ASSESSMENT OF BODY MASS INDEX (BMI) AND DIETARY PATTERN OF DIABETIC PATIENTS ATTENDING STATE HOSPITAL IJAYE, ABEOKUTA OGUN, NIGERIA

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Abstract

Like many other nations, Nigeria has seen an increase in the prevalence of diabetes, which is partly attributed to growing urbanization, changing lifestyles, and altering dietary patterns. The management of diabetes requires a multifaceted approach, with nutrition playing a key role. This research aims to evaluate the body mass index and dietary pattern of diabetic patients attending state hospital Ijaye, Abeokuta, Ogun state, Nigeria. One hundred (100) diabetic patients receiving treatment at state hospital Ijaye, Abeokuta Ogun, Nigeria were selected for this study using exhaustive sampling technique. Information about their socio-demographic, and economic backgrounds was collected using a structured interviewer-administered questionnaire. Additionally, the researchers measured height and weight to evaluate their body mass index. To understand their dietary pattern, a food frequency questionnaire (FFQ) was administered. The results show that most of the participants (67%) were female, between 46-55 years (40%). In addition, 95% had formal education, practiced Christian religion (56%), and were Yoruba (90%). This study also shows that the prevalence of diabetes mellitus was higher among female (67%) adults compared to their male (33%) counterparts. The Nutritional Status of the respondents shows that 32% of the respondents had normal BMI while 25%, 38% and 5 % were overweight, obese and underweight respectively. Additionally, significant association (p<0.05) was observed between BMI and gender, age and occupation of the respondents. Intake of starchy food was high. Therefore, it is important to advice diabetic patients to improve their diets and encourage them to adopt good eating habits in order to prevent diabetes and its complications.

keywords: Diabetes Mellitus, Nutrition, Food, Nutritional Status, Dietary pattern

Introduction

Millions of individuals worldwide suffer from diabetes mellitus, a chronic disease characterized by excessive blood sugar levels that over time cause serious harm to the kidneys, eyes, blood vessels, and nerves (World Health Organization, 2021). The brain, heart, kidney, and limbs can all be damaged as a result of its problems; it is a silent killer and one of the main causes of death worldwide (Olayinka *et al.*, 2021).

The incidence of type 2 diabetes mellitus is rapidly escalating and poses a significant health challenge leading to illness and death, especially in developing countries (Kulu *et al.,* 2019). According to the International Diabetes Federation (IDF) atlas from 2021, diabetes affects 10.5% of adults aged 20 to 79, with nearly half of them being unaware of their condition. IDF has forecasted that by year 2045, about 783 million adults, or 1 in 8, will have diabetes, marking a 46% rise. The majority of individuals with diabetes reside in lower and middle income countries (WHO, 2016). In 2019, diabetes was responsible for 1.5 million deaths, and 48% of these fatalities occurred before individuals reached 70 years of age (WHO, 2023)

Currently, Africa has a population of 24 million adults grappling with diabetes. The projection indicates that this number will surge by 129% to reach 55 million by 2045 (World Health Organization, 2022). According to data from the International Diabetes Federation (2021), the prevalence of diabetes among adults in Nigeria stood at 3.7% in 2021. Research conducted by Onyenekwe *et al,* (2019), in Nigeria suggested that the prevalence of diabetes mellitus ranged from 0.8% to 11% across rural and urban populations. Simply put, nutritional status refers to a person's health state as it relates to nutrient utilization. While physical examination and accurate lab tests play a role, the true assessment relies on connecting information from medical and dietary history (Mohammed, 2019). Nutritional investigation is a critical aspect of diabetes management and self-care education with the goal of attaining and maintaining optimal metabolic outcomes (Mohammed, 2019). In 2015, the international diabetes federation day campaign emphasized healthy eating as a crucial component of controlling both Type 1 and Type 2 diabetes. It also emphasized that unhealthful dietary practices increase the risk of developing Type 2 diabetes and its associated consequences (Nwanwuba *et al.,* 2019).

In order to lower the risk of long-term complications from diabetes and heart disease and to improve the quality of life for people with the condition, the primary goal of nutrition therapy for diabetes is to improve glycemic, lipid, and blood pressure control (Worsa *et al.*, 2021).Hence, adequate knowledge of diabetes nutrition is highly crucial in

diabetic care as it empowers individuals with diabetes to make wise dietary decisions that enhance their ability to manage their metabolism and overall quality of life (Olatona *et al.,* 2019).

Dietary pattern on the other hand is defined by the habitual intake of various food combinations (Wingrove *et al.* 2022). Furthermore, certain distinct food categories and constituents of the diet, such as monounsaturated fatty acids, fruits, vegetables, whole grains, cereals, dietary fiber, fish, magnesium, and nuts, could potentially offer protection against diabetes development. This protection might stem from their ability to enhance insulin sensitivity, exert anti-inflammatory effects. Conversely, the consumption of red and processed meats along with saturated fat might elevate the risk of type 2 diabetes (Rahati *et al.,* 2014).

However, as a result of urbanization, many people have adopted stressful, unhealthy lifestyle switching from eating fresh, healthy meals to more refined carbs and high-fat junk food and beverages (Senadheera *et al.,* 2016). Furthermore, eating habits have long been a part of a person's daily routine and show significant links with factors such as age, culture, society, economy, and psychology. Meal frequency and eating hours can have a considerable impact on a number of cardiac and metabolic markers (Gouda *et al*., 2018).

Diet adherence stands as a fundamental aspect of treating diabetes, and it's linked with better outcomes. However, adherence is still a problem in both developed and developing nations worldwide. In the majority of the data currently available, socioeconomic status, disease duration, diabetes ignorance, the cost of a healthy diet, and poor communication with medical professionals are among the factors most frequently cited as the causes of poor adherence to dietary recommendations (Ayele et *al.*, 2018).

Nigeria, like many other nations, has seen a rise in the prevalence of diabetes which is partly attributed to growing urbanization, shifting lifestyles, and altering dietary practices. Nutrition is crucial to maintaining ideal glucose control and general well-being for those with diabetes. Diabetes care demands a diverse strategy. As a result, improving diabetic patients' quality of life and reducing the diabetic pandemic depends on our ability to assess their nutritional status and dietary patterns. Therefore, this study seeks to assess the body mass index and dietary pattern of diabetic patients attending State Hospital Abeokuta, Ogun State, Nigeria.

Methodology

Study Area

The research was conducted at State Hospital Ijaiye Abeokuta, situated in Ogun State. Established in 1914 in Wasimi Ake, the State Hospital Ijaiye, Abeokuta, was subsequently relocated to its current location, Sokenu, Ijaiye Abeokuta following World War 1. Over time, the hospital has undergone continuous improvements in its infrastructure, resulting in the replacement of most of the original colonial buildings. Ijaiye State Hospital in Abeokuta is a secondary healthcare center with a considerable nursing staff. Situated in the urban area of Abeokuta, the hospital functions using a three-shift system, encompassing morning, evening, and night shift. Functioning as the primary State Government-owned medical facility, the hospital offers essential primary and secondary healthcare services to the residents of Abeokuta, the capital of the state, and its surrounding areas

Population of the Study and inclusion criteria
Adults with physical disabilities were not included; only adults with diabetes diagnosed between the ages of 18 and above were chosen.

Research Design
The research design was descriptive cross-sectional in nature.

Sample size and sampling techniques
The participants in this study were individuals diagnosed with diabetes at State Hospital, Ijaiye Abeokuta. Prior to data collection, a total of 103 diabetic patients who satisfied the specified criteria were listed in the hospital records. However, 100 of them provided consent and were selected to take part in this investigation.

Collection
The data was gathered through a structured interviewer-administered questionnaire. The questionnaire was divided into three parts: Section A covered the social and economic details of the participants, Section B included anthropometry measurement, and Section C evaluated dietary patterns of the respondents using a food frequency questionnaire (FFQ). This was segmented into nine sections; cereal-based foods, roots and tubers, milk and milk products, meat and meat products, legumes, nuts and seeds, fruits and vegetables, leafy vegetables, sweets and lastly beverages. The respondents were given the options of selecting how often they consume a particular food whether daily, 1-3/4-6 times in a week, seasonal, rarely and if they never consume a particular food.

To measure weight, a digital electronic weighing scale was used, calibrated to the nearest 0.1 kg. Height was measured using a stadiometer calibrated to the nearest 0.1 cm. The body mass index (BMI) was computed using the

formula: BMI = $weight \ (kg) / height$(m²). Following this, participants were categorized based on the classification established by the World Health Organization.

The dietary pattern of the respondents was obtained using a food frequency questionnaire (FFQ) that was structured into nine sections to cover all the food groups, and how frequently they consume the food under each food group was assessed using daily, 1-3 times per week, 4-6 times per week, never, seasonal and rarely.

Statistical Analysis

The data collected from the research underwent analysis through descriptive and inferential statistical methods using the Statistical Packages for Social Sciences (SPSS) version 20.0. Descriptive statistics, including measures like mean, standard deviation, and percentage, were applied. Meanwhile, inferential statistics such as Chi-square were utilized to determine the association between categorical variables, and analysis of variance (ANOVA) was used to identify difference in mean values

Results

Socio-demographic and economic characteristics of the respondents

The socio demographic details of the respondents are displayed in Table 1. A significant portion (67%) of the participants were women aged between 46 and 55 years. They identified as Yoruba (90%) and followed the Christian faith (56%). The majority of the respondents (75.0%) were in a marital relationship. Looking at the educational background, the data indicates that a large proportion (89%) had received formal education. A considerable percentage (46.0%) of both male and female respondents were engaged in self-employment, with an approximate monthly earning ranging from ₦30,000 to ₦60,000. Virtually all (97.0%) of the respondents were diagnosed with Type 2 Diabetes

Table 1: Socio-Demographic and Economic Characteristics of the Respondents

	Categorization	Frequency	Percentage(%)
Age (years)	18-35	4	4.0
	36-45	16	16.0
	46-55	40	40.0
	56-65	27	27.0
	66 & Above	13	13.0
Gender	Male	33	33.0
	Female	67	67.0
Marital Status	Single	5	5.0
	Married	75	75.0
	Divorced	6	6.0
	Widowed	13	13.0
	Missing Response	1	1.0
Religion	Christianity	56	56.0
	Islam	42	42.0
Ethnic	Yoruba	90	90.0
	Igbo	**7**	7.0
	Missing Response	3	3.0
Educational Level	Primary	13	13.0
	Secondary	18	18.0
	ND/NCE	37	37.0
	HND/BSc	21	21.0
	No Formal Education	5	5.0
Occupation	Civil Servant	35	35.0
	Trader	46	46.0
	Retiree	14	14.0
	Student	2	2.0

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3rd – 7th September, 2023. University Auditorium, Takoradi Technical University, Takoradi

	Painter	1	1.0
	Missing Response	2	2.0
Estimated Monthly Income (₦)	Less than 30,000	3	3.0
	31,000 - 60,000	62	62.0
	61,000 - 90,000	2	2.0
	91,000 - 120,000	2	2.0
	121,000 & Above	22	22.0
	No responses	9	9.0
Duration of Disease (years)	< 5	92	92.0
	6 – 15	4	4.0
	16 – 25	1	1.0
	More than 35	1	1.0
Type of Diabetes Mellitus	Type 1	1	1.0
	Type 2	97	97.0

3.1.2 Average Weight, Height, and Body Mass Index (BMI) of the Respondents

Table 2 displays the average measurements of weight, height, and BMI of the study participants categorized by their gender. The data reveals that male respondents had an average weight, height, and BMI, of 71.82 ± 12.69kg, 1.68 ± 0.05m, and 25.20 ± 4.40kg/m^2 respectively. Conversely, female participants displayed average values of 74.77 ± 19.30 for weight, 1.60 ± 0.07 for height, and 29.06 ± 6.90 for BMI. The analysis indicated that no statistically significant difference ($p > 0.05$) in mean height and gender. However, a significant difference ($p < 0.05$) was observed in mean weight of the respondents based on their gender, as well as in the body mass index based on the gender of the respondents.
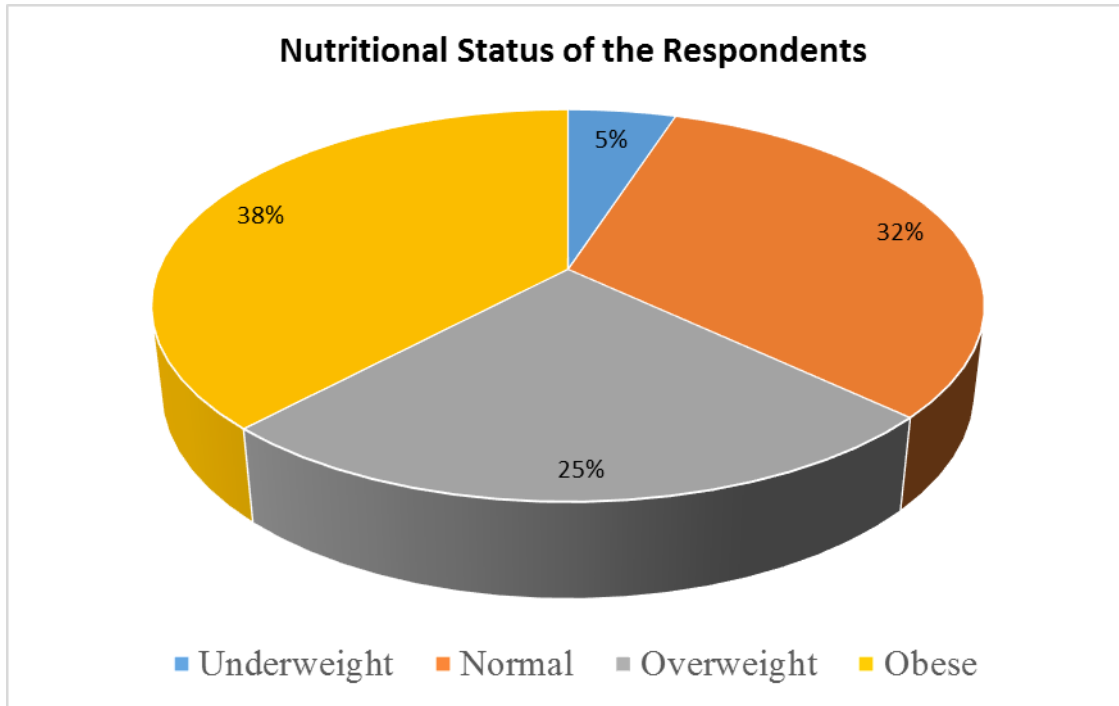
Table 2. The average Weight, Height, and BMI of the respondents

Gender	Weight (kg)	Height (m)	Body Mass Index (kg/m²)
Male	71.82 ± 12.69	1.68 ± 0.05	25.20 ± 4.40
Minimum	45.50	1.58	16.00
Maximum	101.60	1.76	38.20
Range	56.10	0.18	22.20
Female	74.77 ± 19.30	1.60 ± 0.07	29.06 ± 6.90
Minimum	34.50	1.45	15.30
Maximum	130.50	1.84	45.00
Range	96.00	0.39	29.70
f	3.58	0.71	0.02
p-value	0.00*	0.51	0.02*

Significant difference at p < 0.05

Nutritional status of the respondents

The nutritional status of the respondents is shown in Figure 1. The data indicates that 38% of the participants were classified as obese, 32% had a healthy body weight, 25% were categorized as overweight, and 5% were underweight (with BMI less than 18.5kg/m^2).

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3.1.4 Food consumption pattern of the respondents

This study also assessed the dietary pattern of the respondents using a food frequency questionnaire

Figure 1-9, shows the percentage distribution of consumption pattern of the different food groups by the respondents. Figure 1 shows the percentage distribution of the frequency of consumption of cereal-based food among the respondents. Pap (ogi) has the highest daily consumption with 23.0%. Bread has the highest (63.0%) percentage of consumption between one to three times a week; more than half (57%) of the respondents didn't consume Quaker oats, while boiled maize has the highest seasonal consumption rate with 55.0% and cake having the highest (34.0%) percentage of food rarely consumed. Figure 2 shows the consumption pattern of roots and tubers foods, Amala-Isu is mostly (11%) consumed on daily basis by the respondents, while Boiled yam and Amala-lafun with both 43% are mostly consumed one to three times a week, sweet potato was seasonally (34%) consumed by the respondents. In figure 3, evaporated milk was mostly consumed on a daily basis and ice cream, cheese and butter were rarely consumed by the respondents. Figure 4 shows the frequency consumption of meat and fish products, and majority (29%) of the respondents consumed fish on a daily basis while beef was consumed one to three times a week, and chicken is consumed on a seasonal basis. In figure 5, palm oil is mostly consumed on a daily basis, while boiled groundnut was seasonally consumed. In figure 6, watermelon is mostly (23%) consumed on a daily basis while orange, plantain and carrot have the highest consumption one to three times a week. Figure 7 shows that more than half of the respondents (62%) consumed Ewedu 1-3 times in a week and a higher proportion of the respondents never consume spinach. Figure 8 shows the respondents consumption pattern of sweets, 11% consumed sugar/honey on a daily basis while candies (sweets) were never consumed by the respondents. In figure 9, majority (13%) consumed carbonated drinks on a daily basis while more than half of the (58%) respondents never consumed alcohol.
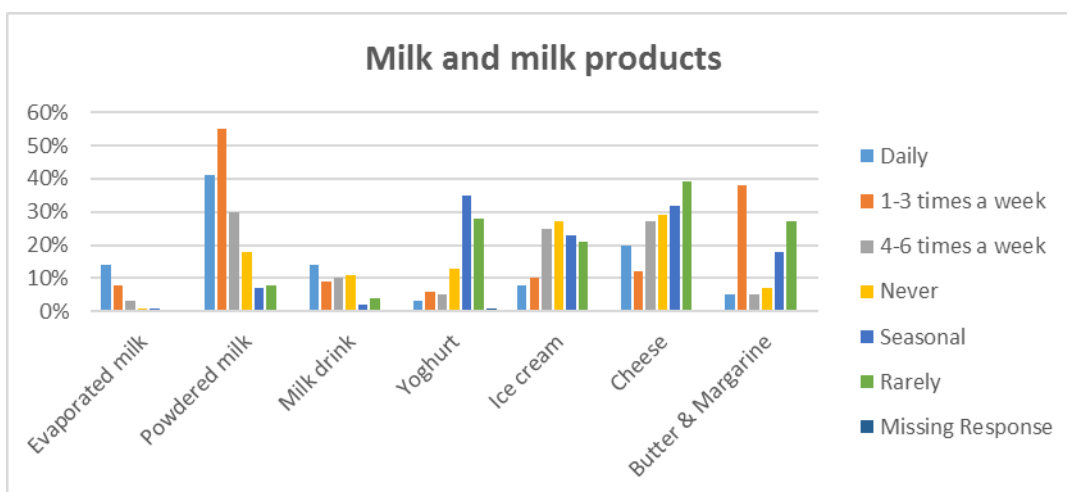
Figure 1: Consumption Pattern of Cereal-based foods

Adedoyin Adebiyi
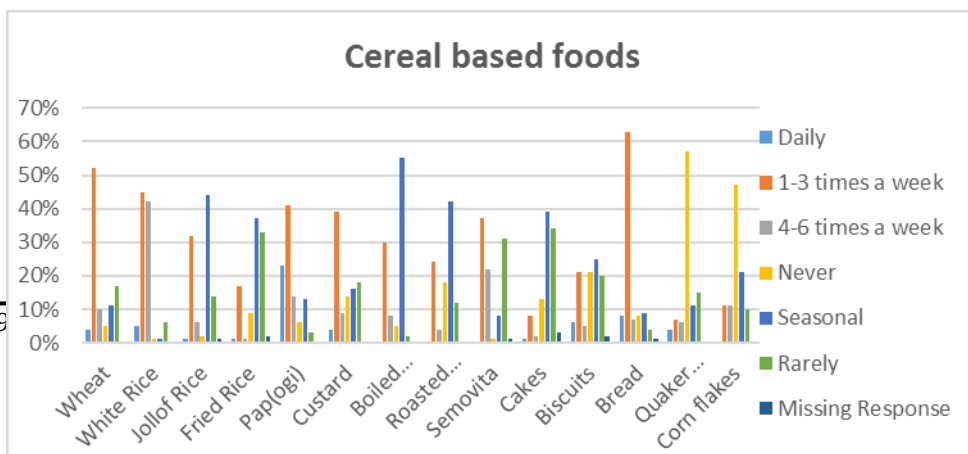
Figure 2: Consumption Pattern of Roots and Tubers
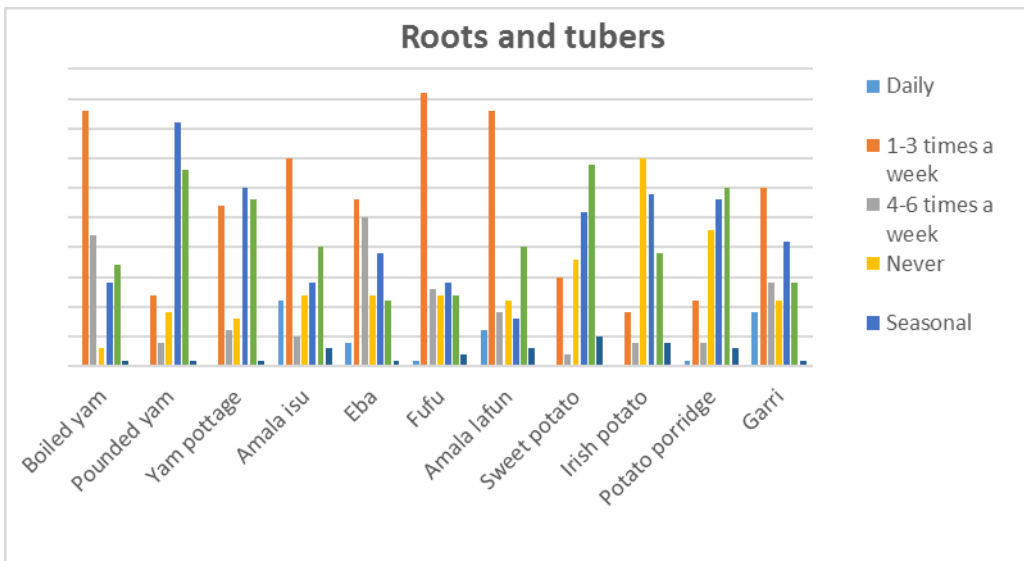
Figure 3: Consumption Pattern of Milk and milk products

Figure 4: Consumption Pattern of Meat and meat products

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3rd – 7th September, 2023. University Auditorium, Takoradi Technical University, Takoradi

Figure 5: Consumption Pattern of Legumes, nuts and seeds
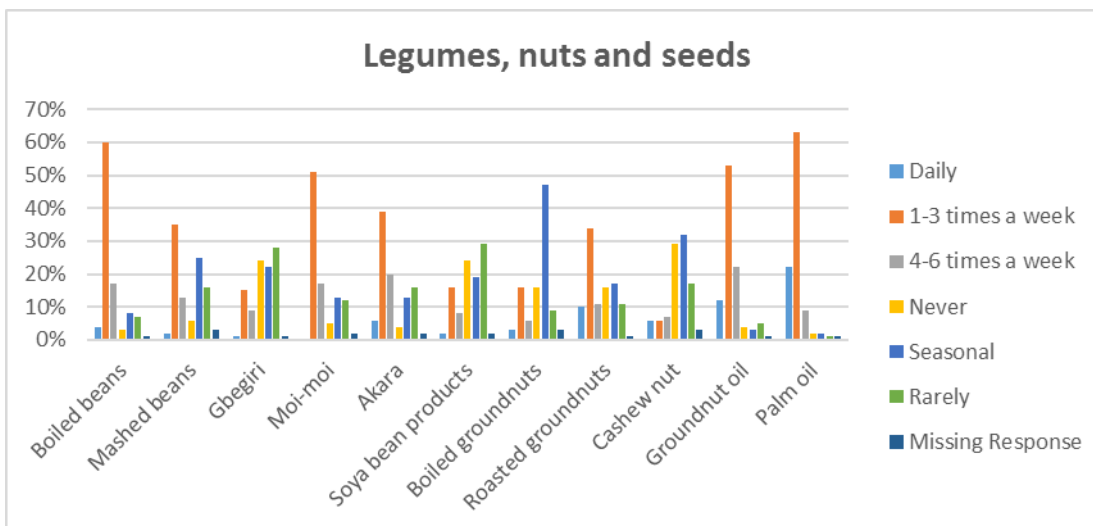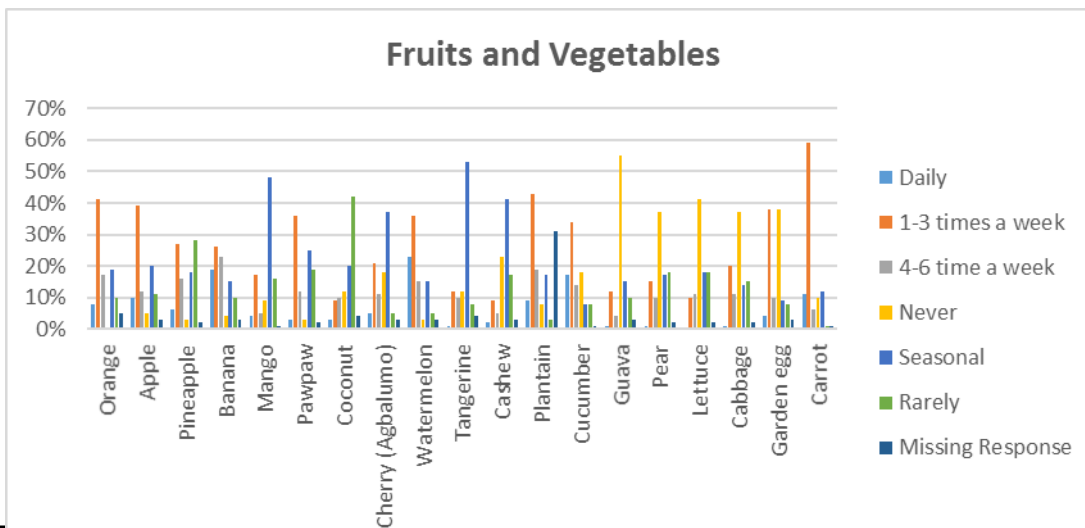

Figure 6: Consumption Pattern of Fruits and Vegetables

Emmanuel Gabriel & Raheemat Adeboyin Adebiyi

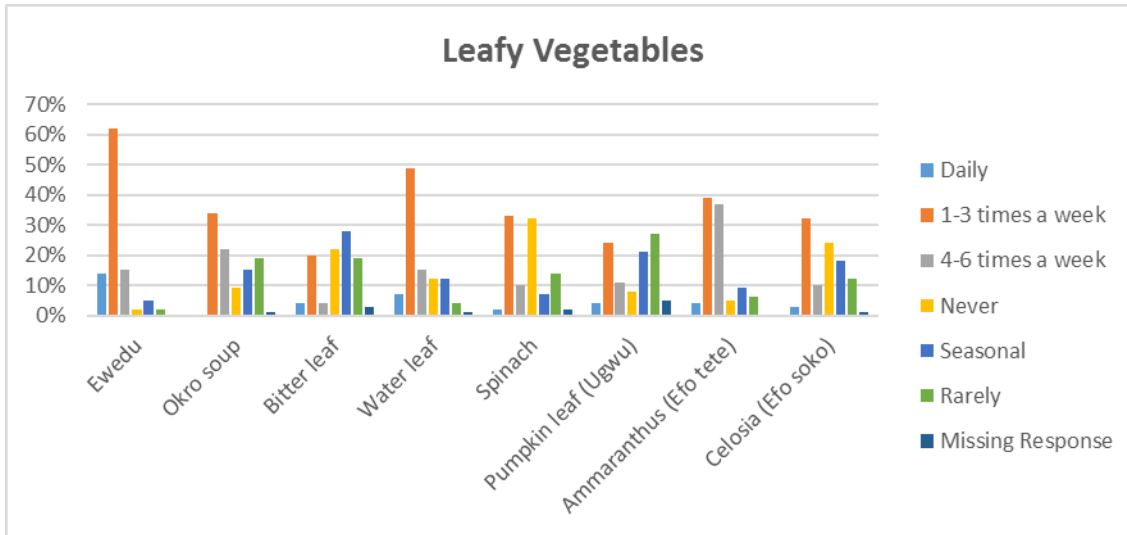**Figure 7: Consumption Pattern of Leafy vegetables**
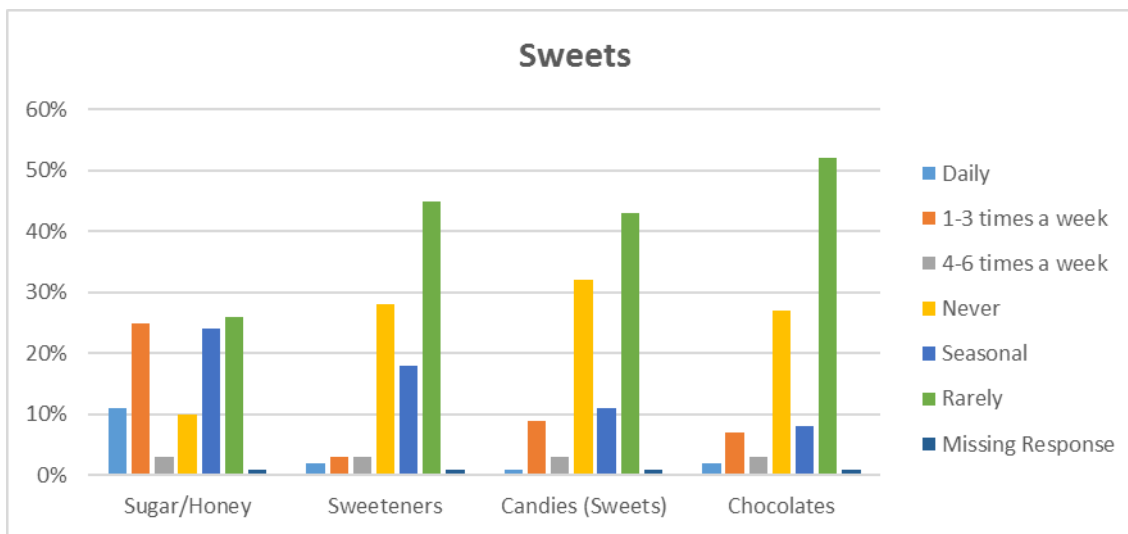

Figure 8: Consumption Pattern of Sweets

Figure 9: Consumption Pattern of Beverages

Association between the socio-economic characteristics and body mass index of the respondents
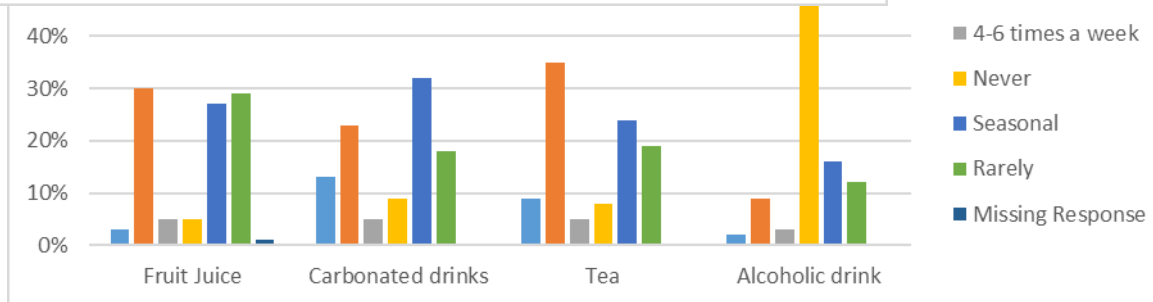

Table below shows the Association between the socio- demographic and economic characteristics and the body mass index of the respondents. No significant (p >0.05) association was observed between BMI and most of the socio-

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3rd – 7th September, 2023. University Auditorium, Takoradi Technical University, Takoradi

economic features of the respondents. However, a significant association ($p < 0.05$) was observed between body mass index and gender, age and occupation of the respondents.

Socio-demographic and economic characteristics	Body Mass Index		
	χ^2	df	p-value
Gender	12.70	3	0.01*
Age (years)	28.29	12	0.01*
Marital status	10.80	12	0.54
Religion	6.05	6	0.41
Ethnic group	9.45	6	0.15
Educational level	12.34	15	0.65
Occupation	28.46	15	0.01*
Nature of work	11.28	9	0.25
Estimated monthly income	14.25	15	0.50

Significantly associated at p < 0.05*

Discussion

This study was on body mass index and dietary pattern of diabetic patients attending Ijaye state hospital. The result of socio-economic characteristics revealed that majority (67%) of the respondents in the study were female and belonged to Yoruba ethnic group (90%). It is not surprising because the study was carried out in the south-western part of Nigeria where the common ethnic group is Yoruba. Furthermore, 75% of the respondents were married. Daely *et al.* (2021) expounds the link between age and one's marital status. Since the research was carried out amongst adults, this could be a determining factor to the high percentage of married people. Few (5%) of the respondents had no formal education this implies that 95% of both male and female respondents had formal education and it is in consonance with the findings of several studies (Bakr, 2015; Kulu et al., 2019). Majority (46%) of the respondents engaged in petty trading leading to a high rate of semi-sedentary lifestyle.

This study also revealed that the prevalence of diabetes mellitus was higher among female adults within the age range of 46-55 years. Mohammed (2019) had a similar finding in a study conducted in Sudan where most of the respondents with diabetes mellitus were female. In another study, Olatona *et al.* (2019) reported high prevalence of diabetes among female than their male counterpart. According to the International Diabetes Federation (2019), majority of type 2 diabetes cases are seen in older adults. This might be explained by the increased age-related glucose intolerance. The sensitivity of cells to insulin decreases with age and this insensitivity may result from the physical inactivity brought on by growing older. The result shows that 97% of respondents had type 2 diabetes which corroborates the report of WHO (2023) that more than 95% of diabetic patients have type 2 diabetes.

From the study, high prevalence of malnutrition - obesity and overweight- was discovered among more than half of the respondents; 5% of them were underweight, 25% were overweight and 38% of them were obese this finding which is similar to that of Olatona *et al.*, (2019) where the prevalence of obesity was found in almost half of the participants. Given that diabetes has been associated with being overweight or obese, this may help to explain its incidence. One of the risk factors for type 2 diabetes is obesity. It is brought on by poor eating habits and insufficient exercise. It's noteworthy that 1 in 3 persons worldwide are overweight, and 1 in 10 are obese (Wahome & Kiboi, 2016).

Furthermore, the present study revealed a moderate intake of fruits and vegetables that translates to a fair dietary pattern which is in agreement with a study conducted in Sri Lanka (Senadheera *et al.,* 2016). This may be as a result of the economic status of the respondents as more than half (62%) received less than ₦60,000 per month. Many (34%) of the respondents consumed Fish 4-6 times a week. According to Pérez-Jiménez et al. (2001), fish oil and fish have been shown to be particularly helpful in lowering the chance of developing diabetes. Groundnut oil was the next most popular oil consumed everyday (22%) after palm oil. This study is fairly comparable to one done in Abia, Nigeria, where palm oil was shown to be the most widely used cooking oil (Ukegbu *et al.,* 2013). When compared to other low-saturated-fat vegetable oils and trans-fat-containing oils, palm oil consumption increases both high density lipoprotein cholesterol and low density lipoprotein cholesterol in people.

In Addition, there was a moderate consumption of green leafy vegetables among the respondents. However, despite the moderate intake of leafy vegetables, from this study it was discovered that the major cereal-based food consumed 4-6 times a week by almost half of the respondents happens to be white rice leading with about 42%. Hu *et al.* (2012) revealed that eating white rice on frequently may increase the risk for type 2 diabetes as it primarily consists of starch.

The data regarding the consumption of beverages from this study revealed that about 30% of the respondents consumed fruit juice 1-3 times a week. Furthermore, more than half (58%) of the respondents never consumed Alcohol. This finding is similar to a study conducted by Olatona *et al*, (2019) at Teaching Hospital Lagos, Nigeria which reported that 76% alcohol consumption among the respondents. This is commendable because alcohol consumption has been identified as a barrier to self-care adherence and also affects the course of diabetes (Ahmad *et al.,* 2008).

Conclusion and recommendations

As indicated by the Body Mass Index (BMI) of the respondents, majority of respondents had normal body weight (38%). However, high prevalence of overweight (25%) and obesity (32%) was found in this study. There was moderate intake of fruits and vegetables, although Intake of starchy foods were high. Diabetic patients need proper nutrition counseling on the impact of a healthy diet on quality of life and disease management. Intervention studies should be conducted on the impact of Dietary intake on the nutritional status of diabetic patient.

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