

Exploring the Knowledge Levels of Bankers on Health Risks of Overweight and Obesity: A Cross-Sectional Study, Ghana

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ABSTRACT

Background: Overweight and obesity are becoming serious public health menace in the world today. Weight gain is skyrocketing across the globe due to growing economy, fast food expansion and a shift towards more sedentary living. However, most people lack knowledge regarding risks associated with overweight and obesity.

Aim: The study aimed to explore the knowledge levels of bankers in the Ho Municipality on health risks associated with overweight and obesity.

Methodology: A cross-sectional study design with quantitative method was employed. The study spanned from September 7, 2018 to April 25, 2019. A self-administered questionnaire and convenience sampling technique were used. Data were analysed using IBM SPSS Statistics 21 Developer and the results presented in statistical tables and graphs.

Results: Of 136 participants investigated, 67 (49.3%) were between 31 - 40 years. 2 participants (1.5%) were underweight, 49(36.0%) had normal weight, 43(31.6%) were overweight while 42 (30.9%) were obese. The study revealed that female bankers were prone to overweight (37.78%) while males were prone to obesity (56.52%). Participants generally had low knowledge and awareness on health risks of overweight and obesity.

Conclusion: Most bankers in the Ho Municipality were overweight and obese due to insufficient knowledge and low awareness on the risks associated with overweight and obesity. Public education and awareness creation are urgently needed to stem the tide.

Keywords: Knowledge; Overweight; Obesity; Body Mass Index; Health Risks

Lay Summary

Excessive weight gain is the major cause of many diseases and health problems. Much weight gain is caused by growing economy, increase in food supply and sitting at one place most of the time. We conducted a study in the Ho Municipality of Ghana to determine how much bankers know about the dangers associated with excessive weight gain. Bankers represent a class of people whose work does not involve much movement. A cross-sectional study was used. The study started in September 7, 2018 and ended in April 25, 2019. Questionnaires were used to collect information and the results presented in tables and graphs.

Of the 136 bankers studied, 2 were underweight, 49 had normal weight while 85 had excess body weight. More men were found to have abnormal body weight than women. Excess weight gain was common among married bankers than the singles. We also found strong association between body weight and gender. Age, marital status, job experience and educational level influenced weight gain.

From our findings, the bankers had limited knowledge on the dangers associated with excess body weight. Therefore, if bankers have enough knowledge on the dangers associated with excess body weight, they will protect themselves.

Introduction

Prevalence of overweight and obesity is currently a global problem and poses as a major public health challenge. The World Health Organization (WHO) defines overweight and obesity respectively as a body mass index greater than or equals 25.0 kg/m² and BMI greater than or equals 30.0 kg/m². Globally, rates of overweight and obesity continue to increase among adults and children and the problem is assuming epidemic proportion. The World Health Organization 2020 updated report (WHO, 2020) shows that prevalence of obesity worldwide has increased tremendously. Worldwide, obesity has nearly tripled since 1975 and in 2016, more than 1.9 billion adults 18 years and above were overweight.

It is estimated that almost one-third of the adult population in the United States were obese and healthcare expenditure for obesity had hit nearly US \$75 billion in 2003 (Zhang & Wang, 2012). A study carried out by the National Institute of Health and Nutrition Examination Surveys (NHANES) between 2013 - 2014 and 2014 - 2016 revealed that more than two-thirds (2 in 3) adults were overweight and obese and more than a third (1 in 3) children were overweight and obese and more than one in thirteen (1 in 13) adults were considered to have extreme obesity (Flegal, Kruszon-moran, Carroll, Fryar, & Ogden, 2016; Fryar, Carroll, & Ogden, 2018; Ogden et al., 2016). The situation in Europe paints the same gloomy picture and presents a worrying phenomenon.

The World Health Organization report indicates that in the WHO European Region, the age-standardized prevalence of overweight has reached 58.3% among adult males and 51.2% among adult females (WHO/EHIG, 2020). In a study to provide current data on prevalence of overweight and obesity among adults from 20 European countries (Marques, Peralta, Naia, & Loureiro, 2017) analyzed 7, 2014 data from European Social Survey involving 34, 814 participants of which 16, 482 were men. The results revealed that only 2% were underweight and 44.9% had normal weight. Overweight and obesity accounted for 53.1%. They found more men to be overweight than women (44.7% vs. 30.5%). Older adults were found to be significantly more overweight (42.4%) and obese (20.9%) respectively than middle age and younger adults. The highest prevalence of overweight was in the Czech Republic (45.2%), Hungary (43.7%) and Lithuania (41.7%). For obesity, Slovenia (20.8%), Estonia (19.7%) and the United Kingdom (19.2%) were the countries with the highest prevalence.

Concomitant with this development is the increasing childhood overweight and obesity which presents serious public health challenges. Studies indicate that overweight and obesity in childhood are associated with higher probability of obesity in adulthood and may have serious consequences for this very vulnerable age group (Nishida, Borghi, Branca, & Onis, 2014). It is estimated that by 2030 over half of the population of Europe will have obesity, according to the World Health Organization's projections.

Admittedly, obesity is rapidly establishing itself as a public health menace in several developing countries with urban communities having a higher prevalence, particularly among those of higher socioeconomic status (Addo, Nyarko, Sackey, Akweongo, & Sarfo, 2015). In a study (Ziraba, Fotso, & Ochako, 2009) reported that overweight and obesity were on the rise in Africa and might assume epidemic proportions in the near future. Available literature indicates that the number of overweight and obese children has more than doubled since 1990. In south Africa, overweight and obesity in children and adolescents are increasing, though prevalence varies with

age, gender and population groups (Rossouw, Grant, & Viljoen, 2012). In Nigeria, (Chukwuonye et al., 2013) reported that prevalence of overweight and obese individuals was of epidemic proportions. A review by these researchers in Nigeria between 2001 and 2012 showed prevalence of overweight individuals ranging from 20.3% –35.1%, while obesity ranged from 8.1% –22.2%. Analysis of prevalence of overweight and obesity among women in twenty-four African countries for the period from 1993 to 2014 revealed increase in all the 24 countries.

In West Africa, the rate of obesity is about 10% and it is 3 times higher among women than men. In South Africa, one in three men and one in two women are either overweight or obese and these statistics are close to the figures for the United States. In Morocco, the rate of obesity is estimated to be 40% in the general population, while it is about 12% in Kenya. The prevalence rates of obesity in selected African countries were 13, 14 and 15% in Sudan, Egypt and Libya (North Africa), 15, 10 and 9% in Ghana, Senegal and Niger (West Africa), and 13, 12 and 14%, respectively, in Kenya, Uganda and Tanzania in East Africa (Lokuruka, 2013).

In Ghana, overweight almost doubled while obesity tripled between such periods (Amugsi, Dimbuene, Mberu, Muthuri, & Ezech, 2017). Most studies describe the overweight and obesity situation as epidemic. Some researchers (Ofori-asenso, Agyeman, & Ashiagbor, 2017) found that between 1993 and 2014, the mean BMI among Ghanaian women increased by 3.0 kg/m² and predicted that by 2030, the average Ghanaian woman will be overweight and have a BMI of 27.0 kg/m². Recent statistics from WHO Global InfoBase (Agyemang, Boatemaa, Frempong, & de-Graft Aikins, 2015; Hagan Jr., Nsiah-Asamoah, Hormenu, Pollmann, & Schack, 2018) documented prevalence of overweight and obesity in 46 African countries and indicated that Ghana ranked 10th and 26th positions respectively, with specific overweight prevalence figures of 35.6% and 32.5% among men and women. In a review (Lartey et al., 2019) reported increasing prevalence of overweight and obesity among older Ghanaian adults from 2007 – 2015, drawing evidence from WHO – SAGE Waves 1 & 2. The report cited the prevalence of overweight in 2007/2008 as 19.6%, and from 2014/2015 as 24.5% while obesity within the period was 10.2% and 15.0% respectively. The results indicated that obesity was higher in 2014/2015 than it was in 2007/2008 and that more than half of the population had central adiposity (2007/2008 = 57.7% and 2014/2015 = 66.9%) in both study periods. While prevalence of overweight increased in both sexes, obesity prevalence was 16% lower in males and 55% higher in females, comparing 2007/2008 to 2014/2015.

Also, in a recent study (Agyapong et al., 2020) reported prevalence of overweight and obesity among Ghanaian adults to be 52.8%. A systematic review and meta-analysis of forty-three (43) studies involving a total population of 48,966 across ten (10) regions of Ghana (Ofori-asenso, Agyeman, Laar, & Boateng, 2016) observed a high and rising incidence of overweight and obesity among Ghanaian adults to be approximately 43% and described the situation as epidemic. They reported the national prevalence of overweight and obesity to be 25.4% and 17.1% respectively. Furthermore, prevalence of overweight among 135 practicing nurses and midwives in the Hohoe municipality of Ghana was 31.8% (6.7% males and 25.1% females) whereas 28.9% comprising females only were obese (Duodu, Awuni, Attito, & Zotor, 2015).

Overweight and obesity are associated with greater risks of cancer, disability and premature death due to type 2 diabetes mellitus (T2DM) and cardiovascular diseases such as hypertension, stroke and coronary heart disease. Research indicates that overweight and obesity are the fifth

leading risk factor for global deaths. In the last decades, the number of deaths from non-communicable diseases in developing countries exceeded those observed in developed countries. Indeed, the estimated socioeconomic cost of overweight and obesity is alarming (Kjellberg, Larsen, & Ibsen, 2017; Lehnert, Sonntag, Fellow, Riedel-heller, & Medicine, 2013; Tremmel, Gerdtham, Nilsson, & Saha, 2017; Zhang & Wang, 2012). The ongoing nutritional transition in Africa is likely to pose a major public health challenge with significant proportion of adults becoming overweight (Kandala & Stranges, 2014). Available literature indicates that prevalence of overweight and obesity is increasing in various populations, and is becoming a huge burden among occupational/professional groups that are perceived as sedentary. Physical inactivity and increased sedentary nature of daily activities pose serious threats to the body as they increase the risk of overweight and obesity, which is harmful to normal body function and job productivity (Duodu et al., 2015).

Bankers represent category of professionals whose occupation is sedentary. With the increasing number of bankers in the Ho Municipality, we hypothesized that these bankers may not have adequate knowledge on the health risks associated with overweight and obesity. Therefore, most of them may not take vital steps to either prevent themselves from becoming overweight or reduce their overweight or obesity burden. This study therefore, seeks to explore the knowledge levels of bankers in the Ho Municipality on the health risks associated with overweight and obesity.

Objective of the Study

The study aimed to explore knowledge levels of bankers in the Ho Municipality on health risks associated with overweight and obesity.

Specific Objectives

1. To estimate prevalence of overweight and obesity among bankers in the Ho Municipality.
2. To determine awareness levels of the bankers on overweight and obesity.
3. To explore knowledge levels of bankers in the Ho Municipality on health risks associated with overweight and obesity.

Significance of the Study

The outcome of the study will serve as a valuable source of information to educate the general public, especially, bankers and other sedentary workers on the risks associated with overweight and obesity and to ginger management to implement effective interventions that will prevent overweight and obesity among sedentary workers. The study will also contribute to existing knowledge on overweight and obesity and offer an opportunity to learn the major factors contributing to their prevalence.

MATERIALS AND METHOD

Study Design

A cross-sectional study design was used to obtain data to explore the knowledge levels of the bankers on health risks associated with overweight and obesity. Structured questionnaires were used.

Study Setting

The study was conducted at nine banks in the Ho Municipality namely; Stanbic Bank, Societé Generale, Ghana, Fidelity Bank, Ghana Commercial Bank, Access Bank, Agricultural Development Bank, Unity Rural Bank, National Investment Bank and Zenith Bank. The Ho Municipality is located in the middle zone of the Volta region of Ghana. It covers an estimated area of 2,564 square kilometres with an estimated population of 160,493. 21.4% of the employed population are farmers, 26.8% engage in service and sales, 22.6% are into craft and related trade and 1.5% are engaged as managers, professionals and technicians. Ho doubles as the Municipal and regional capital (Ghana Statistical Service, 2014).

Stanbic Bank is adjacent to MTN office on the right side along the road to the Ho Market with Societé General Ghana, in front of Bayport Financial Services but next to Stanbic Bank which is also opposite to Unity Rural Bank on the left side of the road to Ho Market. Ghana Commercial Bank is next to Agricultural Development Bank (ADB) on the right side along the road to the Ho Market while Fidelity Bank is opposite to Ghana Commercial Bank on the left side of the road to Ho Market. National Investment Bank is three buildings next to Ghana Commercial Bank on the right side along the Ho Market road while Access Bank is on the left side of the road to the market just opposite to National Investment Bank. All these banks are located at the Civic Centre. The number of bankers in each bank are: Stanbic Bank – 15; Societé Generale, Ghana – 6; Fidelity Bank –13; Ghana Commercial Bank –34 of the three branches in Ho; Access Bank – 11; Agricultural Development Bank–12; Unity Rural Bank–17 of the two branches; National Investment Bank –22 and Zenith Bank –8.

Population, sampling and Sample Size

One hundred and thirty-eight (138) bankers formed the population while 136 participants formed the sample size. Participants were selected from the nine banks mentioned above.

Inclusion and Exclusion Criteria

The study included bankers from the nine banks mentioned above in the Ho Municipality who volunteered to participate. It excluded bankers outside the Ho Municipality and also female bankers who were pregnant at the time of the study. Finally, bankers who met the inclusion criteria above and were not willing to participate were exempted from the study.

Instrument/Tools

Questionnaires were used to collect data. Items on the questionnaire were in four (4) sections: Section one on demographic data, section two on awareness of overweight and obesity, section three on knowledge levels of health risks associated with overweight and obesity, while section four was on anthropometric measurement, where the participants' weight and height were measured.

Operational definitions of terms

Awareness: Having some form of information on overweight and obesity which may or may not be comprehensive.

Knowledge : Possession of facts, deep understanding and familiarity with overweight and obesity and their health risks.

Overweight: $25.0 \text{ kg/m}^2 \leq \text{BMI} < 30.0 \text{ kg/m}^2$

Obesity: $30 \text{ kg/m}^2 \leq \text{BMI}$ (WHO, 2020).

Body Mass Index (BMI): An index of weight-for-height commonly used to classify overweight and obesity in adults; defined as a person's mass in kilograms divided by the square of the height in meters (kg/m^2) (WHO, 2020). These are:

BMI less than $18.5 \text{ kg}/\text{m}^2$:	Underweight
$18.5 - 24.9 \text{ kg}/\text{m}^2$:	Normal weight
$25.0 - 29.9 \text{ kg}/\text{m}^2$:	overweight
$30.0 - 34.9 \text{ kg}/\text{m}^2$:	Clinically obese
$35.0 - 40.0 \text{ kg}/\text{m}^2$:	Extremely obese

Validity and Reliability

Instrument validity was established through a peer review process. This was done to ensure that, assessment tools produce stable and consistent results.

Pilot Study

A pilot study was conducted at three banks – GCB, Avenor Rural Bank and Unity Rural Bank at Dzodze on February 20, 2019. Three bankers from GCB, four from Avenor Rural Bank and three from Unity Rural Bank participated in the pilot study.

Data Collection Procedure

Data collection lasted for one month, starting with Access Bank on February 22, 2019 and ending with NIB on March 22, 2019. Questionnaires were employed to collect data. Anthropometric instruments – a stadiometer and a weighing scale were used to measure participants' mass and height to determine their BMI. Each subject removed his/her footwear, stood feet together and arms at the sides. Subjects stood with heels, buttocks and upper back against the straight edge in a complete upright position. Height was taken in centimetres and expressed in meters. Data were collected between 7 am and 9 am and then 4:30 pm and 6:30 pm.

Data Analysis

Raw data were entered into a database using Microsoft Excel 2016. IBM SPSS Statistics V21 was used to analyse the data. Data cleaning and validation were done to ensure data quality before analysis. The main statistical tools used in analysing and answering the research questions were observed frequencies, percentages and correlations. Frequencies were calculated for all variables to know their distribution and range. Age, gender, educational level, marital status, exercise, eating habits, job position work experience and duration of work hours were all categorized as independent variables. Knowledge on health risks of overweight and obesity (BMI) was the main outcome of interest (dependent variable) in the study. Measures of central tendency were computed for continuous variables. Prevalence of overweight and obesity (BMI) were expressed in percentages at 95% confidence intervals. Association between knowledge on the risks of overweight and obesity and each of the independent variables was assessed using Pearson's Chi-Square Test at 5% significance level while Cramer's V was used to ascertain the extent of the association. Ordinary Least Squares (OLS) were employed to estimate the determinants of knowledge on health risks of overweight and obesity.

Dependent Variable

The main variable of interest was knowledge on health risks of overweight and obesity. It is a continuous variable and was constructed using principal components analysis (PCA). Before constructing the composite index for knowledge, Cronbach alpha analysis was made to obtain Cronbach alpha of 0.81. In constructing the knowledge variable through PCA, all variables whose KMO was less or equal to 0.5 were rejected. To ascertain sampling adequacy, we subjected the data to Kaiser-Meyer-Olkin (KMO) test to obtain a value of 0.7939, indicating usefulness of the data for factor analysis.

Independent Variable

A variable a researcher controls to determine its effect on the dependent variable. In this study, the independent variables were age, marital status, physical activity, eating habits, job position and educational level of respondents. We investigated to determine the extent each of the variables affected the knowledge level of the bankers on risks of overweight and obesity.

Table 1: Principal Component Analysis of Knowledge on Overweight and Obesity

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	4.86328	3.21876	0.2702	0.2702
Comp2	1.64451	.26122	0.0914	0.3615
Comp3	1.38329	.0895436	0.0768	0.4384
Comp4	1.29375	.248788	0.0719	0.5103
Comp5	1.04496	.0582528	0.0581	0.5683
Comp6	.986709	.111838	0.0548	0.6231
Comp7	.874871	.0957554	0.0486	0.6717
Comp8	.779116	.0355274	0.0433	0.7150
Comp9	.743588	.0233552	0.0413	0.7563
Comp10	.720233	.0580523	0.0400	0.7964
Comp11	.662181	.0578751	0.0368	0.8331
Comp12	.604306	.100766	0.0336	0.8667
Comp13	.50354	.0337986	0.0280	0.8947
Comp14	.469741	.0434492	0.0261	0.9208
Comp15	.426292	.043639	0.0237	0.9445
Comp16	.382653	.0647939	0.0213	0.9657
Comp17	.317859	.0187455	0.0177	0.9834
Comp18	.299114	.	0.0166	1.0000

KMO Overall = 0.7939

RESULTS

We present results of the study below. These include socio-demographic characteristics of participants, prevalence of overweight and obesity among them, their level of awareness on overweight and obesity and their knowledge levels on health risks of overweight and obesity.

Table 2 illustrates distribution of the sample by BMI.

Table 2: Association of Individual Characteristics and BMI

Variable	Underweight	Normal	Overweight	Obese	Inferential statistics
Age					
20-30yrs	3.85	50.00	26.92	19.23	X ² = 16.27 Pvalue = 0.001 Cramer's V =0.1997
31-40yrs	0.00	22.39	37.31	40.30	
41-50yrs	0.00	33.33	33.33	33.33	
51-60yrs	0.00	50.00	12.50	37.50	
Gender					
Male	4.35	19.57	19.57	56.52	X ² = 25.61 Pvalue = 0.000 Cramer's V = 0.434
Female	0.00	43.33	37.78	18.89	
Education					
At most Secondary	0.00	66.67	33.33	0.00	X ² = 1.8734 Pvalue = 0.590 Cramer's V = 0.117
Tertiary	1.50	34.59	31.58	32.33	
Marital status					
Married	0.00	26.47	38.24	35.29	X ² = 10.82 Pvalue = 0.288 Cramer's V = 0.162
Single	3.17	44.44	26.98	25.40	
Divorced	0.00	33.33	0.00	66.67	
Widow	0.00	50.00	0.00	50.00	
Job position					
Manager	0.00	26.67	33.33	40.00	X ² = 2.0524 Pvalue = 0.015 Cramer's V = 0.087
Cashier	2.27	34.09	36.36	27.27	
Other	1.30	37.66	28.57	32.47	
Experience					
One year	8.33	37.5	37.50	16.67	X ² = 17.3141 Pvalue = 0.008 Cramer's V = 0.252
2-5 years	0.00	43.4	32.08	24.53	
Above five years	0.00	27.12	28.81	44.07	
Duration of hours					
4-7 hours	0.00	0.00	66.67	33.33	X ² = 3.08 Pvalue = 0.000 Cramer's V = 0.1057
8-11 hours .	1.56	36.72	30.47	31.25	
12 hours and above	0.00	20.00	40.00	40.00	
Eating habit					
Eating in-between meals	2.41	33.73	37.35	26.51	X ² = 5.39 Pvalue = 0.000 Cramer's V = 0.199
No eating between meals	0.00	37.74	22.64	39.62	
Physical activity					
Exercise	1.69	36.44	32.20	29.66	X ² = 1.820 Pvalue = 0.000 Cramer's V = 0.116
No exercise	0.00	27.78	27.78	44.44	

Socio-Demographic Characteristics of Participants

Socio-demographic characteristics of participants is shown in **Table 2**. Male participants were almost twice that of females; 90 males (66.2%) against 46 females (38.2%). There was a significant difference between the mean ages of male and female participants. Averagely, the males were older than the females.

Prevalence of Overweight and Obesity Among the Participants

Prevalence of combined overweight and obesity among the male participants was 76.09% (19.57%; 56.52%) while that of females was 56.67% (37.78%; 18.89%). Obesity was high among males (56.52%) whilst overweight was high among females 37.78%). Overweight and obesity were highest among bankers within 31 – 40 years (77.61%) and least among those in 20 – 30 years (46.15%). Hence, age and gender were associated with overweight and obesity. Overweight and obesity also manifested strongly in marital status – very high among married bankers but low among the singles.

Job Positions and Work Experience of Participants

Statistical analysis revealed that managers had the most work experience, followed by cashiers while the “other” category of bankers had the least (**Figure 1**). We found that work experience and the numbers of hours spent at work had significant bearing on overweight and obesity.

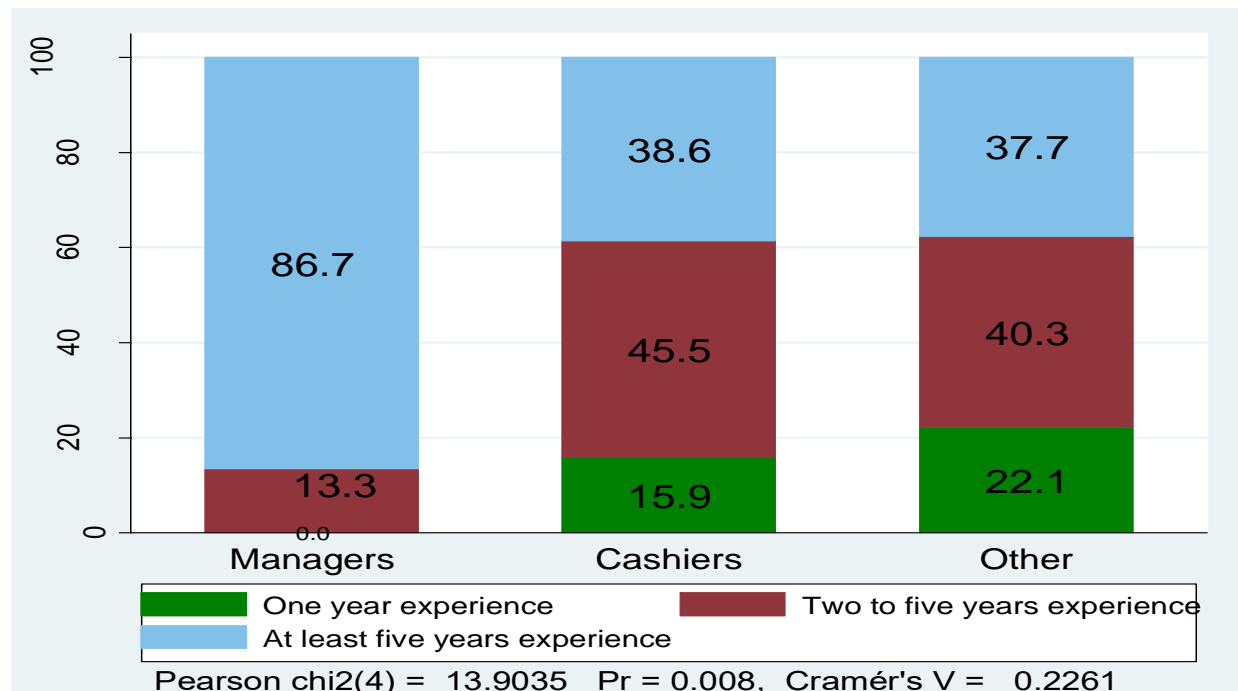


Figure 1: Proportion of Job Positions by Work Experience

For instance, those with five or more years, two-to-five years and one year work experience respectively had combined overweight and obesity burdens of 72.88% (28.81%; 44.07%), 56.61% (32.08%; 24.53%) and 54.16% (37.50%; 16.67%). The number of hours spent at work had a direct bearing on overweight and obesity to the extent that bankers who spent 4-7 hours at work increased their overweight and obesity burden up to 100%!

Variation of BMI with Exercise

Physical activity profile of participants revealed that obesity was inversely proportional to any form of exercise. Generally, those who performed any form of exercise had their obesity burden reduced significantly compared to those who did not (**Figure 2**).

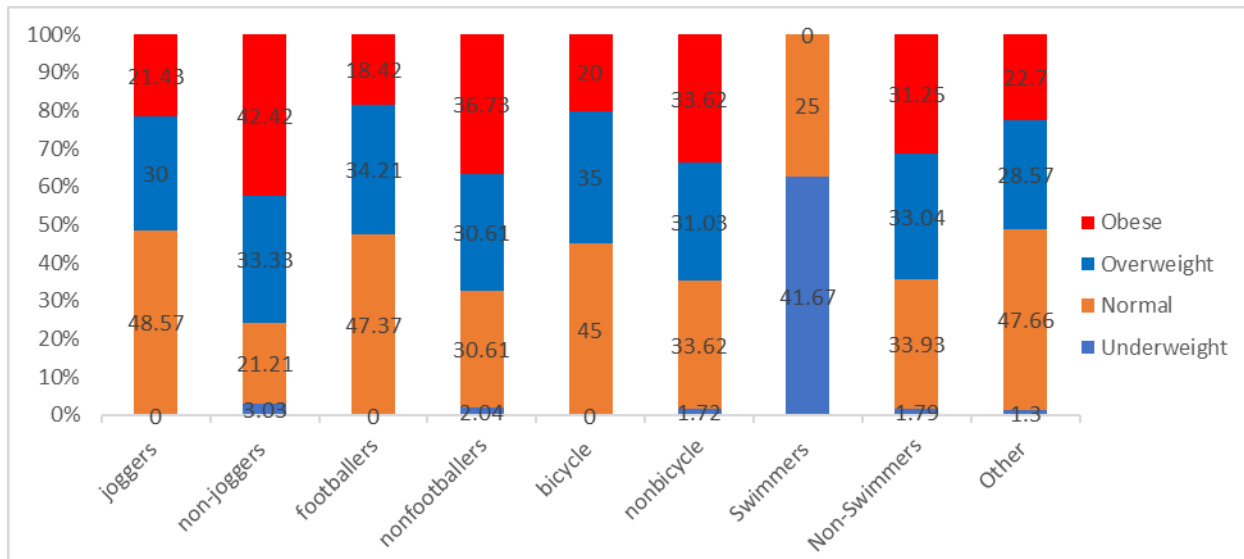


Fig.2: Distribution of BMI Based on Type of Exercise

We also investigated how BMI vary with exercise counts. As exercise counts increase, BMI improves significantly by decreasing overweight and obesity burden (**Figure 3**). Those who performed no exercise at all had a greater proportion of overweight and obesity burden (80.0%) as compared to those who performed all forms of exercises with only 20.0% overweight and 0.0% obesity. The discrepancies within the exercise counts might be due to weaknesses in the exercises.

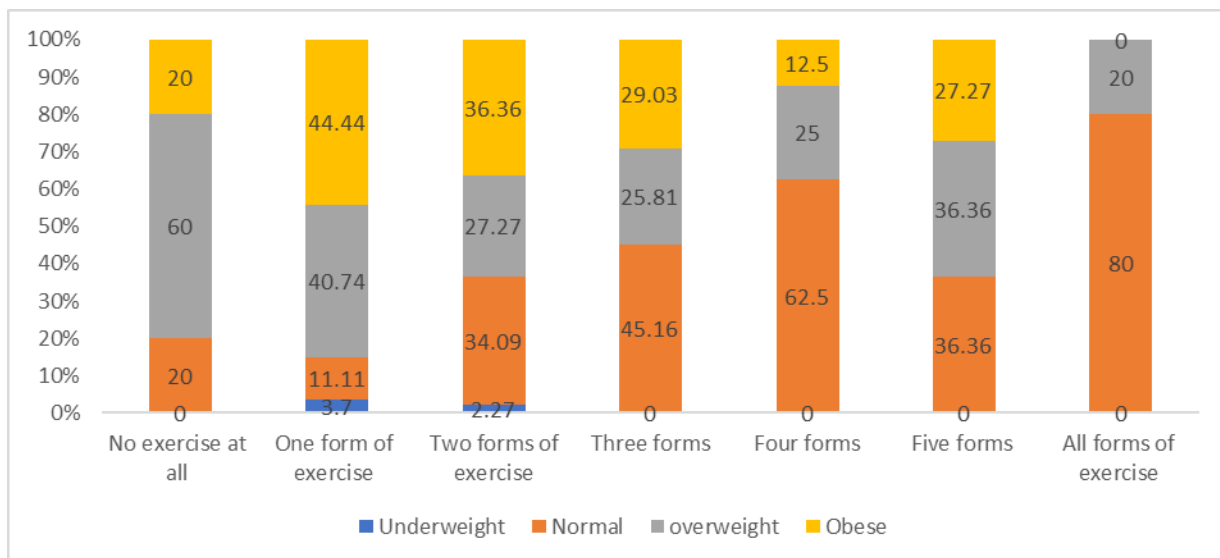


Figure 3: Distribution of BMI Based on Exercise Counts

Association Between BMI, Socio-Demographic Variables and Lifestyles

Associations were found between BMI, socio-demographic variables and lifestyles using Pearson's Chi-Square at 5% significant intervals (**Table 2**). The extent of association was determined using Cramer's V(CV). Gender showed the strongest association (CV = 0.434) while job position showed the weakest (CV = 0.087). Age was positively related to overweight and obesity such that elderly bankers were at greater risks of overweight and obesity than the younger ones. Longer working hours and eating in-between meals were also positively associated with obesity among the bankers. However, those who exercised were less likely to develop overweight and obesity. Thus obesity was inversely related to any form of physical activity.

Awareness on Overweight and Obesity

We investigated awareness levels of participants on overweight and obesity based on:

- ❖ factors that contribute to overweight and obesity;
- ❖ measures to minimize or prevent overweight and obesity, and
- ❖ persons more prone to overweight and obesity.

Factors Contributing to Overweight and Obesity

Most participants 32(23.53%) indicated poor dietary habit was the main cause, followed by family traits and physical inactivity 16(11.76%) and 15(11.03%) respectively. Socio-economic status and medications/diseases 6(7.42%) each, while hormonal imbalance 7(5.15%) participants. The results showed that participants had low awareness on factors that contribute to overweight and obesity.

Measures to Minimize or Prevent Overweight and Obesity

On factors to minimize overweight and obesity, most participants responded exercise 131(96.32%), followed by reduced saturated fat intake 107(78.68%), fruits consumption 103(75.74%) and vegetables consumption 98(72.06%). However, a larger number of participants 90(66.18%) responded negative to medication with only a smaller number 46(33.82%) responding positive. The outcome of this assessment, however, showed that participants had fair awareness on how to minimize or prevent overweight and obesity.

We further investigated their lifestyles to determine whether or not they undertake any form of exercise, frequency of the exercise and their eating habits. The major types of exercise/activity reported were jogging 70(51.47%), skipping 43(31.62%), football 38(27.94%), swimming 24(17.65%) and bicycle riding 20(14.71%). Very few participants indicated other activity type like driving. From the results, almost all the participants indicated they undertook one form of exercise or the other but the frequency was generally not enough. Moreover, the intensity or effectiveness of the exercise also could not be assessed.

We also found a significant association between eating habits and BMI. All those who reported eating in-between meals were either overweight or obese. The results of lifestyles assessment showed that most participants were not taking adequate measures to prevent weight gain.

Persons More Prone to Overweight and Obesity

We explored awareness levels of participants on overweight and obesity with respect to persons more prone to these conditions. The results revealed that females 71(52.2%), sedentary workers 49(36.03%), adolescent 48(35.29%), males 33.09% 45(33.09%), alcoholics 37(27.21%), children 36(26.47), the aged 25.74% (25.74%), and smokers 25(18.38%) respectively were more prone to overweight and obesity. However, **Table 2** showed that male bankers were more prone to overweight and obesity than females. The majority, 128 (94.12%) indicated that physically active people were the least prone to overweight and obesity.

Knowledge Level on Health Risks of Overweight and Obesity

We explored participants' knowledge on health risks associated with overweight and obesity by asking them to indicate BMI cut-off points that represent overweight and obesity. However, no participant was able to do so. We further asked them to choose from a list of health outcomes associated with overweight and obesity. Most participants chose hypertension (102/136), stroke (90/136), and heart disease (88/136) respectively. Diseases such as fatty liver disease (52/136), stress incontinence (42/136) and kidney diseases (42/136) were also chosen by few participants.

Pregnancy and fertility problems were each chosen by 33/136 and 31/136 participants to be some of the health risks. Few participants chose impotence (26/136), type II diabetes (26/136), both osteoarthritis and sleep apnoea (20/136), cancers 18(13.2%), and skin diseases (11/136) as some health risks of overweight and obesity. Dyslipidaemia recorded the least proportion (8/136) as health risks of overweight and obesity. We found that participants' knowledge on health risks of overweight and obesity were mainly limited to hypertension, stroke and heart diseases but with scanty knowledge on the other health risks.

Additionally, most participants (99/136) chose depression to be the highest psychological problem, followed by low self-esteem (85/136) and poor self-esteem 38.97% (53). A large proportion (83/136) responded negative to feeling isolation as being associated with overweight and obesity with only (53/136) responding positive. Their responses revealed that they had fair knowledge on the psychological problems associated with overweight and obesity.

Determinants of Knowledge on Health Risks of Overweight and Obesity

Table 3 presents the results of determinants of knowledge on health risks of overweight and obesity. Age is a significant predictor of knowledge on health risks of overweight and obesity. For instance, compared to the reference individuals within 20-30 years, knowledge on overweight and obesity increased by 64.7% and it is statistically significant at 5%. This implied younger bankers were quite knowledgeable on health risks of overweight and obesity than their older counterparts. It explained why most bankers in that age category had normal BMI. Also, males' knowledge on overweight and obesity increased by 20.3 percent compared with females. The implication is that males had more knowledge on overweight and obesity than females. This observation however, was not consistent with the results in **Table 2**. Other significant predictors of knowledge were marital status, job experience and level of education. Married bankers had more knowledge (53.7%) than their unmarried counterparts.

Table 3: Ordinary Least Squares (OLS) Estimates on Determinants of Knowledge

Variable	OLS Knowledge
Age (ref =51years and above)	
20-30 years	0.647** (0.312)
31-40 years	-0.363 (0.313)
41-50 years	-0.143 (0.381)
Male (ref=female)	0.203*** (0.0773)
Tertiary education (ref=at most SHS)	0.430** (0.080)
Married (ref=not married)	0.537*** (0.156)
Job Position(ref=other)	
Manager	0.178 (0.235)
Cashier	0.0323 (0.152)
Experience (ref=one year)	
2-5 years	0.494** (0.210)
Above 5 years	0.694*** (0.225)
Constant	-1.541*** (0.551)
N	136
R-squared	0.439

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4 presents relative contributions of individual characteristics to overall knowledge on health risks of overweight and obesity. Marital status, age and sex were the most important contributors. Thus married bankers had the most knowledge, followed by young bankers and the male gender in that order.

Table 4: General Dominance Statistics for the Relative Effect

Knowledge	Dominance Stat.	Standardized Dominance Stat.	Ranking
Age	0.0996	0.2988	2
Sex	0.0617	0.1852	3
Education	0.0041	0.0124	5
Marital status	0.1415	0.4243	1
Job position	0.0012	0.0036	6
Experience	0.0252	0.0756	4

DISCUSSION

Socio-demographic data of participants

The bank workers were made up of 90(66.2%) males and 46(38.2%) females. The males, 66.18%(90) were almost twice the females, 33.82%(46). This was in sharp contrast with a study in Iran (Ghaderian et al., 2019) where 46% (1197) were men and Libya (Lemamsha, Randhawa, & Papadopoulos, 2019) where the females were 63%. In our study, 67 (133) participants were between 31 and 40 years which formed was the age category with the highest frequency. Half (68) were married whilst the rest were either single, divorced or widowed. The proportion of married participants in our study was less than the one reported in Iran (Ghaderian et al., 2019) involving a population of 2,575 where 82% were married. Moreover, 97.79%(133/136) of our study population had tertiary level education as compared to the Iranian study where nearly 50% of them had high school education or higher. Our findings were consistent with a similar study conducted in the Accra Metropolis (Addo et al., 2015) on financial workers which recruited more males (92) than females (88) with majority of participants attaining tertiary level of education 147 (81.7%). In that study, more than half of the participants (99/180) were married. Moreover, 58/136 of them had been in the profession for more than five years with the rest working for less than four years.

Prevalence of Overweight and Obesity Among the Bankers

The study found high prevalence of overweight and obesity among the bankers in the Ho Municipality. Of the 136 participants, 2(1.5%) were underweight, 49(36%) had normal weight whilst 43(31.6%) and 42(30.9%) respectively were overweight and obese. The combined overweight and obesity was 62.5%. Our findings were similar to the one reported in Accra (Benkeser, Biritwum, & Hill, 2014) involving a large population of 2,814 women, where 3.6% (95) of them were underweight, 31.5% (828) had normal weight, 27.8% (730) overweight and 37.1% (973) were obese. In all, 64.9% of the women sampled were either overweight or obese. Furthermore, the prevalence of overweight and obesity observed in our study was higher than the one reported in Nigeria (Adaja & Idemudia, 2018) involving 325 healthcare workers in University of Benin Teaching Hospital, where the combined prevalence of overweight and obesity was 57.2%. Another study in Libya (Lemamsha et al., 2019) found that approximately 75.3% of Libyan adults were overweight and obese (32.9% overweight and 42.4% obese). The high prevalence of overweight and obesity among the bank employees in our study could be attributed to low levels of awareness and lack of adequate knowledge on the health risks associated with overweight and obesity.

Our findings were also consistent with a study which reported high prevalence of 55.6% (37.8% overweight and 17.8% obese) among bank workers in eight branches of a financial institution in the Accra Metropolis (Addo et al., 2015). Besides, we found that overweight and obesity profile among the married, singles, divorced and widowed bankers were 38.24%, 35.29%; 26.98%, 25.40%; 0.00%, 66.67% and 0.00% and 50.00% respectively. Thus overweight and obesity was very high among the married bankers but low among the singles. Hence, marital status was associated with overweight and obesity. Our results confirmed a study in Greece (Tzotzas et al., 2010) involving a large population of 17,341 men and women where they found a high risk of obesity in married men and women than in their respective unmarried ones. This observation may be due to the fact that married people are somehow at ease in life and their socioeconomic status and conditions of service are perhaps, okay. Therefore, in our society where looking fat and sleek is viewed as signs of affluence and good living, this might have accounted for this observation.

We found a significant association between gender and BMI ($P < 0.000$). The male bankers had a much greater tendency to becoming obese than their female counterparts, while females were much predisposed to becoming overweight. This was in sharp contrast with some studies (Agyemang et al., 2015; Kandala & Stranges, 2014) which reported that prevalence of obesity was twice as high in women as in men. However, another study (Addo et al., 2015) found that prevalence of these conditions was almost the same in both sexes. Furthermore, we found strong associations between age and BMI ($p < 0.001$), physical activity and BMI ($p < 0.000$), eating habits and BMI (0.000), duration of hours at work and BMI ($p < 0.000$) and job experience and BMI ($p < 0.008$). Our results confirmed some previous studies (Hemmingsson & Ekelund, 2006) which found an association between BMI and physical activity. However, (Yousif, Kaddam, & Humeda, 2019) found no significant relationship BMI and physical activity. With regard to eating habits, our findings were in sharp contrast with (Al-Muammar, El-Shafe, & Feroze, 2014; Benazeera, 2014; Mahmoud & Taha, 2017; Yousif et al., 2019) which found no significant association between BMI and eating habits.

Participants' Awareness on the Risk Factors of Overweight and Obesity

Assessment of awareness levels of participants revealed that poor dietary habits, family traits and physical inactivity respectively were the major risk factors of overweight and obesity. Most of the factors given were in line with WHO's reports (WHO, 2020). Some researchers reported higher socioeconomic status as a contributor to overweight and obesity (Addo et al., 2015). However, most participants did not see hormonal imbalances, socioeconomic status, and medication/diseases as major risk factors of overweight and obesity. This might be due to lack of information on the conditions of overweight and obesity. This is very important because lack of awareness on an issues may lead to wrong choices. Another study (Kandala & Stranges, 2014) reported a direct relationship between socioeconomic status and obesity since higher socioeconomic groups are more likely to buy extra food and achieve their desire to look healthy and stronger. Besides, some driving factors such as physical inactivity, sedentary lifestyles and changes in dietary patterns are consistent with our results. Poor dietary habits and less physical activity are the drivers of overweight and obesity (Romieu et al., 2017) and this was in line with our findings.

Participants also reported that family trait was one of the major risk factors associated with overweight and obesity and this confirmed some previous studies (Hruby & Hu, 2015; Knott, 2018). Very few participants (7.42%) indicated that medication and diseases were risk factors of overweight and obesity. However, (Mandal, 2019) documented medication and some diseases as risk factors of overweight and obesity. Steroids, antidepressants, Cushing's disease and polycystic ovary syndrome could lead to weight gain. A study by (Mehrabani & Ganjifar, 2018) found that changes in life habits and patterns – dietary behaviours, advancement in technology, relief, sedentary life, and decrease of lifestyle physical activities results in increase of obesity and weight gain among men and women. Moreover, (Obirikorang et al., 2016) found that taking snacks in-between meals, eating late at night, physical inactivity, excessive fast food, and alcoholic beverage intake were associated with increased prevalence of obesity. Most of these reports were in line with our findings. A study in Turkey, (Erem, 2015) observed that adult obesity-associated risk factors were age, gender, hypertension, hyperlipidemia, smoking cessation, alcohol consumption, high household income, low education level and physical inactivity, occupation, marital status and a family of selected medical conditions. Though our results confirmed some of these earlier studies, however, our participants generally demonstrated low awareness on the risk factors of overweight and obesity.

Most participants 71(52.21%) believed that females were more prone to overweight and obesity compared to males, adolescents, children, alcoholics, smokers, sedentary workers (Kanter & Caballero, 2012; WHO, 2020). Other studies (Agyemang et al., 2015; Ghaderian et al., 2019; Obirikorang et al., 2016) reported that the female gender was more prone to overweight and obesity than males. Yet, in another study (Lokuruka, 2013) reported that obesity was higher among women than among men. However, our results were contrary to all these findings since obesity prevalence in our study population was higher among the men than in the women. Our study also revealed that physically active people are the least persons prone to overweight and obesity as reported by (WHO, 2020).

On measures to reduce the risks of overweight and obesity, majority agreed that exercise (96.32%), reduced intake of saturated fat (78.68%), fruit consumption (75.74%) and vegetable (72.06%) were the major avenues that could help reduce risk factors of overweight and obesity. This was in line with reports (WHO, 2020) and those documented in other studies. However, most participants were not practicing these safety measures. Moreover, most participants (90) did not know that medication could reduce overweight and obesity contrary to a report (Knott, 2018) that two medications, orlistat and liraglutide were options to weight loss.

Knowledge Levels on Health Risks of Overweight and Obesity

We found that none of the participants as at the period prior to the study knew of WHO's BMI cut-offs for overweight and obesity. Though the majority (124) reported it was important to regularly go for voluntary BMI check-ups, yet very few were doing so. Our result was similar to a study (Torre, Courvoisier, Saldarriaga, Martin, & Farpour-Lambert, 2018) where one-third of nurses and physicians did not know how to calculate BMI. Concerning knowledge on health risks of overweight and obesity, a fairly high proportion of participants; 75%, 66.17% and 64.71% respectively reported that hypertension, stroke and heart diseases were the main complications associated with overweight and obesity. A study (Obirikorang et al., 2016) found a high proportion of participants (81.8%) reporting hypertension as a common known

complication of obesity. Participants' knowledge on health risks of overweight was above average, however, it had no significant bearing on their BMI. Our finding was analogous to a study (O'Brien & Davies, 2007) which found no significant correlation between participants' level of nutrition knowledge and BMI, though a high level of nutrition knowledge was found among the sample. Few of our study participants believed that, aside these three complications, other conditions such as gallbladder disease, dyslipidaemia, asthma, skin irritation, cancers, sleep apnoea, osteoarthritis, type 2 diabetes, impotence, kidney disease, fatty liver disease, heartburns, fertility problem, pregnancy problems and stress incontinence were some of the complications that one may suffer due to overweight and obesity. All these complications were in line with those reported in several studies including (Knott, 2018; WHO, 2020) that high BMI is a major risk factor for non-communicable diseases such as cardiovascular diseases (mainly heart disease and stroke), which were the leading cause of death in 2012; diabetes, musculoskeletal disorders (especially osteoarthritis), some cancers (including endometrial, breast, ovarian, prostate, liver, gallbladder, kidney and colon), breathing difficulties, increased risk of fractures, hypertension and increased risk for caesarean delivery. Majority of the participants believed that depression and low self-esteem were the main psychological problems associated with overweight and obesity, even though they believed overweight or obese individuals could experience poor self-esteem or feeling of isolation. The results confirmed some studies (Knott, 2018; Rajan & Menon, 2017; Simon et al., 2006) that overweight and obesity were associated with psychological problems like low self-esteem, low confidence, feeling of isolation and depression.

Limitations of the study

1. The study used body mass index as the main determinant of overweight and obesity. However, BMI does not take into account different levels of adiposity based on age, sex and levels of physical activity. Nevertheless, it provides the most useful and convenient approximation for the determination of the health status of people.
2. The results were from Ho Municipality of Ghana only, and therefore cannot be generalised to the whole of Ghana.

Conclusion

Prevalence of overweight and obesity among the bakers in the Ho Municipality was high and influenced by socio-demographic characteristics such as age and gender. Physical inactivity and dietary habit were found to be significant contributors. Female bankers were prone to overweight whereas the males were prone to obesity. Generally, the awareness levels of the bankers on health risks of overweight and obesity was low. Though the knowledge levels of the bankers on health risks of overweight and obesity was above average, however, there was no correlation between their knowledge levels and BMI since a high proportion of them were overweight and obese. Dominance analysis revealed that marital status, age and gender were the most important contributors to the bankers knowledge on the health risks of overweight and obesity. The war against overweight and obesity can only be won through awareness creation on modifiable risk factors and also empowering people with knowledge on the associated health risks.

Recommendations

1. Further studies should be carried out on the topic in other organizations and regions of Ghana to generate sufficient evidence-based knowledge in order to effectively educate individuals on the impact of overweight and obesity on health.
2. Management of the banks should plan, implement and monitor the effectiveness of local programmes like wellness and fitness programmes to increase physical activity for the prevention and control of overweight and obesity.
3. Human resource directorate, in collaboration with local health organizations, must intensify public education and create awareness on the health risks associated with overweight and obesity in the Ho Municipality.
4. Local health authorities and public health workers should sensitize the public on healthy dietary habits.

Acknowledgement

Our sincere thanks to our parents for their financial support. Special thanks to Madam Comfort Lotse for allowing us to use the weighing scales and stadiometers in the Skills Laboratory during the data collection. Finally, we are grateful managers and staff of the banks for their cooperation and support.

Declaration of Interest

The authors collectively declare that there was no conflict of interest that would undermine or prejudice the impartiality of this scientific work.

Funding

This research output emanated from students' project work and therefore, did not receive funding from any source. Cost of study was borne by the students themselves.

Authors' Contributions

JWAJ – Designed and supervised the study, analysed data, drafted the manuscript and gave final approval. BS, KKE, SA, GC & OCI designed the study, collected and analysed data, drafted the manuscript and gave final approval.

Ethical Considerations

Approval Body: UHAS – REC

Approval Number: UHAS-REC A.4 [327] 18-19

References

- Adaja, T. M., & Idemudia, O. J. (2018). Prevalence of overweight and obesity among health-care workers in University of Benin Teaching Hospital, Benin City, Nigeria. *Annals of Tropical Pathology*, 9(2), 1–11. <https://doi.org/10.4103/atp.atp>
- Addo, P. N. O., Nyarko, K. M., Sackey, S. O., Akweongo, P., & Sarfo, B. (2015). Prevalence of obesity and overweight and associated factors among financial institution workers in Accra Metropolis, Ghana: a cross sectional study. *BMC Research Notes*, 8(1), 1–8. <https://doi.org/10.1186/s13104-015-1590-1>
- Agyapong, N. A. F., Annan, R. A., Apprey, C., Nana, L., & Aduku, L. N. E. (2020). Body Weight, Obesity Perception, and Actions to Achieve Desired Weight among Rural and

- Urban Ghanaian Adults. *Journal of Obesity*, 2020, 1–8.
<https://doi.org/https://doi.org/10.1155/2020/7103251>
- Agyemang, C., Boatemaa, S., Frempong, G., & de-Graft Aikins, A. (2015). Obesity in Sub-Saharan Africa. *Metabolic Syndrome*, 1–13(January), 1–13.
<https://doi.org/10.1007/978-3-319-12125-3>
- Al-Muammar, M. N., El-Shafe, M., & Feroze, S. (2014). Association between dietary habits and body mass index of adolescent females in intermediate schools in Riyadh , Saudi Arabia. *Eastern Mediterranean Health Journal*, 20(1), 39–45. Retrieved from <http://www.emro.who.int/emhj-vol-20-2014/volume-20-issue-1/association-between-dietary-habits-and-body-mass-index-of-adolescent-females-in-intermediate-schools-in-riyadh-saudi-arabia.html>
- Amugsi, D. A., Dimbuene, Z. T., Mberu, B., Muthuri, S., & Ezeh, A. C. (2017). Prevalence and time trends in overweight and obesity among urban women : an analysis of demographic and health surveys data from 24 African countries , 1991 – 2014. *BMJ Open*, 7(10), 1991–2014. <https://doi.org/10.1136/bmjopen-2017-017344>
- Benazeera, U. J. (2014). RESEARCH ARTICLE ASSOCIATION BETWEEN EATING HABITS AND BODY MASS INDEX (BMI) OF ADOLESCENTS. *International of Medical Science and Public Health*, 3(8), 40–943.
<https://doi.org/10.5455/ijmsph.2014.290420141>
- Benkeser, R. M., Biritwum, R., & Hill, A. G. (2014). Prevalence of Overweight and Obesity and Perception of Healthy and Desirable Body Size in Urban , Ghanaian Women. *Ghanaian Medical Journal*, 46(2), 66–75.
- Chukwuonye, I. I., Chuku, A., John, C., Ohagwu, K. A., Imoh, M. E., Isa, S. E., & Ogah, O. S. (2013). Prevalence of overweight and obesity in adult Nigerians – a systematic review. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*, 43, 43–47.
<https://doi.org/https://dx.doi.org/10.2147%2FDMSO.S38626>
- Duodu, C., Awuni, T. K., Attito, P., & Zotor, F. B. (2015). Assessment of Overweight and Obesity Prevalence Among Practicing Nurses and Midwives in the Hohoe Municipality of the Volta Region , Ghana. *Science Journal of Public Health*, 3(6), 842–851.
<https://doi.org/10.11648/j.sjph.20150306.18>
- Erem, C. (2015). IJC Metabolic & Endocrine Prevalence of overweight and obesity in Turkey. *IJC Metabolic & Endocrine*, 8, 38–41. <https://doi.org/10.1016/j.ijcme.2015.07.002>
- Flegal, K. M., Kruszon-moran, D., Carroll, M. D., Fryar, C. D., & Ogden, C. L. (2016). Trends in Obesity Among Adults in the United States, 2005 to 2014. *JAMA*, 20782(21), 2284–2291. <https://doi.org/10.1001/jama.2016.6458>
- Fryar, D. C., Carroll, D. M., & Ogden, L. C. (2018). *Prevalence of Overweight, Obesity, and Severe Obesity Among Adults Aged 20 and Over: United States, 1960–1962 Through 2015–2016. National Center for Health Statistics. Division of Health and Nutrition Examination Surveys. National Center for Health Statistics.* Retrieved from https://www.cdc.gov/nchs/data/hestat/obesity_adult_15_16/obesity_adult_15_16.htm
- Ghaderian, S. B., Yazdanpanah, L., Shahbazian, H., Sattari, R., Latifi, S. M., & Sarvandian, S. (2019). Prevalence and Correlated Factors for Obesity , Overweight and Central Obesity in Southwest of Iran. *Iran J Public Health*, 48(7), 1354–1361.
- Ghana Statistical Service. (2014). *2010 Population and Housing Census.*
- Hagan Jr., J. E., Nsiah-Asamoah, C., Hormenu, T., Pollmann, D., & Schack, T. (2018). Managing Overweight and Obesity in Ghana from a Cultural Lens: The Complementary

- Role of Behaviour Modification. *Journal of Preventive Medicine and Care*, 2(2), 18–31. <https://doi.org/10.14302/issn.2474>
- Hemmingsson, E., & Ekelund, U. (2006). Is the Association Between Physical Activity and Body Mass Index Obesity Dependent? *International Journal of Obesity*, 31(4), 663–668. <https://doi.org/10.1038/sj.ijo.0803458>
- Hruby, A., & Hu, F. B. (2015). The Epidemiology of Obesity : A Big Picture. *PharmacoEconomics*, 33(7), 673–689. <https://doi.org/10.1007/s40273-014-0243-x>
- Kandala, N., & Stranges, S. (2014). Geographic Variation of Overweight and Obesity among Women in Nigeria : A Case for Nutritional Transition in Sub-Saharan Africa. *PLoS ONE*, 9(6), e101103. <https://doi.org/10.1371/journal.pone.0101103>
- Kanter, R., & Caballero, B. (2012). Global Gender Disparities in Obesity : A Review 1. *Advances in Nutrition*, 3(4), 491–498. <https://doi.org/10.3945/an.112.002063>.published
- Kjellberg, J., Larsen, A. T., & Ibsen, R. (2017). The Socioeconomic Burden of Obesity. *Obesity Facts*, 10(5), 493–502. <https://doi.org/10.1159/000480404>
- Knott, L. (2018). Childhood Obesity. *Childhood Obesity/Risks and Statistics/Patient*, 1–9. Retrieved from [https://www.google.com/search?q=Knott%2C+L.++\(2018\).+Obesity+and+Overweight.&oq=Knott%2C+L.++\(2018\).+Obesity+and+Overweight.&aqs=chrome..69i57.4442j0j9&sourceid=chrome&ie=UTF-8](https://www.google.com/search?q=Knott%2C+L.++(2018).+Obesity+and+Overweight.&oq=Knott%2C+L.++(2018).+Obesity+and+Overweight.&aqs=chrome..69i57.4442j0j9&sourceid=chrome&ie=UTF-8)
- Lartey, T. S., Magnussen, C. G., Si, L., Boateng, G. O., De, B., Biritwum, R. B., ... Palmer, J. (2019). Rapidly increasing prevalence of overweight and obesity in older Ghanaian adults from 2007-2015 : Evidence from WHO-SAGE Waves. *PLOS ONE*, 14(8), 1–16. <https://doi.org/https://doi.org/10.1371/journal.pone.0215045>
- Lehnert, T., Sonntag, D., Fellow, P., Riedel-heller, S., & Medicine, S. (2013). Best Practice & Research Clinical Endocrinology & Metabolism. *Best Practice Research Clinical Endocli*, 27(2), 105–115. <https://doi.org/10.1016/j.beem.2013.01.002>
- Lemamsha, H., Randhawa, G., & Papadopoulos, C. (2019). Prevalence of Overweight and Obesity among Libyan Men and Women. *BioMed Research International*, 2019, 1–16. <https://doi.org/https://doi.org/10.1155/2019/8531360>
- Lokuruka, M. (2013). A Literature Review of Role of Obesity in Adult Health with Reference to Africa. *African Journal of Food, Agriculture, Nutrition and Development*, 13(1), 7088–7104. <https://doi.org/10.18697/ajfand.56.11000>
- Mahmoud, M. H., & Taha, A. S. (2017). The Association between Eating Habits and Body Mass Index among Nursing Students. *IOSR Journal of Nursing and Health Science*, 6(3), 14–26. <https://doi.org/10.9790/1959-0603061426>
- Mandal, A. (2019). Causes of Obesity and Overweight. *News Medical*, 1–4. Retrieved from <https://www.news-medical.net/health/Causes-of-Obesity-and-Overweight.aspx>
- Marques, A., Peralta, M., Naia, A., & Loureiro, N. (2017). Prevalence of adult overweight and obesity in 20 European countries , 2014. *European Journal of Public Health*, 28(2), 295–300. <https://doi.org/10.1093/eurpub/ckx143>
- Mehrabani, J., & Ganjifar, Z. K. (2018). Overweight and obesity : a brief challenge on prevalence , complications and physical activity among men and women. *MOJ Women's Health*, 7(1), 19–24. <https://doi.org/10.15406/mojwh.2018.07.00161>
- Nishida, C., Borghi, E., Branca, F., & Onis, M. De. (2014). Global Trends in Overweight and Obesity. (pp. 1–8).
- O'Brien, G., & Davies, M. (2007). Nutrition knowledge and body mass index. *Health Education*

- Research*, 22(4), 571–575. <https://doi.org/10.1093/her/cy1119>
- Obirikorang, Y., Obirikorang, C., Anto, E. O., Acheampong, E., Dzah, N., Akosah, C. N., & Nsenbah, E. B. (2016). Knowledge and Lifestyle-Associated Prevalence of Obesity among Newly Diagnosed Type II Diabetes Mellitus Patients Attending Diabetic Clinic at Komfo Anokye Teaching Hospital, Kumasi, Ghana: A Hospital-Based Cross-Sectional Study. *Journal of Diabetes Research*, 2016, 1–10. <https://doi.org/https://doi.org/10.1155/2016/9759241>
- Ofori-asenso, R., Agyeman, A. A., & Ashiagbor, G. (2017). Anthropometric Profiles of Child-bearing Women in Ghana — Past Measurements and Future Trends Abstract: *The Open Public Health Journal*, 10, 32–40. <https://doi.org/10.2174/1874944501710010032>
- Ofori-asenso, R., Agyeman, A. A., Laar, A., & Boateng, D. (2016). Overweight and obesity epidemic in Ghana — a systematic review and meta-analysis. *BMC Public Health*, 16(1), 1–18. <https://doi.org/10.1186/s12889-016-3901-4>
- Ogden, C. L., Carroll, M. D., Lawman, H. G., Fryar, C. D., Kruszon-moran, D., Kit, B. K., & Flegal, K. M. (2016). Trends in Obesity Prevalence Among Children and Adolescents in the United States, 1988-1994 Through 2013-2014. *JAMA*, 315(21), 2292–2299. <https://doi.org/10.1001/jama.2016.6361>
- Rajan, T. M., & Menon, V. (2017). Psychiatric disorders and obesity: A review of association studies. *Journal of Postgraduate Medicine*, 63(3), 182–190. <https://doi.org/10.4103/jpgm.JPGM>
- Romieu, I., Dossus, L., Barquera, S., Blotière, H. M., Franks, P. W., Gunter, M., ... Willett, C. W. (2017). Energy balance and obesity: what are the main drivers? *Cancer Causes & Control*, 25(3), 247–258. <https://doi.org/10.1007/s10552-017-0869-z>
- Rossouw, A. H., Grant, C. C., & Viljoen, M. (2012). Overweight and obesity in children and adolescents: The South African problem. *South African Journal of Science*, 108(5–6), 1–7. <https://doi.org/https://dx.doi.org/10.4102/sajs.v108i5/6>
- Simon, G. E., Korff, M. Von, Saunders, K., Miglioretti, D. L., Crane, P. K., Belle, G. Van, & Kessler, R. C. (2006). Association Between Obesity and Psychiatric Disorders in the US Adult Population. *Archives of General Psychiatry*, 63(July 2006), 824. <https://doi.org/https://dx.doi.org/10.1001%2Farchpsyc.63.7.824>
- Torre, S. B. Della, Courvoisier, D. S., Saldarriaga, A., Martin, X. E., & Farpour-Lambert, N. J. (2018). Knowledge, attitudes, representations and declared practices of nurses and physicians about obesity in a university hospital: training is essential. *Clinical Obesity*, 8(2), 122–130. <https://doi.org/10.1111/cob.12238>
- Tremmel, M., Gerdtham, U., Nilsson, P. M., & Saha, S. (2017). Economic Burden of Obesity: A Systematic Literature Review. *International Journal of Environmental Research and Public Health*, 14(4), 1–18. <https://doi.org/10.3390/ijerph14040435>
- Tzotzas, T., Vlahavas, G., Papadopoulou, S. K., Kapantais, E., Kaklamanou, D., & Hassapidou, M. (2010). Marital status and educational level associated to obesity in Greek adults: data from the National Epidemiological Survey. *BMC Public Health*, 10(1), 732. <https://doi.org/10.1186/1471-2458-10-732>
- WHO/EHIG. (2020). *Overweight: World Health Organization/European Health Information Gateway*. Retrieved on May 15, 2020. Retrieved from https://gateway.euro.who.int/en/indicators/h2020_6-overweight/
- WHO. (2020). *Obesity and overweight*. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>

- Yousif, M. M., Kaddam, L. A., & Humeda, H. S. (2019). Correlation between physical activity , eating behavior and obesity among Sudanese medical students Sudan. *BMC Nutrition*, 5(1), 1–8. <https://doi.org/https://doi.org/10.1186/s40795-019-0271-1>
- Zhang, Z., & Wang, M. (2012). Obesity , a health burden of a global nature. *Acta Pharmacologica Sinica*, 33(2), 145–147. <https://doi.org/10.1038/aps.2011.185>
- Ziraba, A. K., Fotso, J. C., & Ochako, R. (2009). Overweight and obesity in urban Africa : A problem of the rich or the poor ? *BMC Public Health*, 9(1), 1–9. <https://doi.org/10.1186/1471-2458-9-465>