Dietary Behavioural Patterns of Urban Women Dwellers and Health Risk of Obesity (A Case Study of Freetown Municipality)

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Abstract: *This study was conducted to determine the dietary behavioural patterns of urban women dwellers and health risk of obesity. Data collected from 300 respondents through well-structured and pre-tested questionnaire.Statistical package for social science (SPSS) software and simple descriptive statistics involving mean, mode, percentages and Chi square used and results presented in tables and charts. Result of the analysis showed that thirty percent (30%) of the respondents were victims of obesity and were between the age brackets 15-47 years (Figure 6). A Chi Square hypothesis used and confirmed that overweight and obesity is associated with socio demographic characteristics, regular food meal consumption frequency and low physical activity levels are the three main modifiable factors for being overweight and obese. (Table 3). Majority (70%) of the respondents occupied themselves in sedentary activities and only 30% engaged in physical activities. [Jogging, aerobics, cardiovascular, and cycling] (Figure3). The prevalence of overweight and obesity within this population was relatively high (65%) thus the respondents experienced breathlessness, and 35% experienced sleep apnea(Figure5). Other symptoms include knee pain (43%), back pain (37%) and heel pain (20%). (Figure 4). Conclusively there are increased comorbidities associated with a higher BMI, reduced productivity, premature mortality, increased medical cost and effect on the economy.*

Keywords: Body mass index, Dietary behavioral pattern, Obesity

1. Introduction

Globally, nearly one billion people are classified as overweight, and 300 million of which are clinically obese (WHO, 2002).

The Sierra Leone Demographic and Health Survey of 2013, revealed that the national prevalence rate of overweight is 18.4% and obesity is 7.5 % for women age 15- 49years (SL-DHS, 2013).In 2016, female obesity prevalence for Sierra Leone was 13.3%. Between 1997 and 2016, female obesity prevalence of Sierra Leone grew substantially from 6.2 to 13.3 % rising at an increasing annual rate that reached a maximum of 5.19% in 2003 and then decreased to 3.91% in 2016(World Data Atlas Sierra Leone Health,2016)

The proportion of obese women is higher in urban areas than in the rural areas, with Freetown having the highest prevalence. According to Sierra Leone medical experts, Sierra Leoneans today are consuming fattier and sweeter diet than ever before, and they rely on using personal and public vehicles to move even the shortest distance other than walking on foot. In urban areas, conveniences such as lifts and escalators have become a standard feature in all shopping malls making it unnecessary to walk up and down the stairs (Knoema.com, 2017, Martorell, R, 2000)

The current obesity pandemic is as a result of the sharp changes that have taken place in the society over the last 20-30 years which have created an environment that promotes a sedentary lifestyle and the consumption of high fat, energy dense diet (Popkin, 2006) and (WHO, 2003).

Worldwide, more than 60% of adults do not engage in sufficient physical activities that are beneficial to their health. Lack of physical activity in leisure time, and spending increasing amount of time on sedentary behaviors such as television viewing, computer use, and excessive use of "passive" modes of transport (cars, buses and motorcycles) has also contributed (albeit partly) to problem of overweight and obesity (WHO, 2003, Emily Banks et al,2011).

Urbanization has accelerated the spread of rapid motorization with developed road networks and highly concentrated residential dwellings with little open spaces for people to engage in physical activity (Zhang, X et al, 2008

Overweight and obesity are defined as abnormal or excessive fat accumulation that presents a risk to health. A crude population measure of obesity is the body mass index (BMI), a person's weight (in kilograms) divided by the square of his or her height (in metres). A person with a BMI of 30 or more is generally considered obese. A person with a BMI equal to or more than 25 is considered overweight. Overweight and obesity are major risk factors for a number of chronic diseases, including diabetes, cardiovascular diseases and cancer. Once considered a problem only in high income countries, overweight and obesity are now dramatically on the rise in low- and middle-income

countries, particularly in urban settings. (World Data Atlas Sierra Leone Health, 2016)

Obesity, recognized as a disease for more than 60 years, is now of such epidemic proportions that its impact threatens the capacity of health services even in the richest Countries. Obesity accounts for 2-6% of total health care costs in several developed countries; some estimates put the figure as high as 7%. The true costs are undoubtedly much greater as not all obesity-related conditions are included in the calculations (WHO, 2004).

The costs of obesity and obesity-related disease are increasing. The estimated figures for the cost of high BMI to health services is US$ 990 billion per year, over 13% of all healthcare expenditure. (WHO, 2019) Obesity also results in a number of indirect costs such as impaired productivity, lost life years, and reduced quality of life. The combined direct and indirect healthcare costs are estimated at currently approximately 3.3% of total GDP in OECD countries a figure which is expected to grow, impairing economic growth and straining national healthcare budgets. (WHO, 2019)

Although indirect costs to society can be substantially higher, they are often neglected. They relate to income lost from decreased productivity, reduced opportunities and restricted activities, illness, absenteeism and premature death (Claire Pearce et al, 2019).

In addition, there are high costs associated with the numerous infrastructure changes that societies must make to cope with obese people i.e. reinforced beds, operating tables and wheel chairs; enlarged seats in sports-grounds, and modifications to transport safety standards (Claire Pearce et al, 2019). Excess weight gain is ranked the third greatest risk factor after smoking and high blood pressure for all premature deaths and disabilities in the affluent world (America Medical Association, 2018). Yet the situation is even worse in poorer countries; widespread fetal and childhood malnutrition increases the impact of even modest weight gain on the development of diabetes and other chronic diseases.

Poorer nations have 4-5 times more adults with overweight-induced illness than the Western world. The result is catastrophic medical costs for hundreds of millions. The epidemic of obesity in children is affecting every continent. The resulting social handicaps, inferior academic and employment prospects, and early medical complications are increasingly evident (Trishnee Bhurosy and Rajesh Jeewon, 2014)

Obesity leads to adverse metabolic effects on blood pressure, cholesterol, triglycerides and insulin resistance. The non-fatal, but debilitating health problems associated with obesity include respiratory difficulties, chronic musculoskeletal problems, skin problems and infertility (WHO, 2003, Tiffany M. Powel et al, 2014).

Overweight and obesity in developing countries has been neglected as most attention is concentrated on famine and under nutrition or malnutrition of children (Popkin, 2006; WHO, 2000). If preventive measures are not put in place, the problem may escalate and overburden the health care system in these areas. Hence there is need to put measures in place to arrest the causes and effect of Obesity and prevent the negative consequences.

The objective of the study is to find out the prevalence and associated factors of obesity among women age 15-49 years and generate data on the dietary behavioral patterns and activities of dwellers of Freetown municipality

2. Materials and Methods

Research Design
The research design for this study was a descriptive survey type, designed to investigate the dietary behavioral patterns of urban dweller and risk for obesity by observing existing consequences and searching back through data for plausible causal factors.

The study used mainly a quantitative research approach, but there were some elements of qualitative approaches that were mainly intending at authenticating quantitative data. (Creswell, 2014). Causal-comparative design was chosen to investigate prevalence, causes and implications of overweight and obesity for women's health.

Study Area
The study was conducted in Western Area urban district. This district was chosen because it hosts the country's capital Freetown .Freetown is the most suitable place for the study because it sought to have good representation of urban life styles which normally leads to overweight and obesity. This study was conducted in various hospitals in Freetown. There are major hospitals in Freetown such as the Connaught hospital, Prince Christian Maternity Hospital (PCMH), Emergency Hospital etc. and other community health centers and MCHP's in the city.

Map Showing Freetown Municipality

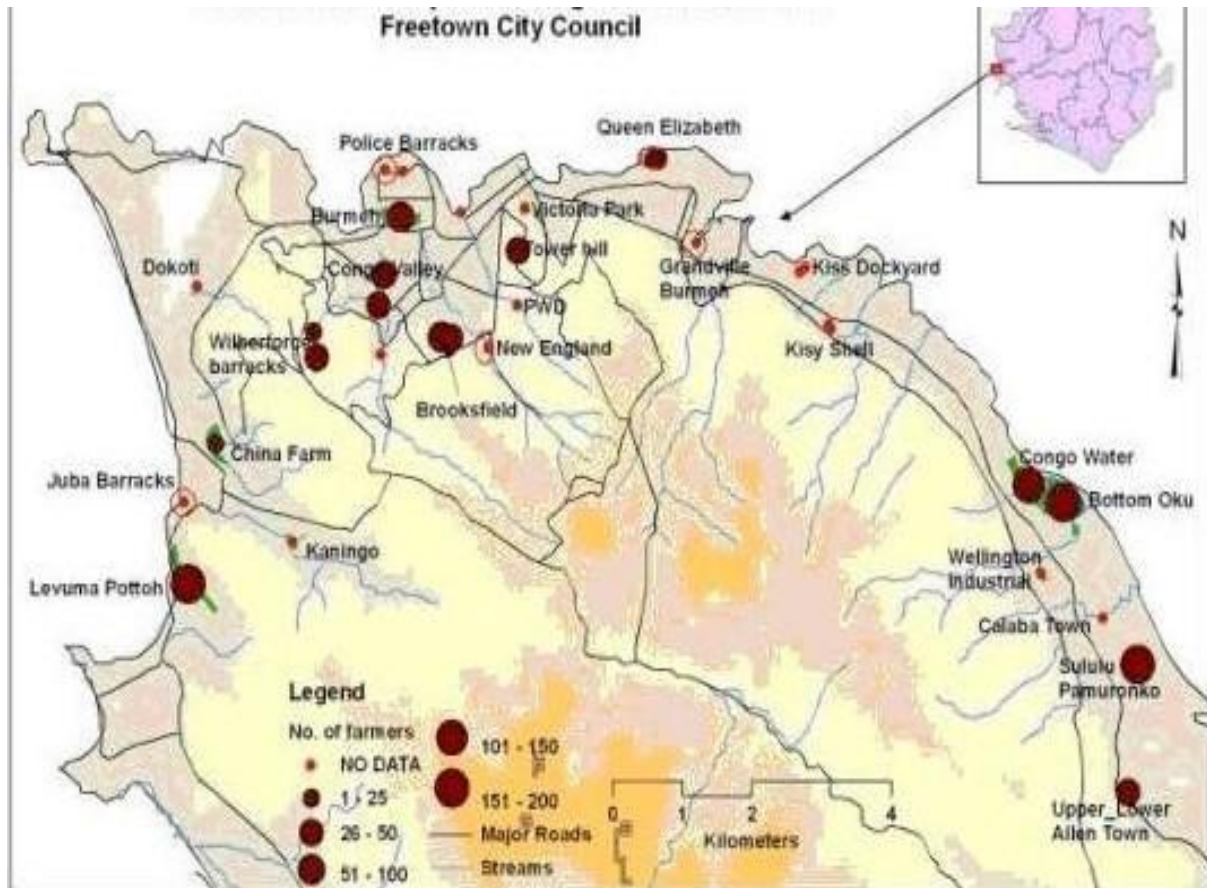**Figure 1:** Source: Field data, 2018

Target Population
The target population for this study included women ages 15-49 attending various Hospitals across Freetown and its environs. Freetown comprised of other various communities like Goderich, Lumley, Aberdeen, Congo Town, Brookfield's etc. in the West, Leicester Road community, Mountain Court, Magazine Court, Bombay etc. in the Central and Fourah Bay, Kissy, Wellington, calaba Town etc. all in the East of Freetown. The target population for the study was drawn randomly from the East, Central and West end of Freetown that seeks health attention in various hospitals.

Sample Size
The sample size for this study comprised of 300 women (between the ages of 15-49 years) 100each from the West, Central and East seeking health care attention from the various hospitals and the other category involved 12 Nurses, two from each of the six hospitals. The sample size was considered realistic for quantitative and qualitative research approaches as the study employed both.

Simple Random Sampling Technic
Women, and Nurses involved in the study were selected randomly. All individuals were chosen in such a way that each had an equal and independent chance of being selected (Terence Shin, 2020). A lottery method of random sampling was used in the selection of participants from each section. Slips of similar pieces of papers with number equal to the total number of women, and Nurses needed for the study were made. The papers were rolled, mixed thoroughly and displayed on table where every participant picked one of the slips blindly. Once the piece of paper was picked it was not replaced (Terence Shin, 2020).

Each participant that picked a piece of paper with number considered herself selected for participation in the study. For ensuring equal representation of participants from sections, pieces of papers for communities and women were displayed separately.

Data Collection Methods
In order to determine prevalence of overweight and obesity, data was collected by measuring women's weights and heights to determine Body Mass Index (BMI) and measurement of waist circumference. Causes and implications of overweight as well as obesity among women were studied by using questionnaires.

Overall the study employed three data collection methods: (1) women's questionnaires, (2) measurement of BMI; and (3) measurement of Waist Circumference.

Before starting the actual data collection women's consent were asked to participate in the study. Ethical measures for protection of participants and confidentiality was observed.

Anthropometric Measurement
The anthropometric data consisted of measurements made on the subjects and indicators derived from such measurements. Anthropometric measurements were obtained; viz.: (1) weight, (2) height (3) waist circumference. Derived values were obtained from these measurements. All the measurements were all taken by the

researcher who took duplicate measurements of each parameter.

Analysis of measurements
Weight and height measurements were subjected to calculations of BMI so as to determine their implication to the participant's weight status. The following formula was used in BMI calculation: BMI = weight in kg/height in m^2. Results were used to classify weight status as "underweight, normal weight, overweight, obesity level 1, obesity level 2 or obesity level 3".

Weight measurement
A balance beam scale, HealthoMeter (model 2311233, HealthoMeter Inc., Bridgeview, Illinois) was used. Prior to weighing any participant, the large and the small weight knobs were adjusted to zero and the bubble level indicator centered. In addition and as a quality control procedure, two bricks, each weighing 10 kilograms, were weighed once every morning before weighing any participant to ensure accuracy of the weighing scale. It was calibrated to one tenth of a kilogram. (Meredith Yorkin et al, 2013)

Each participant was requested to remove all clothing and shoes and just retain the minimal underclothes. Thereafter was asked to step in the Centre of the horizontal platform and look straight ahead, standing relaxed, but still. The small weight knob was adjusted until the bubble was centered. As long as the bubble moved equally across the reference marks, it eventually came to rest between the marks. The first reading was recorded. The same method was done for all participants.

Height Measurement.
Standing height was measured using the measuring device HealthoMeter (model 2311233, HealthoMeter Inc., Bridgeview, Illinois). The respondent was asked to stand on the horizontal platform without shoes and stockings, hold the arms loosely at the sides with the palms facing the thighs; the head was not necessarily in contact with the vertical surface, and was encouraged to stretch upwards to the fullest such that the Frankfurt plane is horizontal, feet together, knees straight, and heels, buttocks, and shoulder blades in contact with the vertical surface of the stadiometer. The horizontal bar was lowered until it touched the crown of the head. The height measurement was taken at maximum inspiration. Height was recorded to the nearest millimeter. The lower reading was recorded when the reading fall between two values.

As in weight measurements, height measurements was taken in the morning after a 12-hour fast. In cases where large amounts of adipose tissue prevented the heels, buttocks, and shoulders from simultaneously touching the wall, subjects were simply asked to stand erect. The subject was then asked to step down and stand again for the second reading (Scott Frothingham, 2019).

Waist circumference
A non-stretchable tape measure was used for taking the waist circumference. The respondents were asked to stand erect with the abdomen relaxed, arms at the sides, feet together and with their weight equally divided over both legs. The right lowest rib margin was first located and marked with a felt tip pen. The iliac crest was palpated in the mid-axillary line, and marked. An elastic tape was then applied horizontally midway between the lowest rib margin and the iliac crest, and tied firmly so that it stays in position around the abdomen about the level of the umbilicus (Wen Ye et al, 2013). The respondents were asked to breathe normally, and to breathe out gently at the time of the measurement to prevent muscles contraction or from holding their breath. The reading was taken to the nearest millimeter.

The circumference of the waist relates closely to body mass index and is also the dominant measurement in the waist: hip ratio (WHR), which reflects the proportion of body fat located intra-abdominally, as opposed to subcutaneously (Nutr.J. 2013), and waist circumference is the best indicator of changes in intra-abdominal fat during weight loss. Waist circumference as a predictor of health risk from overweight and measurement was made using Lean and associates, (1995) technique to determine action levels for weight reduction in women.

Data Analysis: Data was analysed using the Statistical Package for Social Sciences (SPSS) software. The descriptive statistics used for Tables and charts were frequency distributions and percentages. Also variables that were both categorical (underweight, normal weight) and numerical were taken into account. In addition, Chi-square (X^2) test of hypothesis was used and the data analysed by the equation given below.

$$\chi_c^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

Research Hypothesis
H_O: Overweight and obesity have no significant relationship with women's lifestyles.
H_1: Overweight and obesity is associated with socio demographic characteristics, regular food meal consumption frequency and low physical activity levels.

One-Way Analysis of Variance (ANOVA)
One Way Analysis of Variance was used to determine the statistical significant effect of
Independent variables (physical activities, type of food consumed, income, age, level of education, occupation etc)

3. Result and Discussion

There was a significant association with respect to age and obesity. Majority (30%) of the respondents who were victims of obesity were between the age bracket 31-35 years, followed by the age bracket 15-20 years which account for 20%.

Ageing is a contributing factor of obesity, the metabolic abnormalities, characteristic of the metabolic syndrome are known to worsen with age. Genetic predisposition can affect the severity of the risk factors (Amany Mohamed Sheb et al, 2015).

This study further shows a significant relationship between the BMI of the respondents and their age. BMI gradually increases from youthful age and starts to decrease as one approaches old age. (Figure 2).

A comparison of mean waist circumference by age groups revealed in this study showed a significant difference among these groups, the mean waist circumference increases with age as does BMI. Among the total female respondents assessed, when categorized according to BMI a total of 28.1% were normal that is, neither overweight nor obese and 34.2% were overweight and the remaining 37.7% were obese. (Table1)

These findings collaborate with other findings that show a close correlation between WC, WHR and BMI (Geum Joon Cho, 2018).

Majority of respondents were found to engage in physical activity below the WHO recommendations. WHO recommendations stipulates that throughout the week, including activity for work, during transport and leisure time, adults should do at least 150 minutes of moderate intensity physical activity or 75 minutes of vigorous-intensity physical activity (WHO, 2006) .In this study, less physical activity was reported hence overweight and obesity were experienced. Majority (70%) of the respondents do not engaged in rigorous physical activities rather they walk and occupied themselves in sedentary activities. Only 30% engaged in physical activities such as jogging, aerobics, cardiovascular, and cycling respectively.

From the findings of the study, it was further revealed that majorities (65%) experienced breathlessness and the remaining (35%) were experiencing sleep apnea.(figure 5). These two health related problems shows that the respondents suffered from obesity. Other symptoms or evidence of obesity were knee pain (43%), back pain (37%) and heel pain (20%) (Figure 4.). This is related with a study carried out by St-Onge, M. P., and Gallagher, D. (2010)., which revealed that the full designation of the obesity-hypoventilation or Pickwickian syndrome includes somnolence, lethargy, and respiratory acidosis, and typically includes sleep apnea as part of the picture.

A Chi Square test was employed to investigate dietary behavioural patterns of urban women dwellers and health risk of obesity in Freetown municipality, and it was ascertained from the result that 30% of the respondents who were victims of obesity were between the age brackets 15-47 years (Figure 6). Therefore Chi square (X^2) calculated was obtained as **2.0986** (Table 3) which is less than Chi Square Tabulated (X^2) [11.070], therefore the null hypothesis (H_O) which states that overweight and obesity have no significant relationship with women's lifestyles was rejected and the alternative hypothesis **(H_1)** which states that : Overweight and obesity is associated with socio demographic characteristics, regular food meal consumption frequency and low physical activity levels was accepted

4. Conclusions

1) Socio-economic factors, physical activity levels, food and meal frequencies are the three main factors for being overweight and obese among patients seeking healthcare in Freetown.
2) There is a high prevalence of overweight and obesity among women (age 15 and 45) patients seeking health care at Connaught hospital and PCMH, whether measured by BMI, WC or WHR.
3) Socio-demographic factors have a relationship with overweight and obesity among patients seeking healthcare at Connaught and PCMH hospitals. Age and sex are predictive factors for being overweight and obese among patients seeking healthcare in Freetown.
4) There is a relationship between meal and food consumption frequency as well as physical activity with regard to overweight and obesity among patients seeking healthcare in Freetown hospitals
5) Among the overweight and obese patients seeking healthcare at Connaught and PCMH hospitals, there is skipping of meals with many taking either two meals in a day or only one meal regularly. In this regard the Physical activity levels are below the WHO recommendations among patients seeking healthcare at hospitals in Freetown.
6) Obesity is undoubtedly a major healthcare challenge, with its associated comorbidities and impact on female reproductive health.
7) There are increased comorbidities associated with a higher BMI which also have an effect on the economy. These diseases are associated with reduced productivity, premature mortality and increased medical costs.

5. Recommendations

From the findings of the study, the following were recommended
1) The high rates of overweight and obesity among patients could be controlled by adequate physical activities such as jogging, cycling, aerobics, and spend less time in sedentary activities like siting for long hours in office, watching of movies, and football games. Adequate physical activities have shown to have many health promoting properties and has a direct, independent role in reducing CVDs mortality.
2) Campaign on nutrition education should be carried out by health professionals with regards to adequate meal consumption patterns, such as non-consumption of high fatty and oily food, less consumption of red meat and carbohydrate. Over the years, the diets of populations have been changing towards diets that favor weight gain as traditional diets are gradually replaced with modern diets.
3) People should be educated on eating hours especially supper meal. Consumption of late evening meals with carbohydrate-rich foods may also be related to obesity through its effect on hormonal regulation of energy and lipid metabolism
4) Patients seeking healthcare at Connaught and PCMH need awareness and sensitization on the benefits of both planned and unplanned, physical activities as dietary factors and physical activity patterns strongly influence

the energy balance equation and they are also the major modifiable factors ..

5) Obstetricians and gynecologists need to always consider a woman's BMI when considering investigation and treatment strategies, risks associated with treatment and prognosis, and subsequently counsel women appropriately. As the old adage goes, 'prevention is better than cure' so we should continue to promote a healthy lifestyle and aim at preventing the increase in the prevalence of obesity.

6) Health professionals need to encourage patients and monitor their physical body status by using simple anthropometric measurements, such as Waist Circumference which is an independent measure of central obesity that is strongly associated with cardiovascular disease risk factors like hypertension.

7) Monitoring and evaluation should be done to assess the impact of national nutrition action plan in the combating of overweight and obesity.

8) Subsequent studies should be undertaken by the Ministry of Health and Sanitation and other research bodies on overweight and obesity and other related ailments.
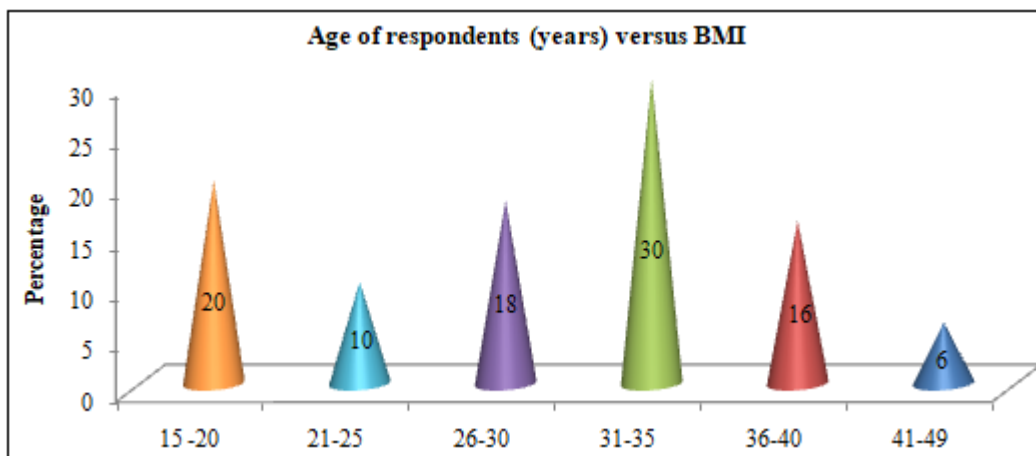

Figure 2

Figure 2 revealed the age distribution of respondents, which indicates that majority (30%) were between 31-35 years, followed by the age bracket 15-20 years which account for 20%. Also 18% of the respondents falls between 26-30 years while 16% were between 36-40 years and the remaining 10% and 6% were between the age bracket of 21-25 and 41-49 years respectively
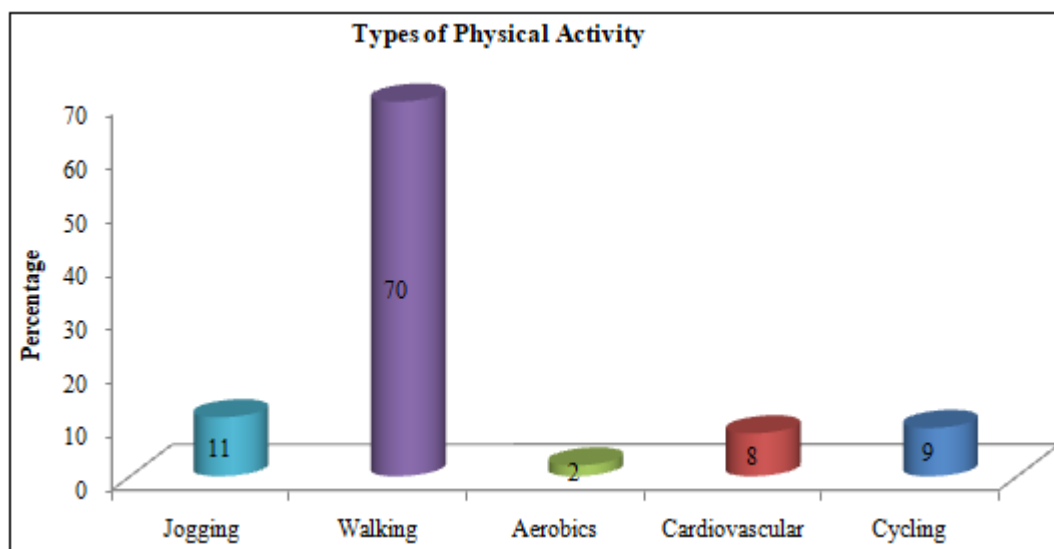

Figure 3

Figure 3 revealed that, majority (70%) of the respondents do not engaged in rigorous physical activities. Only (30%) engaged in physical activities such as jogging, aerobics, cardiovascular, and cycling respectively.

Adequate physical activity has been shown to have many health promoting properties and has a direct, independent role in reducing CVDs mortality. Inactivity on the other hand is one of the most important factors that have been known to fuel overweight and obesity.
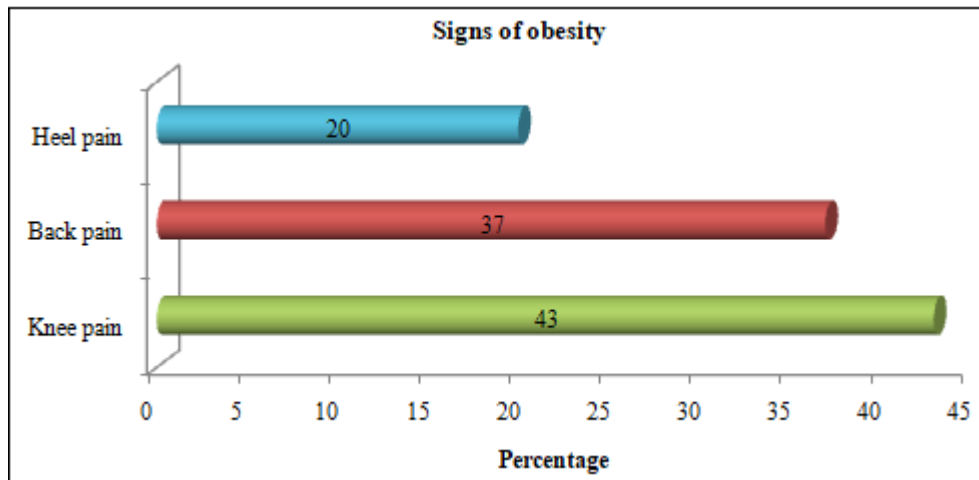
Figure 4: Pain symptoms (heel pain, back pain and knee pain)

Figure4 depicts that majority (43%) of the respondents experienced knee pain and 37% were experiencing back pain and the remaining (20%) had heel pain.

Studies done by Grundy, 1996 suggests that.the metabolic abnormalities engendered by obesity occur in the cardiovascular system. These abnormalities can be called risk factors because they raise the likelihood for cardiovascular disease. The major metabolic risk factors resulting from obesity are
1) Atherogenic dyslipidemia (borderline-high total cholesterol concentrations, raised triacylglycerol concentrations, small LDL particles, and low HDL concentrations);
2) Raised blood pressure;
3) Insulin resistance and glucose intolerance; and
4) Abnormalities in the coagulation system (procoagulant state)
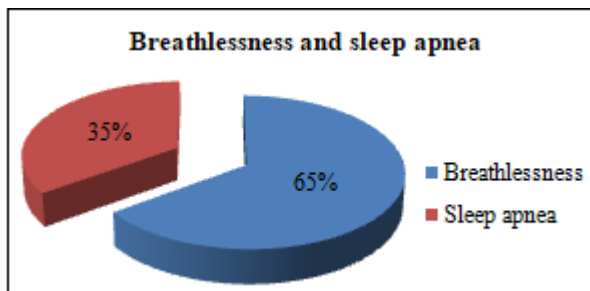

Figure 5: Breathlessness and sleep Apnea

From the findings of the study, majorities (65%) experienced breathlessness and 35% experienced sleep apnea. These two health related problems shows that the respondents were suffering from obesity.

The health consequences of obesity are many and varied, ranging from an increased risk of premature death to several non-fatal but debilitating complaints that can have a marked effect on the quality of life. It is a major risk factor (Tiffy M et al, 2021)

Table 1: Shows the respondents Anthropometric Measurement

Variable	Normal	Overweight	Obese	Total
BMI	35.8%	34.2%	30.0%	100%
WC	45.1%	16.4%	38.5%	100%
WHR	26.1%	73.9%		100%

Among the total female respondents assessed, when categorized according to BMI a total of 35.8% were normal that is, neither overweight nor obese and 34.2% were overweight and the remaining 30.0% were. On the hand when categorized according to WC, a total of 45.1% of the respondents were normal, followed by 16.4% who were overweight and the remaining 38.5% were obese.

When categorized according to WHR a total of 26.1% of the respondents were normal and the remaining 73.9% of the respondents were overweight. This is related to the WHO, 2012 findings and Health Survey of 2013, which revealed that the national prevalence rate of Overweight is 18.4% and obesity is 7.5 % for women age (15- 49).

Table 2: Cases of Overweight and Obesity in Various Hospits

Victims	Hospital And Health Centres in Each Section						Total	%
	East		Central		West			
	Rokupa Hospital	Cottage Hospital	Connaught hospital	Marestop hospital	Emergency hospital	Military hospital		
YES	15	13	17	13	18	14	90	30
NO	35	37	33	37	32	36	210	70
Total	50	50	50	50	50	50	300	100

Table 3: Contingency Table

Category	O_1	E_1	O_1-E_1	$(O_1-E_1)^2$	$(O_1-E_1)^2/E_1$
Rokupa-YES	15	15	0	0	0.0000
Rokupa-NO	35	35	0	0	0.0000
Cottage-YES	13	15	-2	4	0.2666
Cottage-NO	37	35	2	4	0.1143
Connaught-YES	17	15	2	4	0.2666
Connaught-NO	33	35	-2	4	0.1143
Marestop-YES	13	15	-2	4	0.2666
Marestop-NO	37	35	2	4	0.1143
Emergency -YES	18	15	3	9	0.6000
Emergency-NO	32	35	-3	9	0.2571
Military hospital-Yes	14	15	-1	1	0.0666
Military hospital-NO	36	35	1	1	0.02856
TOTAL	300	300	00	44	2.09486

df=(R-1)(C-1)=(2-1)(6-1)=1X5=5   p= 0.9 which is 90% reliability

Calculated=2.09486. Tabulated= **11.070**. Since the p value is above 0.05 we accept the hypothesis which states that overweight and obesity is associated with socio demographic characteristics, regular food meal consumption frequency and low physical activity levels. Any deviation from the expected is due to chance only.

Since the x^2= 2.0986 is less than tabulated value = 11.070, we therefore reject the null hypothesis which states that, " overweight and obesity have no significant implication on health and social wellbeing of women in the Freetown Municipality" and accept the alternative hypothesis that overweight and obesity is associated with socio demographic characteristics, regular food meal consumption frequency and low physical activity levels.
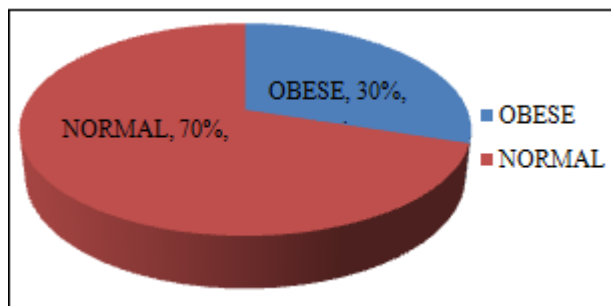

Figure 6: Obese Versus Normal Respondents

Figure6 revealed that 30% of the respondents diagnosed in the various hospitals were obese having a BMI above 35 (BMI>35). Seventy percent (70%) were normal whose BMI were below24 (BMI<24)

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