar Municipality, Cross River State, Nigeria. A cross-sectional descriptive study design was employed, with a study population consisting of shift workers in various organizations within the municipality. The sample size was determined to be 200 using Bluman's formula, with multi-stage and random sampling techniques used for participant selection. Informed consent was obtained, and inclusion criteria ensured participants were current shift workers residing in Calabar Municipality. Data were collected using structured questionnaires and analyzed descriptively, with measures of central tendency and frequencies used. Anthropometric measurements were taken, including weight, height, waist circumference, hip circumference, and BMI. Results showed that the majority of respondents were female (63.0%) and aged between 18-29 years (39.0%). Most had tertiary education (73.5%) and earned between 150,000 and 299,000 Naira monthly (61.0%). Dietary habits revealed that 55.5% of respondents ate three meals daily, with 87.0% consuming snacks mostly at work. The average BMI was 24.46 kg/m² for males and 25.67 kg/m² for females, indicating a statistically significant difference between sexes. Waist circumference was 90.00 cm for males and 83.94 cm for females, while hip circumference was 105.14 cm for males and 97.44 cm for females. Both waist circumference and WHR were significantly different between males and females, with males having higher values. Shift workers in Calabar Municipality exhibit varied dietary habits, with significant differences in anthropometric parameters between males and females. It is recommended to implement interventions aimed at

promoting healthier eating habits among shift workers. These interventions are crucial for mitigating potential health risks linked to irregular dietary patterns.

Keywords: Dietary Habits, Anthropometric Indices, Shift Workers

1. INTRODUCTION

The interplay between dietary habits and health is profoundly influenced by a range of cultural, social, and economic factors. As societies evolve, so do the norms and practices governing food consumption, which significantly impact nutritional status and overall health. This study was undertaken to explore these influences in depth, given their critical role in shaping dietary behaviors and health outcomes. By examining cultural practices, religious beliefs, social factors, and dietary myths, this research aims to provide a comprehensive understanding of how these elements affect nutrition and health.

Previous research has consistently highlighted the significant impact of cultural and social factors on dietary habits. For instance, Lopez (2008) observed that cultural diversity leads to varied dietary practices, with traditional food habits sometimes restricting access to nutritious foods. Similarly, Mazur *et al.* (2003) documented how cultural norms and practices can lead to dietary restrictions, such as the exclusion of meat or dairy products, which may contribute to nutritional deficiencies. Such dietary constraints are particularly evident among pregnant women, where cultural beliefs may limit their intake of essential nutrients, potentially affecting both maternal and fetal health.

Social factors also play a crucial role in shaping dietary behaviors. Factors such as education level, income, and food accessibility are known to influence food choices and nutritional status. Research by Devine (2003) highlighted that lower socioeconomic status is associated with poorer dietary quality, often due to financial constraints and limited access to a variety of healthy foods. Additionally, education level impacts dietary choices, with lower educational attainment correlating with less healthy food choices (Mazur *et al.*, 2003). The availability of healthy food options and the accessibility of shops further compound these issues, as seen in urban versus rural disparities (Dye and Blundell, 1997).

Cultural beliefs and social support systems also play a role in food choices. Social support from family and peers can positively influence dietary habits, as shown by Wardle (2000), who found that social encouragement can enhance fruit and vegetable consumption. Conversely, social influences can sometimes lead to less healthy eating behaviors, as individuals may adopt the food choices of their social circles without critical evaluation (Gibney, 2004).

Stress is another factor influencing food choices and nutritional status. Stress-induced changes in eating behavior, whether through increased or decreased food intake, can impact health outcomes. Research indicates that stress can alter dietary habits, potentially leading to weight gain and increased risk of chronic diseases (Wardle, 2000; Rosenstock, 2006).

The study examined these cultural and social determinants in the context of dietary assessment. Utilized various dietary assessment methods, including food frequency questionnaires (FFQs) and 24-hour recalls, to understand how these factors influence nutritional intake. Despite the strengths of these methods in capturing dietary data, they are not without limitations, such as reliance on memory and potential biases (Beaton *et al.*, 2013). The study also addressed the role of dietary supplements and the challenges in accurately assessing their

intake, considering that supplements can contribute significantly to overall nutrient intake (Andrews *et al.*, 2017).

Through this research, it aimed to highlight the complexities of dietary assessment and the importance of considering cultural and social factors in understanding nutritional status. By integrating insights from previous studies and findings, this study contributes to a more nuanced understanding of how these factors shape dietary practices and health outcomes.

2. MATERIALS AND METHODS

2. 1. Study Area

The study was conducted within Calabar Municipality, Cross River State, Nigeria. Calabar Municipality is one of the two local government areas that make up the Calabar Metropolis, which is the capital of Cross River State. It is bounded in the North by Odukpani Local Government Area and in the North-East by the great Kwa River (Antigha *et al.*, 2015).

Its Southern shores are bounded by the Calabar River and Calabar South Local Government Area, the second local government that make up the Calabar Metropolis (Ide *et al.*, 2022). It consists of 10 wards and is mainly dominated by the Quas and the Efiks. The area is located between Latitudes 40° 50' and 50° 10' North of the Equator and Longitudes 08° 18' and 08° 37' East of the Greenwich Meridian and on an altitude of 27m to 36m above sea level (Okon *et al.*, 2010).

The area is characterized by two distinct tropical moist climates – the rainy and dry seasons. The dry season occurs from November to February, while rainy season occurs between March and October (Okon *et al.* 2010).

2. 2. Study Design

The study was a cross-sectional descriptive study.

2. 3. Study Population

The population of the study consisted shift workers in various organizations in Calabar Municipality.

2. 4. Sampling Procedure

The sampling procedures adopted in this study were multi-stage sampling and random sampling techniques. Using multistage sampling technique, the city was first divided into clusters based on the total number of the wards that make up municipality. Out of total 10 wards in Calabar Municipality, five wards (wards 2, 4, 6, 8 and 10) were randomly selected; using a table of random numbers (Cross River Hub, 2021).

From the selected five wards, shift workers from hospitals, hotels and shopping malls will be selected for the study. Two hospitals (Navy reference hospital and University of Calabar Teaching hospital), two hotels (Monty Suites and Marian Hotel), two filling stations (Uddy King and Northwest), two police stations (Zone 6 headquarters and State command, Ibb way) and two shopping centres (Livingston shopping complex, and Calabar mall) were selected.

In each case, forty shift workers were randomly selected, making a total of 200 shift workers.

2. 5. Informed consent

Informed consent was obtained from eligible participants after explaining to them the study relevance and what they expect to achieve from the study.

2. 6. Exclusion and inclusion criteria

The participants excluded from the study were those who are not shift workers and not residing Calabar Municipality, while participants currently on shift work in hotels, hospitals, police force, shopping malls and residing in Calabar Municipality were selected for the study.

2. 7. Instrument for data collection

The research instrument for this study was a questionnaire. The questionnaire for this study was structured to cover the main objectives of the study and have two sections. Section A consist the demographic information of the respondents, while section B had information on the dietary habit of the respondents. The research instrument was developed with the consideration of variables in the study. The research instrument was scrutinized and approved by the researcher's supervisor.

2. 7. 1. Validation of the instrument

To validate the instrument, the researcher made sure the research instrument was in line with the objectives. The instrument was given to some lecturers in the department for face and content validation. After validation of the instrument, the questionnaire was subjected to administration to the target population.

2. 7. 2. Reliability of Instrument

Reliability of a research instrument refers to the consistency of the instrument in measuring what it is supposed to measure when it is used repeatedly (Bichi, 2002). To test reliability, 40 copies of the research instrument were filled by respondents from Calabar South Local government area of Cross River State. The information generated from the respondents were used for pilot testing. The pilot test was analyzed using Statistical Package for Social Science (SPSS) version 20.0.

2. 8. Data collection method

Data on food consumption were collected using a structured questionnaire printed and distributed to the respondents. The questionnaire was administered by the researcher, and each participant was assigned a unique code for identification. All responses in the questionnaire were coded for easy analysis.

2. 8. 1. Anthropometric measurements

Anthropometric measurements were taken with the respondents wearing light clothes and no shoes, following the standard procedures outlined by the International Society for the Advancement of Kinanthropometry (ISAK) guidelines (Marfell-Jones *et al.*, 2012).

2. 8. 2. Weight measurement

To ensure reliable measurements of body weight using the mechanical bathroom scale, the scale was zero before the respondent steps on it. The respondents were asked to remove any 'heavy' items from their pockets (key's, wallets etc.) and remove any heavy items of clothing or apparel (big jackets, shoes, woollen jerseys etc.). They were asked to look straight ahead and stay still on the scales. The needle/digital screen was allowed to settle before the measurement was recorded. The body weight (kg) was measured to the nearest 0.5 kg.

2. 8. 3. Height measurement

Height measurement was taken using a "drop down" tape measure fixed at about 2 m on a wall. The respondents were asked to remove their shoes prior to taking the measurement. They were asked to stand with their back to the wall and look directly forward. The back of their feet, calves, bottom, upper back, and the back of their head should be in contact with the wall. They were positioned directly underneath the drop-down measuring device. The measuring device was lowered until it rested gently on the top of the respondent's head and the measurement was recorded. Their height (m) to the nearest 0.5 cm was recorded (WHO, 2008).

2. 9. Data Analysis

The data collected from the questionnaire were coded, categorized, and analyzed by means of descriptive statistics using measures of central tendency such as means, percentages, and standard deviation. Results would be expressed as mean \pm standard deviation (SD), frequencies, and percentages. BMI was categorized according to the World Health Organization (WHO) classification for adults, and the data were analyzed using the WHO Anthro software for adults.

2. 10. Statistical Analysis

All statistical analyses would be performed using SPSS version 20.0.

3. RESULTS AND DISCUSSION

3. 1. Socio-demographic characteristics of respondents

A total of 200 respondents participated in this study and they were equally distributed in the various shift working environment in Calabar Municipality LGA, Cross River State. The socio-demographic data of the participants are presented in Table 1. From the results; 37.0% of the respondents were male, while 63.0% were female. In terms of age group, the majority of respondents fell within the 18-29 category, constituting 39.0%. 26.0% were in the 30-39 age group, 32.0% were in the 40-49 age group, and only 3.0% were aged 50-59. Ethnicity-wise, 32.0% identified as Igbo, 6.5% as Yoruba, 32.0% as Hausa, and 29.5% as belonging to other ethnic groups. Concerning marital status, 26.0% of respondents were single, 46.0% were married, 7.0% were separated, and 21.0% were widowed. In terms of education, 7.0% had non-formal education (NFE), 16.0% had secondary education, 73.5% had tertiary education, and 3.5% had post-graduate education (PGE). Monthly income varied, with 29.5% earning less than 50,000 Naira, 9.5% earning between 50,000 and 149,000 Naira, and 61.0% earning between 150,000 and 299,000 Naira. In terms of economic sector, 39.5% of respondents were employed

in the public sector, 38.0% in companies, and 22.5% in the informal sector. Household size ranged from 1 to over 6 members, with 9.0% having a single member, 76.0% having 2-3 members, and 15.0% having 4-6 members. No respondents reported having more than 6 members in their households.

Table 1. Background information

Variable	Sub-variable	n	%	MEAN±SD
Sex	Male	74	37.0	100.0±36.7
	Female	126	63.0	
Age group (year)	18-29	78	39.0	50.0±15.2
	30-39	52	26.0	
	40-49	64	32.0	
	50-59	6	3.0	
Ethnicity	Igbo	64	32.0	50.0±24.7
	Yoruba	13	6.5	
	Hausa	64	32.0	
	Others	59	29.5	
Marital status	Single	52	26.0	50.0±15.1
	Married	92	46.0	
	Separate	14	7.0	
	Widow	42	21.0	
Education	NFE	14	7.0	50.0±14.5
	Secondary	32	16.0	
	Tertiary	147	73.5	
	PGE	7	3.5	
Monthly income (Naira)	<50,000	59	29.5	66.7±19.7
	50,000 – 149,000	19	9.5	
	150,000 – 299,000	122	61.0	
Economic sector	Public	79	39.5	66.7±18.8
	Company	76	38.0	
	Informal	45	22.5	
House hold size	1	18	9.0	50±12.10
	2-3	152	76.0	
	4-6	30	15.0	
	>6	0	0.0	

Values are expressed as mean ±SEM,

3. 2. Dietary habit of shift workers

The dietary habit of the respondents (Table 2) showed that more than half of the respondents (55.5%) eat three times per day with few of them (9.5%) admitted skip their meal, as a result lack of money (6.5 %), with 19.5% having meal twice at work. Most of the respondents (87.0%) admitted that they take snacks most at work place than home, and majority (61.0%) admitted taking the snacks as lunch, and this was as the results of the availability of the snacks (58.50%), just as more than half (56.5%) admitted consume fast food sometimes (Table 2). Regarding meal skipped weekly, more than half (62.1%) of the respondents skipped breakfast 4-6 times, 10.0 % skipped lunch 4-6 times, while 5.8% skipped dinner 4-6 times weekly (Table 3). Regarding food consumed at breakfast (7:00-9:30 am), few (7.5%) of the respondents admitted having corn flakes, Rice & beans and Rice & stew, with 8.0% of them revealed having meat pie as lunch (9:00 am - 12:30 pm) (Table 4 and 5). Regarding food consumed at lunch (12:00-04:25 pm), less than half (29.0 %) of the respondents admitted taking eba and soup at this time, with 5.5% having bananas snack consumed in the afternoon (2:00-3:30 pm), 28.0% of the respondent had Eba and soup at dinner (5:00 – 11:30 pm) and chocolate, fruits, popcorn, and water melon were equally consumed as snack at bedtime (9:50 – 10:20pm) (Tables 2-9).

Table 2. Dietary habit of shift workers.

Variable	Sub-variable	N	%
Daily meal intake	1 meal	0	0.0
	2 meals	12	6.0
	3 meals	111	55.5
	>3 meals	77	38.5
Skipped meals	Yes	19	9.5
	No	181	90.5
Reason for skipping meals	No time to eat	6	3.0
	No money	13	6.5
	No appetite	0	0.0
	No food	0	0.0
Observed food habit change	Yes	45	22.5
	No	155	77.5
Frequency of food intake at work	Once	6	3
	Twice	39	19.5
	Thrice	0	0.0
Where snack is consumed most	Home	26	13
	Work place	174	87

Time of snack consumption	Breakfast	0	0.0
	Lunch	72	61
	Supper	6	3
	Refreshment	122	36
Reason for eating snacks instead of food	Available	83	58.5
	Convenience	117	41.5
Frequency of fast food consumption	Never	0	0.0
	Rarely	42	21
	Sometimes	113	56.5
	Most times	39	19.5
	Always	6	3

Table 3. Meals skipped

	Daily	4-6x	1-3x	Sometimes	Never	Total
Breakfast	9 (15.5%)	36 (62.1%)	6 (10.3%)	7 (12.1%)	0 (0.0%)	58 (100.0%)
Lunch	0 (0.0%)	4 (10.0%)	0 (0.0%)	33 (82.5%)	3 (7.5%)	40 (100.0%)
dinner	0 (0.0%)	0 (0.0%)	3 (5.8%)	9 (17.3%)	40 (76.9%)	52 (100.0%)

Table 4. Food consumed at breakfast (7:00-9:30 am), lunch (12:00-04:25 pm) and dinner (5:00 – 11:30 pm)

Breakfast			Lunch			Dinner		
Menu	N	%	Menu	N	%	Menu	N	%
Corn flakes	15	7.5	Eba & soup	58	29	Eba & soup	56	28
Rice & beans	15	7.5	Rice & stew	43	21.5	Plantain	19	9.5
Rice & stew	15	7.5	Rice & beans	18	9	Corn flakes	10	5
Corn flakes & bread	12	6	Semovita & soup	9	4.5	Indomie	10	5

Tea & bread	12	6	Spaghetti	8	4	Jellof rice	10	5
Beans & yam	11	5.5	Jellof rice	10	5.0	Rice & stew	10	5
Akara & Pap	10	5	Beans & yam	6	3	Spaghetti	10	5
Indomie	7	3.5	Rice & vegetable	6	3	Plantain & beans	9	4.5
Moi moi	7	3.5	Okpa	4	2	Beans & bread	6	3
Platain & bean	6	3	Plantain pottage	4	2	Beans & pap	6	3
Golden mon	4	2	Beans & plantain	3	1.5	Noodles & egg	6	3
Quaker oat	4	2	Chops & coke	3	1.5	Roasted plantain	6	3
Akara & tea	3	1.5	Chops & pepsi	3	1.5	Amala & draw soup	4	2
Custard & bread	3	1.5	Meat pie	3	1.5	Fruits	4	2
Egg & bread	3	1.5				Semovita & melon soup	4	2
Jellof rice	3	1.5				Banana & groundnut	3	1.5
Noodles & eggs	3	1.5				Beans & yam	3	1.5
Pap & bread	3	1.5				Goat meat	3	1.5
Quaker oat & bread	3	1.5				Yam & stew	3	1.5
Yam & eggs	3	1.5						

Table 5. Snack consumed in the morning (9:00 am-12:30 pm), afternoon (2:00-3:30 pm) and bedtime (9:50 – 10:20 pm)

Morning			Afternoon			Evening		
Menu	N	%	Menu	n	%	Menu	n	%
Biscuit	3	1.5	Banana	11	5.5	Chocolate	3	1.5
Biscuit & water	3	1.5	Beans & plantain	3	1.5	Fruits	3	1.5
Bread	3	1.5	Biscuit	3	1.5	Pop corn	3	1.5
Cheese	3	1.5	Buns	8	4	Water melon	3	1.5
Meat pie	16	8	Buns & water	3	1.5			

Chocolate	6	3
Chops	3	1.5
Eba & soup	3	1.5
Gala	4	2
Meat pie	3	1.5
Orange	3	1.5
Pineapple	3	1.5
Pop corn	3	1.5
Roasted plantain	3	1.5
Spaghetti	9	4.5

3. 3. Dietary diversity score

The dietary diversity score of the respondents (Tables 6-7) showed that less than half of the respondents (46.4%) consumed cereal 1-3 times per week, with 33.5% consuming sweet in the same 1-3 times per week frequency, 33.1% consuming starchy food in the same frequency. Also, milk products, fats & oils, fish, egg, vegetables, meat, legumes and fruits were all consumed by a greater number of the respondents 1-3 times per week.

Table 6. Dietary diversity score / food frequency table

Food item	Daily	4-6x	1-3x	Seldom	Never	Total
Cereals	11.7 (5.9%)	52.1 (26.1%)	92.9 (46.4%)	21.4 (10.7%)	21.9 (10.9%)	200 (100.0%)
Sweets	34.0 (17.0%)	27.4 (13.7%)	67.0 (33.5%)	47.3 (23.6%)	24.4 (12.2%)	200 (100.0%)
Starchy food	3.4 (1.7%)	57.3 (28.6%)	66.2 (33.1%)	40.4 (20.2%)	32.8 (16.4%)	200 (100.0%)
Milk products	35.0 (17.5%)	28.2 (14.1%)	55.2 (27.6%)	40.2 (20.1%)	41.4 (20.7%)	200 (100.0%)
Fats & oils	35.1 (17.6%)	47.7 (23.9%)	52.3 (26.1%)	16.1 (8.1%)	48.7 (24.4%)	200 (100.0%)

Fish	21.2 (10.6%)	54.2 (27.1)	76.3 (38.2%)	16.3 (8.1%)	32.1 (16.0%)	200 (100.0%)
Eggs	12.8 (6.4%)	28.8 (14.4%)	75.3 (37.6%)	0.0 (0.0%)	83.3 (41.6%)	200 (100.0%)
Vegetables	14.8 (7.4%)	46.9 (23.5%)	112.8 (56.4%)	18.9 (9.5%)	6.5 (3.3%)	200 (100.0%)
Meat	7.6 (3.8%)	15.6 (7.8%)	147.4 (73.7%)	4.8 (2.4%)	24.6 (12.3%)	200 (100.0%)
Legumes	14.7 (7.4%)	35.1 (17.6%)	82.8 (41.4%)	36.8 (18.4%)	30.6 (15.3%)	200 (100.0%)
Fruits	13.4 (6.7%)	33.4 (16.7%)	81.4 (40.7%)	50.6 (25.3%)	21.3 (10.6%)	200 (100.0%)

Table 7. Dietary diversity score of food consumed by shift workers in Calabar

Food Category	Daily (%)	4-6x (%)	1-3x (%)	Seldom (%)	Never (%)
Cereals	5.9	26.1	46.4	10.7	10.9
Sweet	17.0	13.7	33.5	23.6	12.2
Starch	1.7	28.6	33.1	20.2	16.4
Milk product	17.5	14.1	27.6	20.1	20.7
Fats	17.6	23.9	26.1	8.1	24.4
Fish	10.6	27.1	38.2	8.1	16.0
Egg	6.4	14.4	37.6	0.0	41.6
Vegetables	7.4	23.5	56.4	9.5	3.3
Meat	3.8	7.8	73.7	2.4	12.3
Legumes	7.4	17.6	41.4	18.4	15.3
Fruits	6.7	16.7	40.7	25.3	10.6

Values are expressed as mean \pm SEM, * = significantly different males at $p < 0.05$

3. 4. Anthropometric parameters of the study population

Tables 8 show the anthropometric parameters of the study population. The findings, the overall mean weight and height of male and female respondents were 1.73 m and 1.70 m, while height (cm), weight (kg), waist (cm) and hip (cm) circumference, BMI and waist-to-hip ratio were 73.19, 73.06; 90.00, 83.94; 105.14, 97.44; 24.46, 25.67; 0.87 for male and female respectively (Table 8). Table 9 showed the correlation between BMI and gender of the

respondents with 39.7%, 31.1% and 13.5%, 6.8% for overweight and obese for female and male respectively.

Table 8. Anthropometric parameters of male and female subjects

Variable	Males (n = 74)	Females (n = 126)
Height (m)	1.73 ±0.01	1.70 ±0.01*
Weight (kg)	73.19 ±1.27	73.06 ±1.06
Waist circ. (cm)	90.00 ±1.48	83.94 ±1.39
Hip circ. (cm)	105.14 ±1.82	97.44 1.29
BMI (kg/m ²)	24.46 ±0.46	25.67 ±0.44
WHR	0.87 ±0.02	0.87 ±0.01

Values are expressed as mean ±SEM, * = significantly different males at p<0.05

Table 9. BMI class and WHR class of male and female subject

BMI class	Males	Females	Total
UW	0 0.0%	4 3.2%	4 2.0%
NW	46 62.2%	55 43.7%	101 50.5%
OW	23 31.1%	50 39.7%	73 36.5%
Obese	5 6.8%	17 13.5%	22 11.0%
WHR class	Males	Females	Total
High	14 18.9%	58 46.0%	72 36.0%

Moderate	10 13.5%	28 22.2%	38 19.0%
Low	50 67.6%	40 31.7%	90 45.0%

BMI ($\chi^2 = 8.380$; $d = 3$; $p < 0.05$), WHR ($\chi^2 = 24.674$; $d = 2$; $p < 0.001$)

4. CONCLUSIONS

Shift work has been linked to irregular eating patterns and unhealthy dietary habits, including frequent snacking, meal skipping, and a low intake of fruits and vegetables. These behaviors, particularly the consumption of carbohydrate-rich, high-fat foods, significantly contribute to overweight, obesity, and other health challenges. This study, which examined the dietary habits of 200 shift workers in Calabar Municipality, Cross River State, Nigeria, revealed that meal skipping, especially breakfast was common among younger workers. This often led to poor nutritional intake, affecting their overall health. The findings also showed a high prevalence of overweight and obesity, which was influenced by gender and linked to the low consumption of nutrient-dense foods like proteins, vitamins, and minerals. To improve the health of shift workers, it is crucial to promote regular, balanced meals, especially breakfast, increase the intake of fruits and vegetables, and encourage regular physical activity. Nutritional interventions, supported by employers, should aim to create structured eating patterns, reduce meal skipping, and promote healthier food choices, which are essential for maintaining good health and preventing diet-related chronic diseases among shift workers.

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