

RELATIONSHIP BETWEEN OBESITY AND TYPE OF
OCCUPATION AMONG THE CIVILSERVANTS OF MALE'
MALDIVES

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RELATIONSHIP BETWEEN OBESITY AND TYPE OF OCCUPATION
AMONG THE CIVILSERVANTS OF MALE' MALDIVES

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I hereby declare that this project is the result of my own work, except for quotations and summaries which have been duly acknowledged.

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ABSTRACT

Background: According to WHO, more than 1 in 3 adults globally were overweight and more than 1 in 10 were obese in 2014. Obesity and overweight are risk factors for cardiovascular diseases among many other diseases. Obesity and overweight has been noted as two of the most prevalent risk factors for NCDs in the Maldives. It has been established that sedentary lifestyles affects weight and waist circumference of people. Hence, the purpose of this study was to find the relationship between obesity and type of occupation among civil servants of Male' Maldives.

Method: This was a descriptive cross sectional study among two hundred and seventeen administrative officers, one hundred and one teachers and fifty one nurses from the civil servants of Male'. The dietary and physically active habitat at work and home were measured with the help of a self-administered questionnaire. Obesity (based on body mass index) and fat deposits (based on waist circumference (WC)) were defined using WHO criteria.

Result: The results show that there was no significant relationship between obesity and occupations and neither with most of the explanatory variables selected for this study. Only 9 participants have more than 80 cm of waist circumference. And 5 participants have more than 30 units of BMI among the 92 participants. This study however, highlighted risk factors such as high carb diet, smoking, disease conditions and lack of exercise that could lead to obesity among civil servants and a slightly significant association between obesity and physical activity.

Implications: Due to the small sample size, this study could not identify a relationship between the type of occupation and obesity. But notable number of participants had a waist circumference between 76-80cm, hence it is recommended to raise awareness especially for people working in deskbound jobs. Findings from this study points to the importance of designing work environments to avoid physical inactivity. High risk working populations and larger samples covering more categories of civil service employment beyond the civil service needs to be targeted in further studies. Future research needs to target.

Key words: Obesity, occupations, Maldives

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ABBREVIATIONS AND ACRONYMS

WHO- World Health Organization

WC- Waist Circumference

BMI- Body Mass Index

CHAPTER 01

INTRODUCTION

1.1 Background to the Study

The prevalence of obesity has been increasing dramatically during past years in the world (Gomez-Ambrosi et al., 2012; Stewart-Knox et al., 2012). Overweight and obesity are defined as accumulation of abnormal or excessive fat that provides advance health risk (Obesity and overweight, 2015). Overweight and obesity rates in the United States have been expanding at a speedier pace than in the Asian nations. From 1980 till 2013, China's overweight and weight commonness in grown-ups rose from 11.3% to 27.9% and in people below the age of 20, from 5.7 % to 18.8 %.1 Malaysia saw a three fold increment in stoutness predominance among grown-ups, from 4.4 % in 1996 to 14 % in 2006. Likewise, overweight and heftiness pervasiveness among grown-ups in Vietnam dramatically increased from 1992 to 2002 (2.0 % to 5.7 %) (Cheong, 2014). Numerous studies show that overweight and obesity are risk factors for cardiovascular diseases (CVD), high blood pressure, type 2 diabetes, cancers, hypertension, and stroke (Overweight and obesity, 2012; Salinsky & Scott, 2003; Franz & Feresu, 2013). Generally speaking, the majority of obesity among moderately aged adults aged 40–59 (40.2%) and more established adults aged matured 60 and more than 37.0% was higher than among more youthful grown-ups matured 20–39 (32.3%) (Ogden, Carroll, Fryar, & Flegal, 2015).

According to WHO global statistics, more than 1 in 3 adults were overweight and more than 1 in 10 were obese in 2014 (WHO, 2016, Global diabetes report). Regionally the prevalence of obesity was highest in the WHO Region of the Americas and it was lowest in the WHO South-East Asian Region where Maldives belongs. (WHO, 2016, Global diabetes report, p28)

In 2008, 12.9% of Maldivians were obese and this was more prevalent in females. In 2008, 20.2% of Maldivian females were obese (Non-communicable diseases country profiles, 2014). Most of the deaths that occur in Maldives are due to high blood pressure which is obesity related health risk (High blood pressure leads to most deaths in Maldives, 2013).

1.2 Problem statement and justification

Obesity has reached epidemic proportions globally, with at least 2.8 million people dying each year as a consequence of being overweight or obese (WHO, 2014). WHO defines obesity as an “abnormal or excessive fat accumulation that may impair health” (WHO, 2015). According to WHO (2015), the central cause of obesity and overweight is an energy imbalance between calories taken in and calories used. Globally, there has been an increased uptake of energy-dense foods that are high in fat; and an increase in physical inactivity due to the increasingly sedentary nature of many forms of work, changing modes of transportation, and increasing urbanization (WHO, 2015). No research has been done in the Maldives to address the issue of obesity taking the different types of occupations people perform into consideration.

1.3 Purpose of the Research

The main purpose of this study is to understand the relationship between obesity and the type of occupation among the working population in Male' Maldives.

1.4 General objectives

1.4.1 General objective

To identify the relationship between obesity and the types of occupation among civil servants of Male' Maldives.

1.4.2 Specific objectives

To understand the types of occupation related to obesity.

To identify risk factors among different type of the workers and its relationship with obesity.

1.5 Research Questions/Hypothesis

What are the occupations that are most likely to lead to obesity in Male'?

What are the risk factors for obesity among the workers in the civil service in Male'?

Is obesity associated with the type of occupation?

1.6 Significance of the Research

This study provides an understanding of the contributing factors that will help prevent obesity and other NCDs among the working population of Maldives which is a very large proportion of the total population. Likewise; this study will be helpful to the policy makers to reform existing policies on Non-communicable disease to segmented populations of the

country. This study can facilitate awareness programs and other interventions by identifying the high risk population. This study also provides policy direction for the Civil services commission to make policy changes to the civil service regulation to make workplaces active.

1.7 Delimitation/Scope of the research

This study was restricted to only three professions. Inclusion of other service categories such as labourers, construction workers may have contributed to a better understanding among the working population. Also, the study is concentrated only in Male' and the representativeness of the population may have been improved by including workers from other atolls.

1.8 Definition of terms

Obesity: Obesity has been more precisely defined by the National Institutes of Health (the NIH) as a BMI (Body Mass Index) of 30 and above.

Overweight: Weight that is higher than what is considered as a healthy weight for a given height is described as overweight or obese. Body Mass Index, or BMI, is used as a screening tool for overweight or obesity.

BMI: To calculate BMI, see the Adult BMI Calculator or determine BMI by finding your height and weight in this BMI Index Chart.

- If your BMI is less than 18.5, it falls within the underweight range.
- If your BMI is 18.5 to <25, it falls within the normal.
- If your BMI is 25.0 to <30, it falls within the overweight range.
- If your BMI is 30.0 or higher, it falls within the obese range.

CHAPTER 02

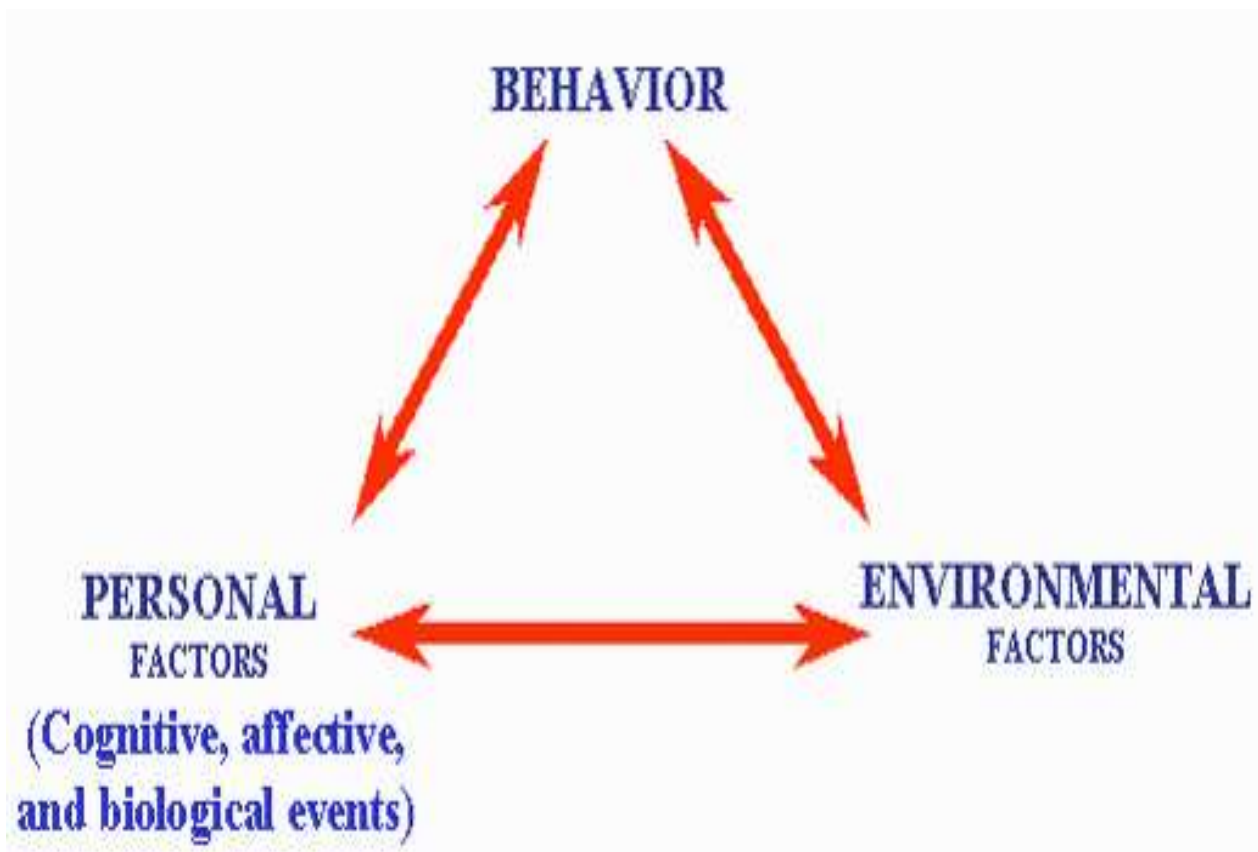
REVIEW OF LITRATURE

2.1 Introduction

Literature review consists of two parts. The first part explains the theoretical framework of the research. The second part presents previous studies on both the dependent and independent variables.

2.2 Theoretical Frame work

Theoretical framework used for this study is a theory which was proposed by Miller and Dollard in 1941 which was known as social cognitive theory (SCT). The SCT theorizes social context with a dynamic and reciprocal interaction of the person, environment and behavior (Boston University School of Public Health, 2016).



Bandura's theory of The Reciprocal Triadic Determinism

Based on Bandura's theory of reciprocal triadic determinism, a conceptual frame work for this study has been designed. As it shows personal factors like gender, background of study will lead to behavioral factors like eating habits, poor cooking disciplines and other factors lead to diseases like obesity, diabetes and heart diseases and other types of diseases.

2.3 Previous studies

Obesity and Physical Activity

Physical activity is characterized as any substantial development created by skeletal muscles that require energy consumption (WHO, Physical Activity, 2016). The term "physical activity" and "exercise" must not be mistaken and be used interchangeably. Exercise, is a subcategory of physical activity that is planned, structured, repetitive, and purposeful in the sense that the improvement or maintenance of one or more components of physical fitness is the objective. Physical activity includes exercise as well as other activities which involve bodily movement and are done as part of playing, working, active transportation, house chores and recreational activities.

As per the statistics of WHO (2016), physical inactivity has been recognized as the fourth leading risk factor for worldwide mortality (6% of deaths all around). Moreover, physical inactivity is estimated to be the main cause for approximately 21–25% of breast and colon cancers, 27% of diabetes and approximately 30% of ischaemic heart disease burden. Approximately 3.2 million deaths each year are attributable to insufficient physical activity (WHO, 2016).

Several researches have been done to find out the relation between physical activity and obesity. According to Larouche (2014), active travel adds to lower obesity risk and premature cardiovascular disease mortality among grown-ups, and enhanced wellness in youngsters and youth. Moreover, a study done by Khan, Thompson, Blair, Sallis, Powell, Bull & Bauman (2012), have shown that game and recreation participation is identified with lessened overweight or weight and enhanced physical wellness. Another study done by Lee, Shiroma, Lobelo, Puska, Blair & Katzmarzyk (2012) also have shown that being active lowers type 2 diabetes and cardiovascular disease in adults.

A study done over 13 years by Lee, Djoussé, Sesso, Wang & Buring (2010) has shown that women consuming a usual diet, physical activity were associated with less weight gain. Moreover, the study also has reflected that women who spend an average of approximately 60 minutes a day of moderate-intensity gained fewer than 2.3 kg over 13 years. This study reflects the importance of physical activity to maintain the weight, hence reducing the risk of being obese.

In addition to this, a study done by Must & Tybor (2005) suggests that increased physical activity and decreased sedentary behavior are protective against relative weight and fatness gains over childhood and adolescence.

Furthermore, higher levels of sedentary behaviour among children and young people are associated with greater risk of obesity and cardiovascular disease risk factors, higher overall energy intake and consumption of energy-dense food and drinks, and lower intake of fruit and vegetables (Victorian Health Promotion Foundation, 2016).

Obesity and Sleeping Duration

Apparently, short sleep duration is independently linked with weight gain, particularly in younger age groups (Gangwisch, Malaspina, Boden-Albala, & Heymsfield, 2005). Further researches with target measures of sleep duration, repeated assessments of both sleep and weight, and experimental study designs that control sleep are expected to better characterize the causal relationship of lack of sleep deprivation on obesity. Findings in both cross-sectional and cohort studies of kids proposed short rest term is firmly and reliably connected with simultaneous and future obesity (Patel & Hu, 2008)

There are a few conceivable ways that lack of sleep could build the chances of becoming obese. Sleep-deprived people might be excessively drained, making it impossible to work out, diminishing the "calories burned" side of the weight-change condition. Alternately individuals who don't get enough rest may take in a bigger number of calories than the individuals who do, simply because they are awake longer and have more opportunities to eat; absence of rest likewise upsets the adjust of key hormones that control hunger, so restless individuals might be hungrier than the individuals who get enough rest every night (Sleep Deprivation and Obesity, n.d.).

At the point when the body gets less rest, the metabolism slows down to save energy. That stoppage activates the release of the hormone cortisol, which expands hunger. In a continuous loop, sleep loss additionally causes the body to discharge more ghrelin, another hormone that signs hunger, and less leptin (Why Lack of Sleep Could Be Making You Fatter, n.d.).

Obesity and Cessation from Cigarette Smoking

Numerous cross-sectional studies indicate that body weight, or body mass index (BMI) is lower in cigarette smokers than in nonsmokers. In the World Health Organization Monitoring Cardiac Disease (WHO MONICA) surveys, BMI was lower in smokers than in nonsmokers. However, cessation from cigarette smoking has a negative impact on weight. A research done by Chioloro (2008) and his colleagues found out that after 30 day of smoking cessation, the resting metabolic rate in female quitters was shown to be 16% lower than it had been when they were smoking, and an increase in body weight was attributable to a decrease in resting metabolic rate and an increase in caloric intake (Chioloro, Faeh, Paccaud & Cornuz, 2008). A comparative research done by Mackay (2013) and his colleagues additionally discovered that ex-smokers were at expanded danger of putting on weight than the never smokers and momentum smokers.

The systems of weight increase subsequent to smoking discontinuance incorporate diminished metabolic rate and expanded caloric admission, impacts inverse to those created by nicotine. Nicotine has numerous potential consequences on central nervous system regulation of eating and energy expenditure. The release of hormones such as norepinephrine, dopamine, serotonin and γ -aminobutyric acid by the central nervous system impacts brain chemicals that smother eating and increment metabolic rate, (such as pro-opiomelanocortin and cocaine-amphetamine-regulated transcript) and in addition those that stifle eating and lessening metabolic rate, (such as neuropeptide Y, Agouti-related peptide, melanin-concentrating hormone, and orexin). Nicotine has complex effects on these hormones; the intense reaction is steady with initiation of systems that abatement hunger and increment body metabolism, whereas the chronic changes are consistent with activation

of systems that expand craving and diminishing metabolic rate (McGovern & Benowitz, 2011).

Obesity and unhealthy diet

Utilization of fast food among individuals around the world appears to adversely effect dietary quality in ways that could increase risk for obesity. Studies have demonstrated that utilization of sustenance consumed from home has additionally risen alarmingly. It is notable that eating out may prompt to excess calorie admission and builds the danger of weight as a result of large portion sizes and increased energy density of foods. Fast foods fall into this classification of food. Fast foods are ordinarily high in calories, high in calories, rich in saturated and trans fat and contain lot of sugar and sodium (Mandal, 2016).

The main area in the brain that regulates energy balance is the hypothalamus. According to Gunnars (2014), consumption of highly processed junk foods can cause inflammation in the hypothalamus of the brain, causing leptin resistance. This makes the brain think that the body is starving. Leptin is the principle hormone required in long-term energy balance. The greater the fat cells, the more leptin they deliver. It senses various signals, including hormones, then either makes us feel satiated or hungry. The brain regulates food intake both on a short-term (meal to meal) basis, as well as on a long-term basis. (Gunnars, 2014)

Obesity and Diabetes

Obesity is one of the most important modifiable risk factors for the prevention of type 2 diabetes (Nguyen, Lane, Wang, 2010). Recent studies have identified “links” between obesity and type 2 diabetes involving proinflammatory cytokines (tumour necrosis factor and interleukin-6), insulin resistance, deranged fatty acid metabolism, and cellular

processes such as mitochondrial dysfunction and endoplasmic reticulum stress. (Eckel, Kahn, Ferrannini, Goldfine, Nathan, Schwartz, Smith & Smith, 2011)

At least three distinct mechanisms have been proposed to link obesity to insulin resistance and predispose to type 2 diabetes:

1) increased production of adipokines/cytokines, including tumor necrosis factor- α , resistin, and retinol-binding protein 4, that contribute to insulin resistance as well as reduced levels of adiponectin ;

2) ectopic fat deposition, particularly in the liver and perhaps also in skeletal muscle, and the dysmetabolic sequelae; and 3) mitochondrial dysfunction, evident by decreased mitochondrial mass and/or function (Gordon, 2014). Mitochondrial dysfunction could be one of many important underlying defects linking obesity to diabetes, both by decreasing insulin sensitivity and by compromising β -cell function.

According to Gordon (2014), researchers have found that obesity causes stress in a system of inner cellular membranes called endoplasmic reticulum (ER), which in turn causes the endoplasmic reticulum to suppress the signals of insulin receptors, which then leads to insulin resistance.

As per the data available in Obesity Society (2015), almost 90% of people living with type 2 diabetes are overweight or have obesity. People who are overweight or have obesity have added pressure on their body's ability to use insulin to properly control blood sugar levels, and are therefore more likely to develop diabetes (obesity society, 2015).

A study done by the Harvard School of Public Health's (HSPH) showed that being even slightly overweight increased diabetes risk five times, and being seriously obese increased it 60 times. Today, roughly 30 percent of overweight people have the disease, and 85 percent of diabetics are overweight. (Powell, 2012).

In a nationally representative sample of US adults, the prevalence of diabetes increases with increasing weight classes. Nearly one fourth of adults with diabetes have poor glycemic control and nearly half of adult diabetics are considered obese suggesting that weight loss is an important intervention in an effort to reduce the impact of diabetes on the health care system (Nguyen, Lane, Wang, 2010).

A study done by Jean-Philippe Bastard, Mustapha Maachi, Claire Lagathu, Min Ji Kim, Martine Caron, Hubert Vidal, Jacqueline Capeau, Bruno Feve (2006) revealed that excess weight has been shown to be associated with an increased prevalence of type II diabetes, gastroesophageal reflux, hypertension, dyslipidemia, and certain cancers and both obesity and diabetes are associated with an increased risk for mortality, particularly from cardiovascular disease.

Obesity and Hypertension

Hypertension is responsible for at least 45% of deaths due to heart disease and 51% of deaths due to stroke. Behavioural risk factors which are attributed hypertension are unhealthy diet, harmful use of alcohol, lack of physical activity, excess weight and exposure to persistent stress (WHO, 2013). In addition to this, the Framingham Heart Study, estimated that excess body weight accounted for approximately 26 percent of cases of hypertension in men and 28 percent in women Delaney, n.d).

A research done by Cowley (2014), has revealed that the hormone leptin which is secreted by fat cells is altogether increased after weight gain and in obesity, acts in the brain to hoist blood pressure. In the study, both animal and human experiments were included with patients lacking the hormone leptin or lacking the leptin receptor.

In genetically engineered mice, just those with ordinary leptin, results demonstrated an elevated blood pressure when they became obese. This rodent data was affirmed in human studies, in which obese leptin-deficient and leptin receptor deficient patients had lower systolic blood pressure compared to aged and BMI matched controls. Re-establishing leptin receptors to the brain of obese leptin receptor deficient mice increased their blood pressure (medicals, 2014)

Obesity and genetics

It is at present established that overweight and the distinctive types of obesity are conditions tending to concentrate within a family. Heritability of obesity may shift contingent upon the phenotype, however it tends to be higher for phenotypes linked to adipose tissue distribution and for weight or body fat excess. Weight gain and adiposity increment are likewise affected by heredity (Laval, n.d.). Obesity risk is two to eight times higher for a person with a family history as opposed to a person with no family history of obesity, and a considerably higher hazard is seen in instances of severe obesity (Laval, n.d.).

According to Rofles & Whitney (2007), researchers have recognized an obesity gene referred to as *ob*, that is expressed particularly in the adipose tissue and codes for the protein leptin. Leptin acts as a hormone, mainly in the hypothalamus. Leptin keeps homeostasis through regulating meals consumption and energy expenditure in response to adipose tissue. When the body fat increases, leptin will increase which suppresses urge for food and vice versa. Although extraordinarily rare, a genetic deficiency of leptin or genetic mutation of its receptor has been identified in human.

Ghrelin is another protein which goes about as a hormone fundamentally in the hypothalamus (Rofles & Whitney, 2007). Rather than leptin, ghrelin is discharged by the stomach cells and advances weight gain yet fortifying hunger and advancing efficient energy storage. Ghrelin triggers the longing to eat. Blood levels of ghrelin ordinarily ascend before and fall after a supper in extent to the kcalories ingested, reflecting the craving and satiety that proceed and take after eating.

Uncoupling proteins also codes for genes that are involved in energy metabolism. These proteins may impact the storing or expending of energy with different efficiencies or in different types of fat (Rofles & Whitney, 2007). Uncoupling proteins are active not only in brown fat, but also in white fat and numerous different tissues. Their activities appear to impact the BMR and contradict the improvement of obesity. Individuals with a hereditary variation of an uncoupling protein have brought down metabolic rates and are more overweight than others.

Obesity and Eating Pattern

Changes in dietary propensities and physical action have been involved as potential reasons for weight. A few studies have recommended that eating patterns, which describe eating frequency and the temporal distribution of eating events across the day. As per the results of a research conducted by Ma, Bertone, Stanek, Reed, Hebert, Cohen, Merriam & Ockene (2003), a greater number of eating episodes each day was associated with a lower risk of obesity. They also found out that those subjects who had fewer meals but consumed large portion were at a greater risk of being obese. Moreover, in their study they also came up with skipping breakfast was associated with increased prevalence of obesity.

According to Ma et. al (2003), obesity effect hormonal regulation of energy and lipid metabolism. Inappropriate dinner also seems to increase the prevalence of obesity. As stated by Ma et. al (2003), eating multiple, small meals may smother yearning and general serum insulin concentrations. Insulin restrains lipase enzyme activity and increases fat deposition. Since insulin is related to fatty acid storage, meal frequency may be one of the variables influencing body weight. Furthermore, the research of Ma et. al (2003), also showed subjects who eat late in the evening with an increase amount of glucose stored in muscle as glycogen. In people, muscle glycogen vacillates as per times of muscle action and resulting starch utilization. Unless this put away glycogen is singed as fuel, it will eventually be put away as fat (Ma et. al 2003).

This study aims to identify many of the risk factors discussed above that are applicable to the working population of the Maldives.

CHAPTER 03

METHODOLOGY

3.1 Research Design

This is a quantitative descriptive cross sectional study which used quantitative technique for data collection. The descriptive cross-sectional study design was used since it is relatively easy to conduct within a short period of time and it is less expensive compared to other study designs. This study was conducted in Male' Maldives to study the relationship between occupation and obesity among the civil servants (Teacher, Nurses and Admin officer). Hence this study design helped to collect information from the three groups of participants to describe the obesity related factors and its association with their occupation.

3.1.1 Study Area

The study area chosen for this research is Male'. This is the capital city of Maldives where almost one third of the total population (approximately 100,000) lives.

3.1.2 Target Population

The target population of this study is the working population of all civil servants from Male' Maldives. According to the statistic from Civil service commission there are 24511 civil servants' across the country (Civil Service Commission, n.d). However, in Male' are.

There are 9553 civil servants' and among them 1355 (14.18%) are teachers, 688 (7.2%) are nurses and 2919 (30.5%) are admin staffs (Civil Service Commission, n.d).

3.1.3 Sampling Techniques

Stratified random sampling technique (Appendix-A) was used in this research. There are 31 service types in the civil services, among which three service types were selected in this research. These three service categories represent the three strata. The three strata were Teachers, Nurses, and Admin officers. These three service categories were chosen because it represent the top three services by number of people involved in the professions. Furthermore, a subset was made from each stratum for males and females. This was done to increase the chances to have a proportionate number of males and females in the sample.

Once all the three services were divided into subsets, a random sampling technique was used in selecting the portion of services from each subset. More samples were taken from the subset that contains more people in service. This is done according to their percentage of involvement of the total population (Appendix-B).

The stratified random sampling technique was used in this research since it works well for populations with a variety of attributes and it represent all sub groups proportionally in the sample by selecting individuals from all the strata. Therefore, all the possible characteristics could be included in the sample.

3.1.4 Exclusion criteria

Pregnant women were excluded from this study. Pregnant women have more waist circumference and BMI due to the pregnancies.

3.2 Sample

The sample size of this study was calculated using online software RAOSOFT with 5% margin of error and a 95% confidence level. With 4962 people in service among the three chosen service types, the sample size for this study was 370 participants. Sample size for the strata was calculated proportionate to the percentage it represents. Due to limited time and slow response from the participants, 50% of the sample size was collected for this study, totaling to 185 participants. Questionnaire was given to these 185 participants and the response rate was 50% (92/185).

3.3 Instrumentation

The research instrument used in this research was a self-administered structured questionnaire. The questionnaire consisted of dichotomous question for collecting the data. The questionnaire was prepared in English (Appendix-C) and was translated to Dhivehi (Appendix-D). It took 10 to 15 minutes to answer the questions mentioned in the questionnaire. The questionnaire was designed in such a way that the researcher can achieve the objectives of the research. Hence it was divided into four sections which included questions on specific areas of the research. .

Section A was composed of nine questions which offer respondents a number of defined response choices. This section gathered information about the socio-demographic features of the service type such as age, gender, marital status, the highest level of education etc.

Section B of the questionnaire consisted of four questions. The questions in this section gathered information about the Type of occupation, working hours and sleeping hours.

Section C consisted of fifteen questions which targeted to gather information on the participant's diet and physical activity.

Section D consists of two questions which were based on the participants' medical and smoking history.

3.4 Pre-Testing

The questionnaire was pretested to decrease the errors that might arise from questionnaire. Questionnaire was given to 10 different people from the selected services. The recommended changes were brought to the questionnaire before collecting the data.

3.5 Validity and Reliability

Before the data collection, both English and Dhivehi version of the questionnaire was pre-tested at research site and amendments were made as necessary. Amendments were made to the questionnaire based on the pre-testing. Also to increase the validity and reliability of the research, questionnaire strictly focuses on achieving the objectives of the research.

3.6 Data collection Procedure and ethical considerations

Data for this study was collected from administrative officers who are working in government office in Male', teachers who are working in government schools in Male' and nurses who are working in Male' IGMH and Villi Male' hospital. Thus, before giving the questionnaire participants were given information on the purpose of the research. For this study data was collected using self-administered questionnaire which was filled by employees. Questionnaire was filled by only the participants who signed the consent form.

Participants were fully informed about the aims and objectives of the study. The participants had right to withdraw their part of information, if they did not want to participate in this study after giving their information. The questions in this survey were designed only to collect information for this survey; information collected from the questionnaire will not be disclosed to any other people. Also the participants were informed about the confidentiality of the information. The participants have signed a consent form provided. A copy of the consent form is attached in Appendix.

3.7 Data Analysis

Data collected was entered in to Microsoft Excel and analysed by Statistical Package for the Social Sciences (SPSS) software version 17.0. The descriptive statistics of all the independent variables like age, occupation etc.. Was described using mean, median, mode, standard deviation and the range. For categorical variables, the frequencies and percentages were analysed and interpreted using graphs and in the tables. For inferential statistics, cross tabulations were used and relative frequencies were calculated. The strength of the association was calculated by conducting Pearson's chi square test.

3.8 Conceptual framework of the study

Conceptual framework in figure 3.1 shows the dependent and independent variables used in this study. Independent variables of the study would be measured by conducting the study based on the dependent variable. And effects of the dependent variable will be justified.

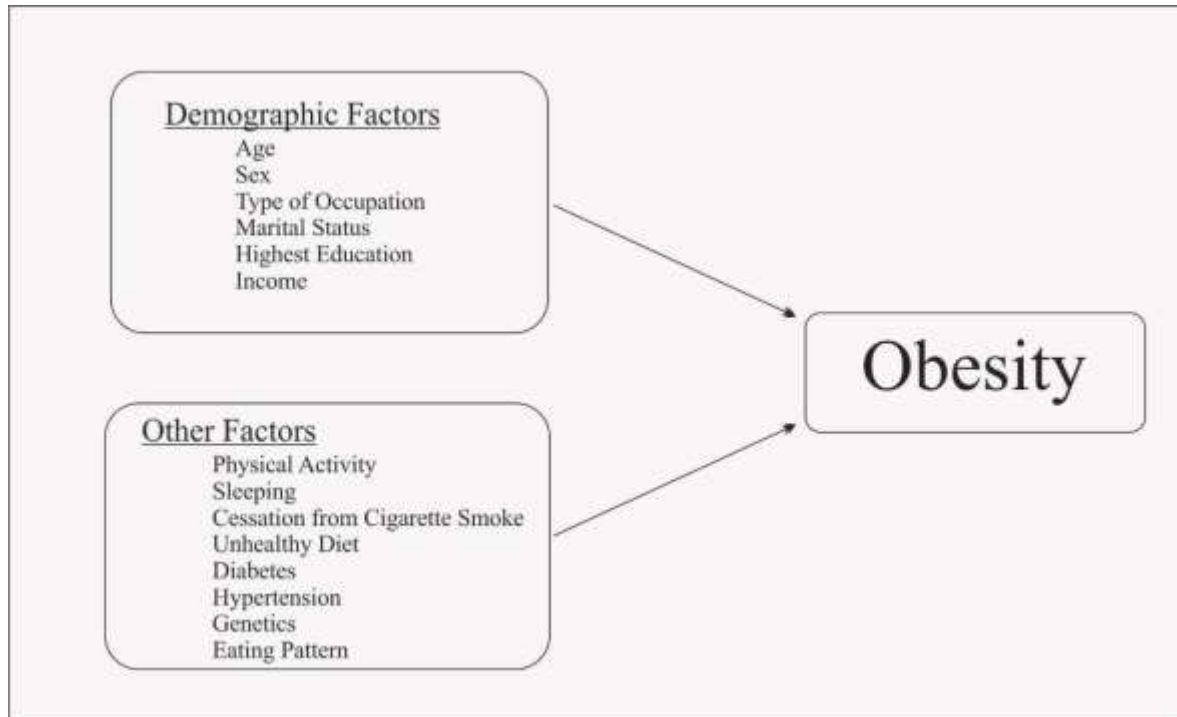


Figure 3.1: Conceptual Frame work

Table 3.1: Summary of data analytic frame work

Objective	Instrument Question No.	Sources of Data	Types of Data	Technique of Analysis
Describe the demographic characteristics of the participants in the study.	Q1-9 of Section-A	Self-administered questionnaire	Primary	mean, median, mode, frequency and percentages
Describe the types of occupation, working hours and sleeping hours	Q1-3 of Section-B	Self-administered questionnaire	Primary	mean, median, mode, frequency and percentages
Describe diet and Physical Activity level of participants	Q4-17 of Section-C	Self-administered questionnaire	Primary	mean, median, mode, frequency and percentages
Describe the use of Smoking and Medication	Q18 and 19 of Section-D	Self-administered questionnaire	Primary	mean, median, mode, frequency and percentages

Objective	Sources of Data	Types of Data	Technique of Analysis
Relationship between occupation and all independent variables	Self-administered questionnaire	Primary	Pearson chi square test, cross tabulations, relative frequencies

CHAPTER 04

DATA ANALYSIS AND RESULTS

4.1 Introduction

This chapter presents the results of the study which was conducted among the civil servants of Male' Maldives to understand the relationship between the type of occupation and obesity. Both descriptive and inferential statistics were used in the analysis of the findings from this research. Descriptive statistics shows frequency, percentage in tabulated form and bar graphs to describe the findings. For inferential statistics, relative frequencies were calculated for each combination of the response variable and the explanatory variables using cross tabulations. Moreover, the Pearson chi-square test was used to determine the strength of the relationship between obesity and different occupations.

4.2 Descriptive statistics

Socio-demographic characteristics included in this research were designation, weight, height, waist circumference, gender, age, marital status, the highest level of education and monthly income. All the socio-demographic characteristics of the participants are explained as below.

Table 4.2.1: Demographic characteristics of participants in the study

Characteristics	Frequency	Percent
	n = 92	
Occupations		
Admin Officer	54	58.1
Nurses	13	14
Teacher	25	26.9
Gender		
Male	29	31.2
Female	63	67.7
Marital Status		
Married	77	82.8
Single	15	16.1
Educational Level		
Certificate/O'Level	20	21.5
Diploma/A'level	48	51.6
First Degree	18	19.4
Masters	6	6.5
Income		
MRF 4,000 to 8,000	51	55.4
MRF 8,000 to 12,000	16	17.4
MRF 12,000 to 16,000	16	17.4
MRF 16,000 to 20,000	9	9.8

BMI

Mean: 21.42 Median: 21 SD: 2.96 Min: 18 Max:32

Age

Mean: 33.64 Median: 32 SD: 7.83 Min: 18 Max:50

Table 4.2.1 shows the socio demographic characteristics of the study participants. Majority of the subjects were females (67.7%) and were married (82.8%). Most were admin officers with 58.1%, with 26.9 % teachers and 14% being nurses. Among 92 participants the mean age was 33.64 year, where the youngest civil servant in the study was 18 years and the oldest was 50years. Educational level of the participants showed that 6.5% have master degree and 19.4% had a first degree qualification. 73.1% off participants have completed their O’Level or A’Levels. Majority (51%) of the participants were in the lower income group. Only 9% participants are in higher income.

Table 4.2.2: Risk factors among participants

Risk Factors	Frequency	Percent
	<hr/> n = 92 <hr/>	
Physical Activity		
No activity	42	45.7
Exercise	20	21.7
Sports	30	32.6
Mode of Transport		
Vehicle	58	63.0
Walking	34	37.0
Working Hours		

6 hours	83	90.2
7 hours	4	4.3
8 hours	5	5.4
Fried Foods		
Once a day	28	30.4
Twice a day	44	47.8
Thrice a day	20	21.7

Table 4.2.2 shows the risk factors among the participants, the number of hours spent in working was considered as an important risk factor for obesity. Majority participants (90.2%) were working 6 hours a day. 5.4% participants worked 8hours. Since obesity is directly related to the physical inactiveness, the subjects were also questioned about their involvement in physical activity, 45.7% participants were not involved in any kind of activity while, 32.6% played some kind of sports. Mode of transport uses to attend the work was also considered as an important risk factor because it involves physical activity, 63% of participants used vehicle for their mode of transportation. Compared to this 37% participants attend their work by walking. Majority of the subjects are used at least twice day (47.8%) of fried foods.

As this study is based on measuring relationship between type of occupation and obesity table 4.2.3 and table 4.2.4 describes the risk factors of this study with occupation.

Table 4.2.3: Risk factors by occupation

Occupation	BMI			Waist Circumference					
	18.5-24.9 (Normal)	25-29.9 (Overweight)	>30 (Obese)	71cm-75cm		76cm-80cm		81cm-85cm	
				M	F	M	F	M	F
Admin officer	47	2	5	3	11	4	12	3	6
Teacher	13	0	0	2	7	16	15	0	0
Nurse	25	0	0	0	6	1	6	0	0

*Waist circumference for females: ≥ 80 cm is at risk, ≥ 88 cm is increased risk (1)

*Waist circumference for males: ≥ 94 cm is at risk, ≥ 102 cm is increased risk

*18.5-24.9(Normal), 25-29.9(Overweight), >30 (Obese) (2)

Height and weight of the participants were measured to calculate BMI and to determine obesity among the employees. Moreover, waist circumference was also measured to determine abdominal obesity. Table 4.2.3 show the participants' waist circumference and BMI. Only 9 participants have more than 80 cm of waist circumference. And 5 participants have more than 30 units of BMI among the 92 participants.

Table 4.2.4: Risk factors by occupation

Occupation	Smoke		Disease condition		Type of Oil used			No of Meals / day			
	No	Yes	Yes	No	Olive	Sunflower	Vegetable	Two	Three	Four	Five
	%	%	%	%	%	%	%	%	%	%	%
Admin officer	40.2	18.5	43.5	15.2	4.3	23.9	30.4	16	16	12	14

Nurse	14.1	0.0	10.9	3.3	2.2	7.6	4.3	4	2	4	3
Teacher	22.8	4.3	23.9	3.3	2.2	10.9	14.1	7	7	8	7

As per the tables, admin officers are at a great risk of being obese compared with teachers and nurses. 40.2% of admin officers' smoke and 43.5% of them have disease condition. Moreover, majority of them consume two or three (16%) meals per day. Also 30.4% of them are using vegetable oils. Majority of the nurses (7.6%) are using sunflower oil for cooking. Nurses are smoke free however 10.9% them has disease condition. Furthermore, 4% of nurses take 2 or 4 meals per day. 22.8% teachers are non-smokers and 14.1% of the teachers used vegetable oil for cooking. 8% of the teachers ingest four meals per day.

Figure 1: Percentage of coffee consumption among the three different occupations.

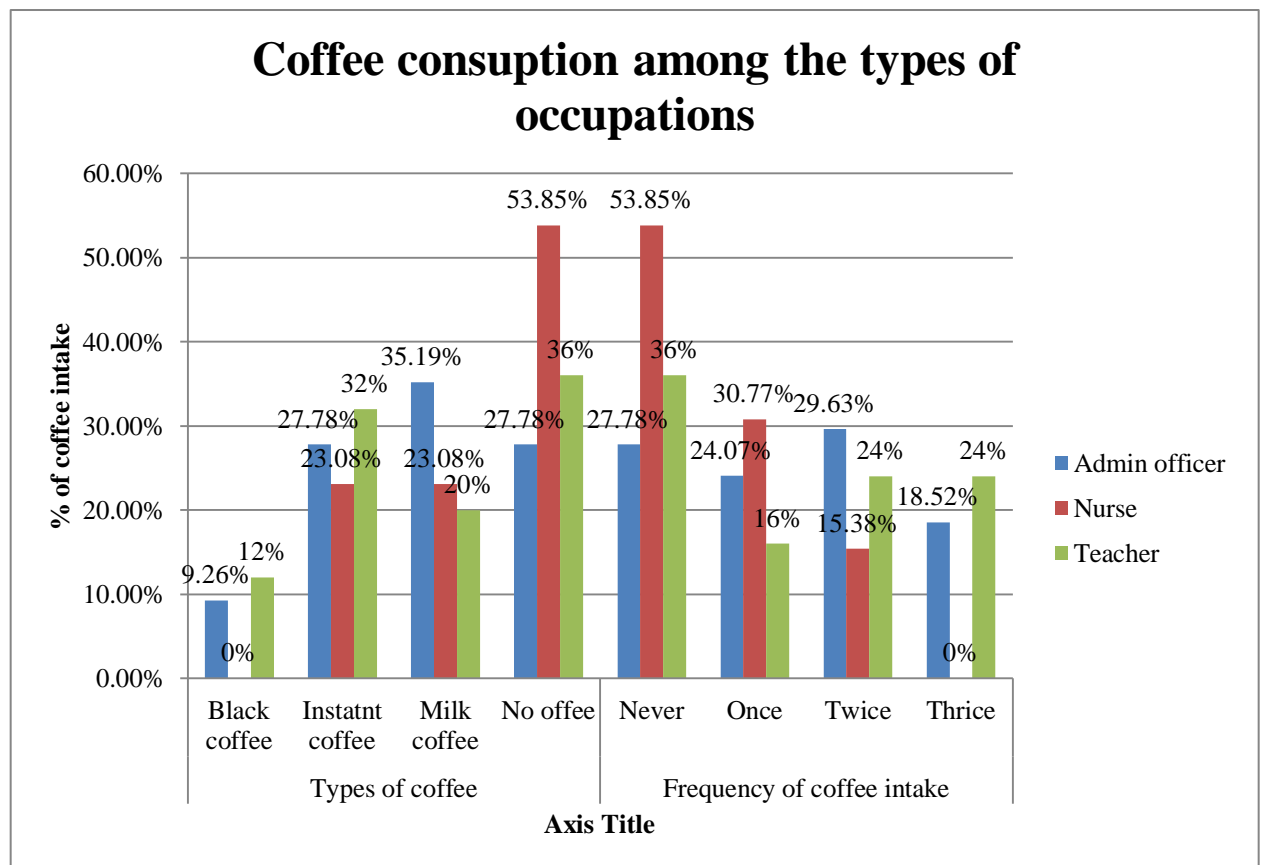
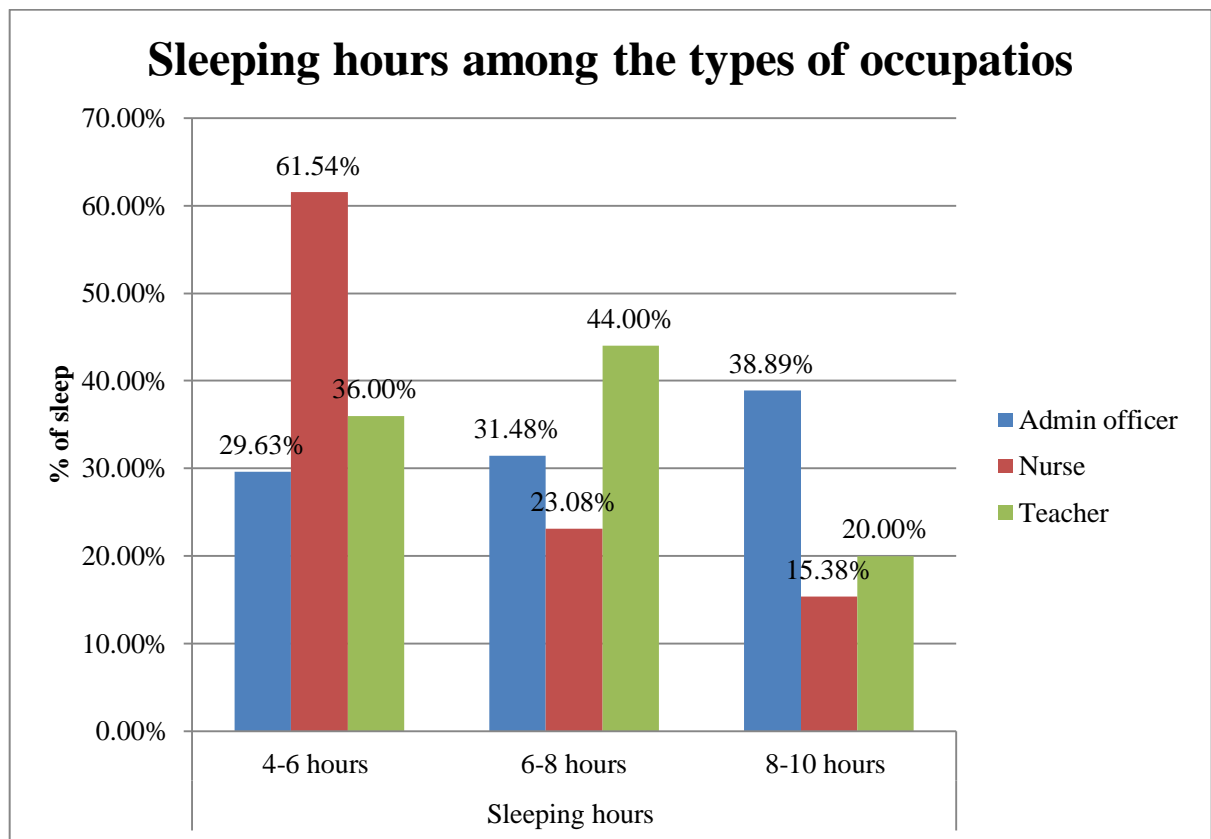


Figure 1 shows frequency of coffee intake and the types of coffee consumption of different occupation. 53.85% of nurses did not drink coffee. Admin officers with 29.63% drinks twice with the 23.08% instant coffee. 24% teachers drink three times coffee with 32% of instant coffee.

Figure 2: Percentage of sleeping hours among the three different occupations.



Number of hours spent sleeping also affects the amount of calorie that is burnt in the body. Figure 2 shows nurses (61.54%) had a sleep around 4-6 hours, among them (15.38%) had sleep of 8-10hours. Admin officers with 29.63% had sleep of 4-6 hours however, 38.89% had sleep of 8-10hours. With (44.0%) of teachers had sleep of 6-8hours and 20% are having a sleep of 8-10hours.

4.3 Inferential statistics

Pearson chi-square test was used to determine the relationship between obesity and different occupations. The results show that there was no significant relationship between obesity and the most of the explanatory variables selected for this study. The two tables below are the only relationship which shows slight association between the response and explanatory variables.

Table 4.3.1: Association between obesity by type of occupation

Occupation	Obesity		Total %	P- value
	Obese	Not obese		
	N (%)	N (%)	N (%)	
Admin staff	5(9.3)	49(90.7)	54(100)	0.15
Nurses	0(0)	13(100)	13(100)	
Teachers	0(0)	25(100)	25(100)	

Table 4.3.1 shows association between obesity and occupation. The result shows there's no statistical significance with the P-Value of 0.15, which is greater than P-Value 0.05. However, the relative frequencies between levels of the response variable highly differed from one another across administrative jobs, only 5 (9.3%) were obese and 90.7% were not.

Table 4.3.2: Association between obesity by the type of physical activity

Type of physical activity	Obesity		Total %	P-value
	Obese	Not obese		
	N (%)	N (%)	N (%)	

Exercise	3(15)	17(85)	20(100)	*0.06
No activity	2(4.8)	40(95.2)	42(100)	
Sports	0(0)	30(100)	30(100)	

Table 4.3.2 shows the association between obesity and type of physical activity. The result shows that there is slight significance shown by the P-Value of 0.06 which is close to P-Value 0.05. Among the different types of activity, there is no single obese person who is involved in sports activity. Percentage of people who were obese is highest (85%) among those who do not exercise.

CHAPTER 05

DISCUSSION AND CONCLUSION

5.1 Introduction

This chapter provides explanations to the main findings of the study in relation to previous similar studies. Moreover, limitations of the study and directions for future research in the area will be discussed before conclusions of the research are presented.

5.2 Discussion

The results showed that the socio-demographic characteristics of civil servants who participated in this study were mostly females, were married, and were young with an average age of 33 years. Majority of them were from poor households and did not have a college education. The reason for the high proportion of females surveyed in this study maybe due to the fact that 55.01% of the civil servants are females according to the official data from civil service commission of the Maldives (Civil Service Commission, n.d). Statistics from the National Bureau of statistics show that a majority of the civil servants (97%) received a salary below 10,000MRF which may explain the fact that majority of the respondents were poor and hence the lack of a college education (National Bureau of Statistics, 2016).

Education level is above diploma level among majority of the participants. Higher level of education, level of income and food availability is some of the important factors

contributing to healthy eating behaviors. A range of analyses of health survey data from Australia, Canada, England and Korea shows a linear relationship between the number of years spent in full-time education and the probability of obesity, with most educated individuals displaying lower rates obesity. A study done in Germany among 1979 parents shows that there were a strong relationship between parental years of education and childhood obesity (Lamerz, et al., 2005).

Even though there is no association between occupation and obesity from the sample taken for this study, there are risk factors which can soon lead to overweight and obesity among the sample and the greater civil service working population. Results obtained showed that majority of the participants have lower than 30units of BMI value which can be considered as not obese. Obesity and chance of being obese were more common in admin officer rather than teachers and nurses.. In the other two groups there is no single person as overweight and obese. These results are consistent with many of the studies that claimed obesity is more prevalent among sedentary occupations than the active jobs (Choi et al., 2010) (Choi, et al., 2014), (McCrary & Levine, 2009), (JO & Melanson EL., 1999) and (Smith MJ, Conway FT, & Karsh BT, 1999).

In contrast to the findings of this study, research done in Ghana (Duodu, Awuni, Attito, & Zotor, 2015), Nigeria (Ogunjimi, Ikorok, Yusuf, & Olayinka, 2010) and Malaysia (Coomarasamy, Wint, E. Neri, & Sukumaran , 2014) showed a considerable number of registered nurses in these countries to be obese. There is also evidence that people who do shift work such as nurses and teachers are at a greater risk of being obese (Eberly & Feldman, 2010) and (Di , et al., 2003) which differed from this study where none of the

teachers nor nurses were obese. These differences may be explained by awareness level, race and other demographic factors.

A noteworthy percentage of participants does not participate or do any form of physical activity and uses vehicle as a mode for transportation to work. This indicates that most of the participants are not aware of importance of daily physical activity and simple daily walk to work can be an essential exercise.. Admin officers had very less active work during the daily six hours. Smoking rate and disease conditions were also higher among the admin officers. A research done by School of Medicine and the Brown School at Washington University in St. Louis found that women who spent 31-180 minutes of daily sedentary time at their jobs were 1.53 times more likely to be obese than women who spent 30 minutes sitting Moreover, women who spent more than 360 minutes sitting were 1.70 times more likely to be obese than women who spent 31-180 minutes sitting (Ellis, 2014). According to Levine (2013), sitting for a long time causes the muscles to stop moving all together and the heart slows down. Moreover, the body's calorie-burning rate falls to approximately one calorie per minute -- a third of what it would be while walking. According to WHO (2011), adults aged 18–64 should involve in at least 150 minutes of moderate-intensity aerobic physical activity throughout the week or do at least 75 minutes of vigorous intensity aerobic physical activity throughout the week to remain healthy. Therefore it is important to in-cooperate activeness and modifications to the office environments for administrative jobs to get a better output and to keep the employees healthy.

The waist circumference of the admin officers are high compare to the other two occupations. Among them 6 are at risk of being obese. A notable percentage of Admin

officer and nurses falls between 76-80cm waist circumferences. Accumulation of fat in the abdominal area is dangerous, because it is closely located to the vital organs and their blood supply (Virtual Medical Centre, 2014). According to Canadian Diabetes Association (2013), a waist circumference more than 80 cm is a risk factor for South Asian women. Therefore, as a notable number of participants have a waist circumference between 76-80cm and the average age 33 it is important to raise more awareness especially for people working in deskbound jobs.

The amount of calories consumes has a direct impact on weight, the dietary behavior of the participants was analyzed via the questionnaire. High carbohydrate foods such as “Theyo Roshi”, “Mas Huni”, bread and white rice are the most common foods consumed by all occupations. Most common food eaten by the participants for their breakfast could be considered as a high carbohydrate meal while studies have shown that a high intake of energy-dense, micronutrient-poor foods as risk factors for obesity and a high intake of dietary non-starch polysaccharides (NSP)/fibre as a protective factor for obesity (Swinburn, Caterson, Seidell, & James, 2004). Moreover, the type of oil used for cooking was also questioned. Higher percentage of admin officers used vegetable oil compare to nurses and teachers. The type of oil used for food preparation may also affect obesity. According to Svendsen (2012), omega-6 in certain vegetable oils leads to overweight and obesity. This could explain why teachers and admin officers have a slightly higher waist circumference when compared to nurses.

A good night’s sleep is key to good health. The results obtained showed that high percentage of civil servants in this study sleep for about 4 to 6 hours. Sleeping less can impact the metabolism of the body and have several health impacts. A study done by Dr

Knutson (2012) showed a strong relationship between getting fewer than six hours sleep and increased body mass index (BMI) and obesity. According to Knutson (2012), inadequate sleep impacts secretion hormones ghrelin and leptin. Ghrelin is known to increase appetite, while leptin indicates when the body is satiated. This can lead to increased food intake without the compensating energy expenditure. Many studies have established the evidence that sleep deprivation is associated with risk of obesity (M, et al., 2011), (Parvaneh, Poh, Hajifaraji, & Ismai, 2014) and (Gangwisch, Malaspina, Boden-Albala, & Heymsfield, 2005)

This study identified risk factors common to the civil servants which were the use of fried foods in the meals, the number of meals taken per day, lack of physical activity among the some of participants, the use of a vehicle for transportation, the fact that two thirds of the participants slept less than 8 hours a day and the consumption of coffee once to thrice a day. Study among Nigerian civil servants showed that physical inactivity was the most prevalent behavioral factor, followed by unhealthy diet and cigarette smoking (Oladimeji, Fawole, Nguku, & Nsubuga, 2014) which was consistent with the results of this study. In contrast, a study of civil servants from Nepal indicated marriage and/or having a better job to increase the risk of overweight/obese risk by nearly 8 and 9 times (M, et al., 2011).

The study showed a significant relationship between physical activity and obesity whose association may have been stronger with a larger sample size. A review of 24 published observational studies on the relationship between physical activity and obesity showed that increased physical activity and decreased sedentary lives are protective against obesity (Must & Tybor, 2005). Another study done among Chinese also showed the presence of an inverse association between physical activity and obesity (Liu, et al., 2016). However, this

study was conducted among the elderly which differ from this study as most of the participants were young. A study done in Sydney/Australia among adults (aged 18-60 years) showed that there were no association between physical activity, sedentary lifestyle and visceral adiposity and liver fat (Keating, et al., 2016). This study was done using magnetic resonance imaging of liver fat which is a more objective way of measuring the association between physical activity and obesity. Findings from this study are in line with the majority of published literature which claims an association between obesity and physical activity.

5.3 Limitation of the research

Main limitation of this research was the small sample size. Therefore research can be improved by taking the appropriate sample size to see if there is any relationship between type of occupation and obesity. This research could be further improved by conducting it for a longer period (e.g. 3 months) with control variables such as diet and exercise. In addition, more variety of occupations can be included such as taxi drivers, construct workers, etc. Although it is difficult to find subjects with very similar backgrounds (e.g. dietary behavior, same number of working hours, etc.) the research could be further improved by including such subjects. Furthermore, the questionnaire used for the research could be improved to study the participants in detail. Also knowledge attitude and practices study can be a good study to identify eating behavior and knowledge behavior on eating healthy among various occupations.

Measuring the waist circumference was another limitation faced in this research. As removing cloth from the waist line is a key rule to measure waist circumference it was not

possible, because all the measurements were done in the working environment. This could possibly give inaccurate measurements depending on the thickness of the cloth. The results obtained from the research did not fully support our hypothesis as the average BMI of the office workers remained in the “healthy weight”. However, participant BMI from admin officers group had people in the category of overweigh and obese when compared with nurses and teachers therefore a further study with a larger sample size may lead to better inference.

5.4 Conclusion

It can be concluded that due to the small sample size the study could not prove a relationship between type of occupation and obesity. But this study highlights risk factors such as high carb diet, smoking, disease conditions and exercise that could lead to obesity among civil servants and findings can be used to pave for early interventions. As non-communicable disease can easily become a burden to the community, the development of early interventions in to workplaces and awareness is vital.

Recommendations:

Further studies should target different varieties of occupations. Additional stratification of people by their weight and height may be helpful in identifying more cases with obesity and overweightness which was lacking in this study. High risk working populations beyond the civil service also needs to be targeted in further studies. As a notable number of participants had a waist circumference between 76-80cm it is recommended to raise more awareness especially for people working in deskbound jobs. Findings from this study points to the importance of designing work environments to avoid physical inactivity.

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APPENDIX A: Stratified simple random sampling technique by using actual population.

Designations	Total number of Employees	% of Representation from Total	No of Samples selected
Admin Officer	2919	58.8	217
Teachers	1355	27.3	101
Nurses	688	13.9	51

APPENDIX B: Stratified simple random sampling technique by using number of gender selected population.

Designations	Total number of Employees	Gender Representation	% of Gender Representation	No of Samples selected	No of Gender selected
Admin Officer	2919	1210 Males	24	217	89.9 Males
		1709 Female	34		127.0 Female
Teachers	1355	338 Males	7	101	25.8 Males
		1017 Females	20		73.8 Female
Nurses	688	60 Males	1	51	3.6 Male
		628 Females	13		47.9 Female

APPENDIX C: English version of the consent form

Consent form

My name is Mohamed Hamzath (Student Number: 000002210) and I am studying bachelor of primary healthcare at Maldives National University (MNU). As a part of this course, I am conducting a research on **the relationship between types of occupation and obesity**. Your opinions will be extremely important for this research project, since your opinions will help me to identify the relationship of the occupation and obesity in the occupation you are. I would be glad if you could participate in this study.

So I kindly request you to complete this questionnaire as much as possible for you. Your information required for this questionnaire will not be exposed and your name is not required for the questionnaire. The information you provide will be confidential and it will only be used for academic purpose. Your participation is voluntarily and you will never be forced to answer any of the questions in the questionnaire. You have your own right to answer or ignore any question of the questionnaire. Still your contribution is highly preferable to complete this survey.

There are no physical or emotional risks for participating in this survey. Even though, if you feel or decide to discontinue after filling the questionnaire, you are welcome to stop from there. Your participation up to that end will be highly appreciated.

If you have any queries regarding any part of the questionnaire, you are most welcome to contact me.

My name is Mohamed Hamzath, Phone number: +960 7948536

E-mail address: hamxa_10@hotmail.com

My decision

I agree to participate in this project. The purpose of the project has been explained to me. I understand that my decision to participating in this research project is completely voluntary and also I understood that I can withdraw my name anytime during the research. I am convinced the information I provide will be subjected to strict anonymity and confidence.

Participant Phone Number: Date:/...../..... Sign:

QUESTIONNAIRE

Section (A)

Socio-demographic features

1. **Designation:**

2. **Weight:**

3. **Height:**

4. **Waist circumference:**

5. **Gender:**

a. Male

b. Female

6. **Age:**

a. Between 18 to 30

b. Between 31 to 40

c. Between 41 to 50

d. Between 51 to 60

7. **Marital Status:**

a. Single

b. Married

c. Widowed

d. Divorced

8. Highest education Level:

- a. Certificate Level / Ordinary Level
- b. Diploma / Advance Level
- c. First Degree
- d. Masters certificate/Above

9. Monthly income:

- 7.1 Between MRF 4,000 to 8,000
- 7.2 Between MRF 8,000 to 12,000
- 7.3 Between MRF 12,000 to 16,000
- 7.4 Between MRF 16,000 to 20,000
- 7.5 Above MRF 20,000

Section (B)

Type of occupation, working hours and sleeping hours

1. How many hours do you work officially?

6 hours 8 hours others (specify)

2. How many hours do you work actively?

.....

3. How many hours do you sleep?

.....

Section (C)

Diet and Physical Activity

4. How many major meals do you take daily? (major meals are breakfast, lunch and dinner)

One Two..... Three Other (specify).....

5. What do you usually take for breakfast? (usually here refer to most of the time of food you take)

- Roshi and Curry
- Roshi and Mashuni
- Continental breakfast (bread, jam, butter)
- Cornflakes and Milk
- Roshi and Kulhimas

6. What quantity of food do you take for breakfast? (please put in numbers)

Roshi Bread Cornflakes (measure in cups)

7. What do you usually take for Lunch? (usually here refer to most of the time of food you take)

- Rice / Garudiya / Riha / Thelulimas
- Roshi / Garudiya / Riha / Thelulimas
- Fried Noodles / Fried Rice / Spaghetti

8. What quantity of food do you take for breakfast? (please put in numbers)

Roshi Rice (bowl)..... Noodles(pkts).....

9. What do you usually take for Dinner? (usually here refer to most of the time of food you take)

- Rice / Garudiya / Riha / Thelulimas
- Roshi / Garudiya / Riha / Thelulimas
- Fried Noodles / Fried Rice / Spaghetti

10. What quantity of food do you take for breakfast? (please put in numbers)

Roshi Rice (bowl)..... Noodles(pkts).....

11. What type of oil used for cooking?

Vegetable oil sunflower oil olive oil

12. How often do you include fried foods in your meals?

Once a day Twice a day Thrice a day Never

13. How often do you drink coffee?

Once a day Twice a day Thrice a day Never

14. What type of coffee do you usually drink?

Instant coffee Milk coffee Black coffee

15. Do you take part in any kind of physical activity? If so, what are they? How many hours do you spend on it per week?

No activity
Sports (any kind of spots)
Exercise (walking, running, swimming)

16. What mode of transport usually used to attend office?

Walking
Bicycle
Vehicle (car or motorbike)

17. What is you estimated time to travel to office by chosen mode of transport for question no.16?

.....

Section (D)

History of Smoking and Medication

18. Do you have any chronic illness?

Yes NO

19. Are you a smoker?

Yes NO

7. لارڤوسرې ټولگي:

لارڤوسرې لارڤوسرې

لارڤوسرې سرلارڤوسرې

لارڤوسرې لارڤوسرې

لارڤوسرې لارڤوسرې

8. لارڤوسرې د لارڤوسرې لارڤوسرې:

لارڤوسرې لارڤوسرې لارڤوسرې / لارڤوسرې

لارڤوسرې لارڤوسرې لارڤوسرې / لارڤوسرې

لارڤوسرې لارڤوسرې لارڤوسرې لارڤوسرې

لارڤوسرې لارڤوسرې لارڤوسرې لارڤوسرې

9. لارڤوسرې د لارڤوسرې د لارڤوسرې د لارڤوسرې (لارڤوسرې):

لارڤوسرې 8000-4000

لارڤوسرې 12000-8000

لارڤوسرې 16000-12000

لارڤوسرې 20000-16000

لارڤوسرې 20000

