

**LIFESTYLE FACTORS INFLUENCING BODY WEIGHT
AMONG WORKERS AT SEVENTH-DAY ADVENTIST
INSTITUTIONS IN KIGALI, RWANDA: IMPLICATIONS
ON MAJOR ORAL DISEASES**

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APPROVAL SHEET

This thesis entitled *Lifestyle Factors Influencing Body Weight Among Workers at Seventh day Adventist Institutions in Kigali, Rwanda: Implications on Major Oral Diseases*, written and submitted by **Susana Judith Tito Mamani**, in partial fulfillment of the requirements for the degree of Master of Public Health is hereby accepted and approved.

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ABSTRACT

This study examined the lifestyle factors which influence body weight and their relationship with major oral diseases among workers at Seventh-day Adventist institutions in Kigali, Rwanda. Furthermore, this study also explored whether lifestyle factors are related with dental caries and periodontal diseases. Research questions included: (1) What are the body weight and oral health status of workers in Seventh-day Adventist (SDA) institutions in Kigali, Rwanda?; (2) What is the lifestyle of workers in SDA institutions in Kigali, Rwanda in terms of a) diet?, b) physical activity?, and c) stress?; (3) Which of the lifestyle factors (diet, physical activity, and stress) significantly influence(s) body weight among workers in SDA institutions in Kigali, Rwanda?; (4) Is there a significant relationship between body weight and oral health status of workers in SDA institutions in Kigali, Rwanda?

Methodology. A descriptive-correlation research design was used in this study. Data were collected using questionnaires, measurement of BMI, periodontal and caries index. Using the SPSS software, Pearson product-moment and Chi Square, correlations were computed to link factors that influence body weight with oral health status.

Results. Workers at Seventh-Day Adventist Church institutions in Kigali, Rwanda were generally overweight, the oral status showed high prevalence of caries and gingivitis affecting 67% of the participants. Diet (*insufficient consumption of fruits and vegetables in terms of amount and frequency, poor choices and intake of quality dietary fats, and high consumption of starchy foods*) and physical activity significantly influenced body weight while body weight and oral health status showed no significant relationship.

Implications: Changes in the lifestyle factors that influence body weight need to be addressed. There is a need for leaders of the Seventh-day Adventist Church institutions in Kigali, Rwanda to plan and organize programs to promote awareness and lifestyle changes for their workers, particularly on healthy diet and regular physical activity and exercise. Moreover, health programs may include good oral health practices emphasizing the role of carbohydrates and sugar in the diet in order to prevent oral and chronic diseases.

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LIST OF ABBREVIATIONS

ADRA:	Adventist Development and Relief Agency International
AUCA:	Adventist University of Central Africa
BMI:	Body Mass Index
CDC:	Center for Diseases Control and Prevention
CPITN:	Community Periodontal Index of Treatment Needs
DMFT:	Decay, Missing, Filled, Teeth Index
GWA:	Genome Wide Association
HDL:	High Density Lipoprotein
LDL:	Low Density Lipoprotein
NCD:	Non Communicable Diseases
RUM:	Rwanda Union Mission
SDA:	Seventh Day Adventist
SPSS:	Statistical Package for the Social Sciences
TRA:	Theory of Reasoned Action
UEAB:	University of Eastern Africa, Baraton
WHO:	World Health Organization

CHAPTER ONE

INTRODUCTION

This chapter deals with the background of the study, the statement of the problem, research question, hypothesis, significance of the study, justification of the study, theoretical framework, scope of the study and definitions of terms that were used in this study.

Background of the Study

The definition of health according to the World Health Organization 1946 is stated as “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.” Unfortunately the most common of the twenty-first century public health problems is excess weight gain which has nearly doubled since 1980. Excessive weight gain is affecting adults, adolescents, and children, it has reached the level of, one in six adults being obese, one in ten diabetic and one in three with raised blood pressure. It is estimated that 2.8 million people die each year as a result of being overweight or obese. This problem has increased at an alarming rate, especially in developed countries (WHO, 2012).

Previous studies have characterized an increasing trend about body weight that is the archetype of multifactorial process that is associated with significant comorbidities and it is a risk factor for disease in adulthood. Overweight and obese children tend to remain obese in adulthood and are more likely to suffer at younger ages. Non Communicable Diseases (NCD's) are serious chronic diseases as hypertension, hyperlipidemia, type-2 diabetes, cardiovascular diseases and stroke, any type of cancer, and also poor oral health (Delmau & Vitoria, 2008).

Non communicable diseases in developing countries along and the total disabilities are extremely high. They have become an urgent need especially in Africa where nutrition education is pertinent for good health. Health professionals are therefore called for to offer good health programs and appropriate treatment of diseases adding consistent advice, working in a multidisciplinary team close to the nutritionist since the major risk factor is diet (Amuna & Zotor, 2008).

Traditional plant-based diets including foods such as cereals and potatoes are increasingly being replaced by diets that lead to diseases. Whatever was the original dietary pattern of pre-agricultural humankind, a plant-based diet regimen provides the lowest content of promoters and the highest content of inhibitors of metabolic dysregulation that lead to the major causes of disease and debility in adults over 40 years of age. This transition, combined with a general trend towards a more sedentary lifestyle, is an underlying factor in the risk of developing chronic diseases (Salomons, 2000).

Data shows that more than half of the countries in Sub Saharan Africa are in initial stages of nutrition transition, where the prevention may still be well accepted while the rest of the countries clearly show signs of the non-communicable diseases that are affecting the health of people due to this nutrition transition (Abrahams et al.,2011).

Singh et al. (2011), showed that dietary imbalance as a risk factor during childhood will lead in adulthood to greater damage to the stomatognathic apparatus. People take for granted their oral health not knowing that it is an essential part of daily lives, and may cause oral diseases which could result into poor quality of life and causing disabilities (Oziegbe,2012).

Findings showed that people with excess body weight have fewer teeth than those who have normal weight due to premature extraction of the teeth, after tooth decay, resulting in disability and lack of confidence in their daily lives (Ostberg, et al.,2009).

WHO (2008) reported that the African Region is confronted by a number of oral health problems and pays particular concern to dental caries and periodontal diseases. Between 60% and 80% of school-age children in the African Region, who represent the most vulnerable group, will continue to be affected even during adult age, thus increasing rates of caries in Africa which is attributed to both increasingly widespread adoption of sugar-rich diets and inadequate exposure to fluorides.

Dental decay is the most common oral ailment which is attributed to low awareness on oral hygiene. The majority of people around do not take periodic dental check-ups seriously, so they come with dental sickness conditions that have worsened and the only option is extracting the affected tooth (Ngoboka, 2014). In Kibogora Hospital, of Nyamasheke District in Rwanda after trying to eliminate oral diseases in the area, reported oral health cases early in 2015 dropped to 350 in the same month in the same year.

Statement of the Problem

World Health Organization (2008) indicated that 65% of the population in the world are living with weight gain problem. More than 1.4 billion adults, 20 years and older, were overweight. Of the over 200 million men and nearly 300 million women that were obese, we had 35% among adults aged 20 and over that were overweight in 2008, and 11% were obese.

Dramatic increase of overweight and obese people in low and middle income countries, particularly in urban settings, is associated with serious health complications and increased in all premature illness (WHO, 2014).

It is really a concern to know that almost two thirds of deaths all over the world is due to non-communicable diseases, and the major factors for it are: first and foremost, tobacco smoking; second, poor diet; and the third physical inactivity with significant association to weight gain. Therefore the effort in this 21th century from Public Health and Health Care Systems where dentist are included is to lay strategies and interventions in order to address this problem (Bauer et al., 2014).

This problem has been observed in all age level, sex, religious and racial group. The Seventh-day Adventists is a religious group of people who are believed to live longer and healthier lives than their non-Adventist counterparts because they do not smoke, drink alcoholic beverages and they eat a healthier diet. The study that was conducted in a group of young adults, Seventh-day Adventist Church members, found a prevalence of overweight and obesity of 30% (21% overweight and 10% obese), showing clearly that these conditions are affecting all groups (Pawlak & Sovyanhadi, 2009).

One of the risk factors for chronic diseases is unhealthy diet that inevitably will affect the oral cavity triggering oral diseases, therefore all dentists are responsible for diagnosing oral diseases related with diet and at the same time should provide dietary advice as part of routine patient education. (Scardina & Messina, 2012).

The most common oral diseases are dental caries (tooth decay), periodontitis (gum disease) and oral and pharyngeal cancers. The oral diseases listed above are global health problems in both industrialized and increasingly in developing

countries, especially amongst poorer communities. Others are oral infectious diseases, trauma from injuries and hereditary lesions (WHO, 2012).

Worldwide nearly 100% of adult have dental cavities, often leading to pain and discomfort. Severe periodontal (gum disease), which may result in tooth loss, is found in 15 to 20% of middle aged (35-44) years adults while oral cancer is the eighth most common cancer in men worldwide and the incidence ranges from one to 10 cases per 100,000 people in most countries (WHO, 2012).

WHO (2012) reported that the African region has available health data in 40 countries among 46 countries in all. The DMFT (decay, missing, filled, teeth) index ranged from 0.3 to 5.5, and the highest is 6.0. Half of the countries had an index of 1.3. Among those 40 countries in Africa, Rwanda has the second lowest incidence of oral caries (Da Silveira, 2012).

Research Questions

1. What are the body weight and oral health status of workers in Seventh-day Adventist institutions in Rwanda?
2. What is the lifestyle of workers in SDA Institutions in Rwanda in terms of:
 - a. Diet
 - b. Physical activity
 - c. Stress
3. Which of the lifestyle factors significantly influence body weight among workers in Seventh-day Adventist institutions in Rwanda?
 - a. Diet
 - b. Physical activity
 - c. Stress

4. Is there a significant relationship between body weight and oral health status of workers in Seventh-day Adventist institutions in Rwanda?

Hypothesis

The following null hypotheses were tested in the study:

Ho₁: Lifestyle factors do not significantly influence body weight.

Ho₂: There is no significant relationship between body weight and oral health status.

Significance of the Study

The research study was able to identify the principal lifestyle factors which influence body weight and their relationship with major oral diseases and therefore able to establish which factor(s) are more strongly related with caries and periodontal diseases. The findings also benefited the Seventh day Adventist Institutions in terms of awareness in this group of people since weight problems in relation to dental diseases is a major concern worldwide. Furthermore, this study has given the participants the awareness on their own current Body Mass Index and oral health status. This study was also able to control this trouble with different approaches which normally are not taken into account. The institutions of the Seventh-day Adventist Church are being threatened by Non Communicable Diseases. It is significant to find new approaches so as to close the gap between where we are and the ideals of total health as defined by WHO: “A state of complete physical mental and social well-being, and not merely the absence of disease or infirmity”.

Justification of the Study

The prevalence of overweight/obesity increases by about 5% per year on the average in the sub-Saharan Africa (Ziraba et al, .2009). On the other hand, oral cavity plays an important role in the body of human beings, but oral diseases are devastating people all over the world, whereby people in low social economic status suffer the

most. Findings show that a series of risk factors related with diet are also contributory to the development of obesity even in children. (Curtis et al., 2011).

Studies between oral health and obesity generally showed significant associations. Therefore, addressing body weight and oral health promotion can be an important emphasis for health providers (Ostberg et al., 2012). This emphasis showed direct relevance and concern, and therefore is worthy to explore answers among the Seventh-day Adventist population as to the concerns of body weight and oral diseases, factors that influence body weight, and their relationship with the major oral diseases.

“Every Christian is to be a missionary. In sympathy and compassion we are to minister to those in need of help, seeking with unselfish earnestness to lighten the woes of suffering humanity” (White,1994).

Theoretical Framework

The theoretical framework of this study is the “Theory of Reasoned Action” developed by Fishbein in 1967. This explains voluntary behaviors. This theory provides a framework in the study of attitudes toward behaviors.

Fishbein and Ajzen (1975) distinguished between attitude, belief, behavioral intention, and behavior and their relationship among these four constructs. Behavioral intention measures a person's relative strength of intention to perform a behavior (Parcel, 1983). Attitude toward the behavior consists of beliefs about outcomes or attributes of performing the behavior. If a person who has strong beliefs about positive attributes of performing a particular behavior, that person will have a positive attitude towards the particular behavior. Subjective norm is determined by normative beliefs. The person's perception that most people who are important to him or her such as peers, parents, relatives, close friends, etc. will influence the behavior. To put

the definition into simple terms, a person's volitional (voluntary) behavior is predicted by his attitude towards that behavior and how he thinks other people would view him if he performs the behavior. A person's attitude, combined with subjective norms, form his or her behavioral intention.

Fishbein and Ajzen suggest that attitudes and norms are not weighed equally in predicting behavior. Indeed, depending on the individual and the situation, these factors might be of very different effects on behavioral intention; thus weight is associated with each of these factors in the predictive formula of the theory.

Although influential in many behaviors, subjective norms are generally a poor predictor of behavioral control possibly due to the lack of sufficient measurement. Without any substantial follow-up measurements, researchers can only assess immediate and short-term changes without determining any long-term changes in behavioral antecedents or behavior (Hackman & Knowlden, 2014).

A conceptual framework is an illustrated representation of an idea or body of knowledge based on individual understanding of the relationships between the variables.

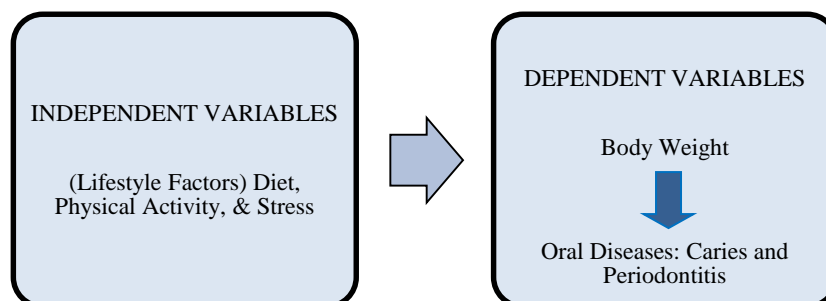


Figure 1. Conceptual framework.

Three major components of the conceptual framework include the independent variables, the intervening and dependent variables. (Gardner et al., 2014). Independent

variables were diet, physical activity, and stress that will influence body weight and oral diseases like caries and periodontal diseases as dependent variables. The relationship is presented in Figure.1. Dietary practices, physical activity, and stress may be influenced by the intention to perform the behavior that in turn can be explained through three cognitive factors: attitudes, social influence (including subjective norms, modeling and support) and self-efficacy. Additionally, barriers and lack of skills might limit the possibility to put the intention into practice. There can be a possibility for an association between these factors and oral diseases. Hence, the possibility of controlling and preventing oral diseases by controlling the lifestyle factors that influence body weight.

Scope of the Study

This study focused on factors that influence body weight, particularly lifestyle factors like diet, physical activity and stress with implication on major oral diseases such as caries and periodontal disease among SDA institutions in Rwanda. Specifically the participants were workers at the institutions under the Rwanda SDA Union Mission located in Kigali that is the capital city of Rwanda.

Limitations

The study were limited to the lifestyle factors influencing body weight including diet, physical activity, and stress among workers at SDA institutions in Rwanda.

Definition of Terms

Blood pressure: It is the heart beats that pump blood around the body to give it the energy and oxygen it needs. As the blood moves, it pushes against the sides of the blood vessels. The strength of this pushing is called blood pressure. Blood pressure is summarized by two measurements, systolic and diastolic measurement, which depend

on whether the heart muscle is contracting (systole) or relaxed between beats (diastole).

Body Mass Index: Is used in a wide variety of contexts as a simple method to assess how much an individual's body weight departs from what is normal or desirable for a person of his or her height. Measure weight based on an individual's mass and height. The calculations are: a person's weight in kilograms divided by the square of his or her height in meters.

Body weight: Refers to a person's mass or weight. Body weight is measured in kilograms, a measure of mass, throughout the world; although in some countries such as the United States it is measured in pounds, or as in the United Kingdom, stones and pounds.

Chronic: Having had a disease for so long.

Co-morbidity: The presence of one or more additional disorders or diseases simultaneously with a primary disease or disorder.

Dental caries: Also known as tooth decay or a cavity, is an infection, bacterial in origin that causes demineralization and destruction of the hard tissues of the teeth.

Epidemic: Is the rapid spread of infectious disease to a large number of persons in a given population within a short period of time. May be restricted to one location; however, it can only be regarded as such, if it spreads to other countries or continents and affects a substantial number of people.

Hyperlipidemia: Involves abnormally elevated levels of any or all lipids and/or lipoproteins in the blood.

Hypertension/high blood pressure: Sometimes called arterial hypertension. It is a chronic medical condition in which blood pressure in the arteries is elevated.

Morbidity: It is the proportion of sickness or of specific diseases in a geographical locality.

Obese: Abnormal or excessive fat accumulation that may impair health. A person with a BMI of 30 or more is generally considered obese.

Oral health: It is a state of being free from mouth and facial pain, oral and throat cancer, oral infection and sores, periodontal (gum) disease, tooth decay, tooth loss, and other diseases and disorders that limit an individual's capacity in biting, chewing, smiling, speaking, and psychosocial wellbeing.

Overweight: Abnormal or excessive fat accumulation that may impair health. A person with a BMI equal to or more than 25 is considered overweight.

Periodontitis: Is a set of inflammatory diseases affecting the tissues that surround and support the teeth. Periodontitis involves progressive loss of the alveolar bone around the teeth, and if left untreated, can lead to the loosening and subsequent loss of teeth.

Public health: Health services to improve and protect community health, especially sanitation, immunization, and preventive medicine.

Stomatognathic: It is a system integrated by mouth, jaws, and closely associated structures.

CHAPTER TWO

REVIEW OF RELATED LITERATURE AND STUDIES

This chapter reviews the major concepts which include the various variables that were the focus and are related to this study. In particular the measurements of body weight, factors that influenced body weight, as well as the factors that influenced body weight related to oral diseases were investigated to determine existing knowledge that form the foundation of this research study.

Measurements of Body Weight

Body weight used in the areas of biology and medical sciences refers to a person's mass. The causes of obesity have been recognized and are largely related to a genetic predisposition and an environmental susceptibility to gain weight due to increased energy intake and reduced energy expenditures (Lifshitz, 2014). An increase in body weight can also result from an increase in muscle mass. This is a consideration for people who participate in regular weight training, and does not reflect unhealthy weight gain (WHO, 2010).

Assessment of weight and health risks involves using three key measures: Body mass index (BMI), waist circumference and risk factors for diseases. Knowing conditions associated with weight gain helps screen for possible health risks that come with overweight and obesity (NIH, n.d).

Body Mass Index is commonly used to classify underweight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in meters (kg/m^2) (WHO, 1995).

Research has shown that there is strong relationship between fatness and BMI, and they are significantly influenced by age and sex but there is no relationship with ethnicity. The researcher recommended the use of this index for body fatness (Gallagher et al., 1996).

Waist circumference acts as a marker for risk factors, but it cannot measure weight, so it simply helps to identify the needs for weight management. Men with waist circumference ≥ 102 cm and women with waist circumference ≥ 88 cm were consider overweight and should be urged to lose weight (WHO, 2010).

Factors that Influence Body Weight

A study showed that people think as having normal weight without realizing the real status of their BMI, which may hinder prevention and control of the causes and effects of the weight condition (Sutcliffe et al., 2014). The major factors that influence body weight are discussed below.

Lifestyle Factors

Diet. Diet is part of lifestyle, and it has to be managed properly. When people have weight problem; self-motivation, settings goals, and self-control are the three major keys in order to address the problem. Since human beings require energy deficit to promote weight loss, therefore the objective or goal has to be less caloric intake (Vasely & de Mattia, 2014).

Nutrition is important not only in terms of development and growth, but also in order to prevent diseases. The World Health Organization (2012) says that nutrition is important for maintenance and functionality of health.

In Africa, nutrition is at the forefront of the health priorities. Other continents' nutrition related problem is the lack of capacity. Unfortunately, the nutrition transition described in terms of changes in activity levels and dietary patterns that

happens when a country passes to higher levels of economic development which further facilitates the availability of cheaper energy dense and nutrient poor foodstuffs is responsible for the co-existence of obesity and under nutrition (Wojcicki, 2000).

Consumption of fat, sugar, and meat in bigger portions plus combination of other food and decrease of physical activity made up the risk factors to gaining weight and metabolic diseases. This is a growing concern in developing countries, where unfortunately the same countries have issues on food security and policies on food intake (Hoffman,2004).

The problem of body weight has increased since 1981 for both sexes, with lower trends in Africa and Southeast Asian countries. The attribution for this issue is due to alterations in eating habits and physical activity level plus socioeconomic influences. This matter has to be addressed from a multidisciplinary approach and wide socioeconomic support (Buroshy&Jeewon,2014).

Physical activity. In a research study, it was found out that regular exercises are significant in the regulation of body weight and prevention of obesity. It was concluded that regular and moderate exercise along with good nutrition can reduce LDL levels and increase HDL levels, creating a positive influence on hormones and body fats. Exercise could be an important factor in ones standard of life (Guclu, 2014).

Reduction of sedentary lifestyle leads to an increased longevity and an increase in the years that people can live without impairment due to weight bearing. Furthermore reduction of sedentary lifestyle can help one avoid cognitive impairment (Anstey et al., 2014).

In ages between 18 – 64 years old, physical inactivity is identified as the fourth leading risk factor for worldwide mortality. Currently many countries are

involved in controlling physical inactivity. In order to prevent the risk of NCDs and other health effects, the following are recommended: (WHO, 2010).

- Unless there are medical condition/cautions given, for adults aged 18-64 years, at least 150 minutes of moderate-intensity aerobic physical activity throughout the week, or at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week, or an equivalent combination of moderate-and vigorous-intensity activity are recommended.
- Aerobic activity should be performed in bouts of at least 10 minutes duration.
- For additional health benefits, adults should increase their moderate-intensity aerobic physical activity to 300 minutes per week, or engage in 150 minutes of vigorous-intensity aerobic physical activity per week, or an equivalent combination of moderate and vigorous intensity activity.
- Muscle-strengthening activities should be done involving major muscle groups on 2 or more days a week”.

Alcohol. Center of Diseases and Control (2012) showed associations between alcohol and obesity, small amounts of alcohol consumed before meals cause a clear and consistent increase in food intake, heavy drinking has also been reported to lead to overeating.

Other studies showed that many people have less information about the calories contained in alcoholic drinks and the effects of alcohol on body weight. Alcohol consumption which can lead to an increase in food intake shows that frequent drinkers are at higher risk of obesity than moderate drinkers. Relationships between obesity and alcohol consumption was also observed to be different between men and

women. This shows that women who are more alcohol dependent have higher relationship with obesity (Gatineau & Mathrani, 2012).

In a study, researchers found in both men and women that the number of drinks consumed was significantly related to their BMI. Although men in the study consumed more drinks than women in all levels of BMI, women show a higher rate of increase in the number of drinks consumed as BMI increases (Smarandescu, L., Walker, D., & Wansink, 2014).

Stress. The hormone cortisol is secreted by the adrenal gland in response to stressful situations, where even after food is consumed, it leads people to eat again. Another study found out that people with high BMI secrete more cortisol hormone in response to stress as compared to those with normal BMI. Excess fat stores expose the bodies to increased levels of cortisol hormone every after meals (Anonymous, 2012). Hence, overweight and obese individuals which have increase secretion of cortisol hormone every time food is ingested and still feel hungry and therefore eat more are at a greater risk in getting other disease (Glenn, 2013).

When people suffer stress in a short period of time, appetite can shut down due to the corticotrophin releasing hormone that suppresses appetite. But if the stress continues, the cortisol hormone is secreted which then increases appetite and motivate people to eat and eat endlessly (Vicenatti et al., 2012).

Stress tend to lead people to choose some foods such as those high in fats, sugar or both. That is why these foods as are called “comfort foods” because people under stress crave for these type of food (Adams, Greenway, & Brantley, 2011).

Genetic Factors

Today, more than ever, molecular genetics is fundamental in obesity research, because findings showed that it is far from being entirely within an individual's

control. It is not a biologic element led by voluntary action. Genetic predispositions can influence the amount and rate at which weight is gained or lost. Genetics and the rapid development of food environments that facilitate overeating make people require minimal energy expenditure, which may help explain why so many are gaining weight today (Jou.C., 2014).

A Chinese study identified as Genome Wide Association (GWA) which included body mass index (BMI) measurements, suggested profound effect on the synthesis and storage of triglycerides which can impact on overall energy homeostasis associated with weight gain (Yang et al 2014).

It was established that gaining weight can be seen within the family. The risk is two to eight times higher in individuals with a family history compared to another without history. Heritability of gaining weight leads to obesity and it increases when the person increases in age (Anonymous, n.d.).

Social and Environmental Factors

Population in the world is influenced by three trends: population-ageing, rapid unplanned urbanization, and globalization; all of which result in unhealthy environments and behaviors (WHO, 2012). Many low-and middle-income countries are beginning to suffer the double burden of non-communicable diseases, overweight and underweight. Health systems in these countries are now tussling to cope up with both (WHO, 2008). The environment in low income countries showed a picture where healthier foods are not available. Socioeconomic factors and unhealthy habits led individuals to lifestyle practices influenced by what they see and what they can afford. Also, each group of people such as children, elderly, poor, villagers have their own specific challenges. Challenges may include small housing conditions, sanitation, lack of transportation which expose them to a number of diseases. Few shops to buy

healthy food in rural or poor communities compared to those in urban centers with full shopping choices, better prices, good quality, and variety in fruit and vegetables are the other socio-economic and environmental challenges generally present (Papas et al., 2007).

According to CDC (2009), people make decisions based on their environment or community that may lead to improved or reduced weight. Therefore, societies should give importance to creating environments and communities that make easier for everyone to engage in physical activity and healthy dietary practices.

Medical Condition and Treatment

Thyroid Dysfunction. Study in hypothyroid subjects showed a small decline in mean body weight of the participants over the first six months of treatment. But body weight returned to pretreatment weight at the end of the 24 months study which shows that effective treatment of hyperthyroidism is accompanied by weight gain (Hoogwerf&Nuttall,1984). Changes in the body weight occur in thyroid dysfunction specifically in hypothyroidism condition where the thyroid gland, located in the neck, produces too little thyroid hormone that is responsible for the regulation of the metabolism in the body, and too little hormone slows the metabolism and often causes weight gain (Biondi,2013).

Cushing Syndrome. This condition occurs when the adrenal glands located on top of each kidney produce an excess amount of a steroid hormone called cortisol. This condition contributes to a concentration or build up of fat in specific areas of the body such as the face, upper back, and especially around the abdomen (Wagenmakers,2014).

Other Medications. According to Center of Diseases Control (2009), Americans are generally taking 5 or more prescription drugs. The most frequently

prescribed classes of medications are for pain, for lowering cholesterol level, anti-depressants, and to manage diabetes. It is known that those patients with weight problems are the ones who suffer most co-morbidities leading them to ask for medical prescriptions; whereby some medications which include steroids, antidepressants, high blood pressure drugs, and epileptic medications can also cause increased body weight (WHO, 2009).

Attitude Factor

The issue of being big in size or too slim has become popular among societies, at the same time psychological and social consequences make people think about stigma and discrimination by being called names or hurled hurting comments because of the body weight status. A study showed that 79% of the participants in the survey supported policies against weight stigma reduction and acceptance of body size (Young et al., 2014).

In a study conducted in South Africa showed that the black African women do not consider themselves overweight or obese compared to the white African women. Referring to education, it was interesting to see that there were significant relationship among those women who had no education and those with more than 12 years of education having the highest BMI compared with those who had between 1 and 12 years of education (Puoane et al., 2002).

Factors that Influence Body Weight Related to

Major Oral Diseases

Worldwide

Among European countries increased body mass index showed 15% - 30% prevalence due to high energy intake and less energy expenditure as primary risk factors, where the co-morbidities were visibly related to several aspects of oral health,

and concluded that oral diseases were influenced by obesity and were implicated with preparations of dental treatment plans (Vliegen & Brand, 2007).

In western Sweden, the results of a study showed association between oral health and central adiposity leading to weight gain especially among those with high BMI. The findings demonstrated significant association in the number of teeth and in the number of restorations. (Ostberg et al., 2012).

The growing body of evidence on obesity linked with periodontal diseases gave the opportunity to assess risk factors in patients with metabolic problems from different approaches. This body of evidence shows beneficial influence not only on weight gain problems and periodontal diseases, but also on the prevention of other related diseases. These measures showed the way to prevent obesity and metabolic diseases, particularly among patients with periodontal issues (Hein & Batista, 2014).

Findings on the prevalence of dental caries, diseases in the periodontal and saliva flow related with obese people showed high prevalence in periodontal pockets due to xerostomy. On another hand this emphasized that sugar and carbohydrates are included as the primary approaches to address oral diseases and non communicable diseases. (Marcicanet al., 2012).

In order to prevent oral diseases, programs for their prevention and control should be focused in oral hygiene and healthy diet, emphasizing sugar and carbohydrates as causes of caries and fibrous foods as foods that prevent oral diseases (Belcastro et al., 2007).

Africa

Akinboboye, Azodo, and Soroye (2014) identified Nigeria, a country in west of Africa as facing the challenge of seeking for options for treatment in people missing one or more teeth. This issue of missing teeth has become prevalent, and the

causes are commonly caries, periodontitis, and traumas. The findings showed low prevalence of missing teeth compared to those having replacements of missing teeth. The effect of missing a tooth or teeth will be great in the condition of imposed dietary restrictions because of the inability to chew, forcing themselves to prepare very soft food, putting them at higher risk for nutritional imbalances (Dosumu, Ogunrinde, & Bamigboye, 2014).

Study conducted in Tanzania and Uganda in Kiswahilli and Luganda languages, (the latter mention language is currently the national official language used in order to gather quality data/findings) showed that parents are not aware of their children' and their own oral health status. They cannot discriminate between harmful and healthy foods and believed that if there is no oral pain there is no disease. The objective of that study was to find the impact of caries on the health of children and their families, and to assess the properties of an oral health related quality of life (Masumo et al., 2012).

CHAPTER THREE

RESEARCH METHODOLOGY

This chapter describes the methodology that the researcher followed in accomplishing this research. The chapter discusses the research design, research site, research population, research instruments, validity of instruments, data collection procedures, statistical treatment of data, and ethical considerations.

Research Design

A descriptive-correlation research design was used in this study to investigate the factors that influence body weight as measured by BMI and its implications on major oral diseases. Descriptive design allows for deep exploration and description of phenomena associated with characters of a subject population (Cohen, Manion, & Morrison, 2011), while correlation design allowed the researcher to establish which factors associated with body weight changes was/were linked to major oral diseases.

The study is specifically intended to investigate the factors that influence body weight among workers of SDA institutions in Rwanda and whether these factors are also associated to major oral diseases.

Research Site

The research site was in Kigali, Rwanda, and in particular the main SDA institutions within the city. Kigali is the capital and largest city of Rwanda and is located near the geographic centre of the nation. The city is built in hilly country, sprawling across about four ridges and valleys in between. The city centre is located on one of these ridges. The population in Kigali is around 1,132,686 and it keeps increasing in number, as also the physical development of the city.

There are three main SDA institutions in Kigali selected by the researcher. They were Adventist University of Central Africa (AUCA), Rwanda Union Mission (RUM) and ADRA Rwanda. The population of SDAs in Kigali during the time of the research study is around 500,000.

Research Population

There were approximately 140 workers in the three main SDA institutions in Kigali, Rwanda from which the research population was taken.

The researcher selected the research population due to three reasons:

1. It represents the SDA population, where the researcher is a member and has much interest due to its globally known positive lifestyle awareness and practices.
2. The researcher has closer contact and access with Rwanda SDA institutions.
3. The availability of a dental clinic and dentists to assess the oral conditions of the population.

Cluster sampling method was used in this study. This is a sampling technique where the entire population is divided into groups, or clusters, and a random sample of these clusters is selected. Since there were only 140 workers in all three SDA institutions in Kigali, Rwanda, the researcher decided to include everyone in the study. After all preparations and announcements were done, 108 workers were available, the rest were not, hence, the study had 108 participants in all.

Research Instruments

There were three instruments utilized in the research study. They included the BMI calculator, the survey questionnaire, and the caries and periodontal index.

BMI Calculator

The BMI was taken from all participants using the Karada scan to determine the body weight status. The Karada scan is a body fat analyzer, a full body composition monitor sensing technology for a more accurate and precise body composition measurement. Segmental body weight percentages (full body, trunk, legs, and arms) for both subcutaneous and skeletal muscle can also be determined by the Karada scan. In this research study, each of the participants was asked to stand on the Karada scan; keyed in the height, age, and gender, and the BMI was calculated automatically in few seconds including all other results. (Omron HBF-500., 2012).

Survey Questionnaire

Questionnaires were given to the participants with the purpose of finding the factors that may influence body weight status. This questionnaire that was developed with the guidance of my supervisors was the main research instrument. It was organized from concepts taken from review of related literatures based on the research questions. The questionnaire consisted of two sections, the first containing the demographics, and the second which contained information referring to specific lifestyle factors including diet, physical, and stress.

Caries and Periodontal Index

Decay Missing Filled Teeth (DMFT) caries index was done in order to determine the prevalence of caries in each participant. The researcher used the Decay, Missing, Filled Teeth Index (DMFT) which was introduced by Klein, Palmer and Knutson in 1938 and modified by the WHO (1991). The modifications are described below.

D component. Used to describe “Decayed” teeth which include carious tooth, filled tooth with recurrent decay, only the roots are left, defect filling with caries, temporary filling, and filled tooth surface with other surface decayed.

M component. Used to describe “Missing” teeth due to caries. Other cases that are not included are:

1. Tooth extracted for reasons other than caries are excluded, which include:
 - a. Orthodontic treatment
 - b. Impaction
 - c. Periodontal disease
2. Interrupted teeth
3. Congenitally missing
4. Avulsion teeth due to trauma or accident

F component. Used to describe “Filled” teeth due to caries.

Teeth were considered filled without decay when one or more permanent restorations were present and there was no secondary (recurrent) caries or other area of the tooth with primary caries. A tooth with a crown placed because of previous decay was recorded in this category. Teeth restored for reasons other than dental caries were not included in this component such as:

1. Trauma (fracture)
2. Hypoplasia (cosmetic purposes)
3. Bridge abutment (retention)
4. Seal a root canal due to trauma
5. Fissure sealant
6. Preventive filling

Note:

1. A tooth is considered to be erupted when just the cusp tip of the occlusal surface or incisor edge is exposed. The excluded teeth in the DMF index are:
 - a. Supernumerary teeth
 - b. The third molar according to Klein, Palmer and Knutson only.
2. DMFT index in this study did not include people older than 75 years and children because index can overestimate caries record by cases other than dental caries.

Principles and Rules in Recording DMFT

- A tooth with several restorations is counted as one tooth(F).
- A tooth with restoration on one surface and caries on the other is counted as decayed (D).
- No tooth must be counted more than once, D M F or sound.

Calculation of DMFT. The formula for calculating DMFT in individuals is(DMF = D + M + F). Likewise, the formula for calculating DMFT in a population is (Mean DMFT = Total DMF/Total number of the subjects examined). The criterion for the calculation of oral caries is as follows:

0.0 – 1.1	= very low caries
1.2 – 2.6	= low caries
2.7- 4.4	= moderate caries
4.5- 6.5	= high caries
6.6 >	= very high

After the caries index, the researcher found the Periodontal Index, it was obtained during individual oral examination where data was recorded in specific criteria as follow:

Community Periodontal Index of Treatment Needs (CPITN). This was introduced by WHO/FDI in 1982. The mouth was divided into six parts (sextants). The examination was done by periodontal probe. The score is identified by examination of specific index of 6 teeth which correspond to the first molars (superior and inferior jaw) and central incisors (superior and inferior).

CPI score criteria.

- 0 = No periodontal disease (Normal).
- 1 = Bleeding on probing (Mild Gingivitis)
- 2 = Calculus with plaque seen or felt by probing (Gingivitis)
- 3 = Pathological pocket 4 – 5 mm.(Mild Periodontitis)
- 4 = Pathological pocket 6 mm or more. (Periodontitis). When only 1 tooth or no tooth is present.

Validity of the Instruments

Validity is an important key to effective research, according to Cohen (2007). If a piece of research is invalid then it is worthless. Validity refers to the degree to which an instrument accurately reflects or assesses a specific concept that a researcher is attempting to measure.

The instrument developed was presented to the supervisors and statistician in the University of Eastern Africa, Baraton for content validation based on their comments and advice, the necessary adjustments were done.

Reliability

Reliability, according to Punch (2009), means replicability, the extent to which another research can reach the same conclusions by following the same research process when using the same instrument.

A pilot study was done at Gahogo Secondary Adventist School, which is the nearest Adventist School, with thirty three workers, Gahogo is located approximately 50 Km from Kigali town. The purpose of piloting was to ensure clarity of meaning and consistency of items in the research instruments. A calculation of Cronbach's alpha coefficient was done to establish the internal consistency of the test items using computer soft ware Statistical Package for Social Sciences (SPSS) program version 17. A high value of alpha indicates that the items to be measured have an underlying construct as such an alpha value of averagely 0.7 will be accepted for this study.

After doing this Pilot study at Gahogo Adventist Secondary School the table below shows that the alpha value was 0.749 for 26 questions about diet, and 0.638 for 10 questions about stress given the acceptability of the questionnaire.

Table 1

Reliability (Diet)

Reliability Statistics	
Cronbach's Alpha	N of Items
.749	26

Table 2

Reliability (Stress)

Reliability Statistics	
Cronbach's Alpha	N of Items
.638	10

In the section about exercises it was not necessary to compute the reliability since the intended classifications was to find out the frequency, intensity and time of physical activity.

Data Gathering Procedures

After having the reliability of the instrument established through a pilot study, the researcher was cleared by supervisors and department chair and authorized her to get an introductory letter from the office of Graduate Studies at UEAB, which was to enable her find permission from the relevant authorities at SDA institutions of Rwanda while carrying out the research.

Upon the approval from the authorities, a letter of consent was distributed first to the participants to make sure that it is totally a voluntary process. The researcher made official arrangements with the workers of the institutions to schedule them for suitable dates to collect data.

Participants were measured to determine their body weight status (BMI) using the Karada Scan scale and in the same day questionnaires were filled after oral examination at Kigali Adventist Dental clinic.

The questionnaire was important in identifying the factors influencing body weight changes and this data was used to correlate with major oral diseases.

Statistical Treatment of Data

Descriptive and inferential statistics were used to analyze the collected data from the questionnaires, Karada Scan scale, caries, and periodontal index .Pearson product-moment and Chi Square correlation were computed to link factors that influence body weigh with oral health status. SPSS 20 software was used for the data storage calculation, percentage and mean of the variables.

Ethical Considerations

Ethical review was conducted by the Institutional Research and Ethics Committee in the University of Eastern Africa, Baraton, and administrative approvals

were sought. Likewise, consent and approval were sought from the executive committee of the SDA Union Mission of Rwanda where they themselves endorsed the program to the three SDA main institutions in Kigali, Rwanda, before the final implementation of the study was conducted.

All participants for this study were voluntary and each of them who accepted to participate in this research signed a consent form. They were given the option to withdraw from the study at any time they wanted to. Questionnaires were given to the participants by the researcher. Codes were used, no names or identifying information were indicated on the questionnaires, all data collected about the participants were safeguarded to ensure the privacy and the personal integrity, and all participants were assured of absolute confidentiality and anonymity.

CHAPTER FOUR

PRESENTATION OF FINDINGS, ANALYSIS AND INTERPRETATION

This chapter presents the findings of the study that involved workers at SDA institutions in Kigali Rwanda. The data are presented in tables, analyzed and compared to the related literature. In this study, the researcher divided the inquiry into two sections. Section one relates to respondents' demographic information in the questionnaire and section two relates to the questions addressing the independent and dependent variables.

Demographic Information

This section shows the gender, age, number of years of service in the institution, employment status, and educational qualification of the participants.

Gender of Participants

The participants were required to indicate their gender in the survey questionnaire. Table 3 summarizes the gender of respondents.

Table 3

Gender Distribution of Participants

Gender	Frequency	Percent
Male	82	75.9
Female	26	24.1
Total	108	100.0

Table 3 shows the distribution of participants by gender. There were 82 male participants (75.9%) and 26 female participants (24.1%) among all the available workers of SDA institutions in Kigali, Rwanda.

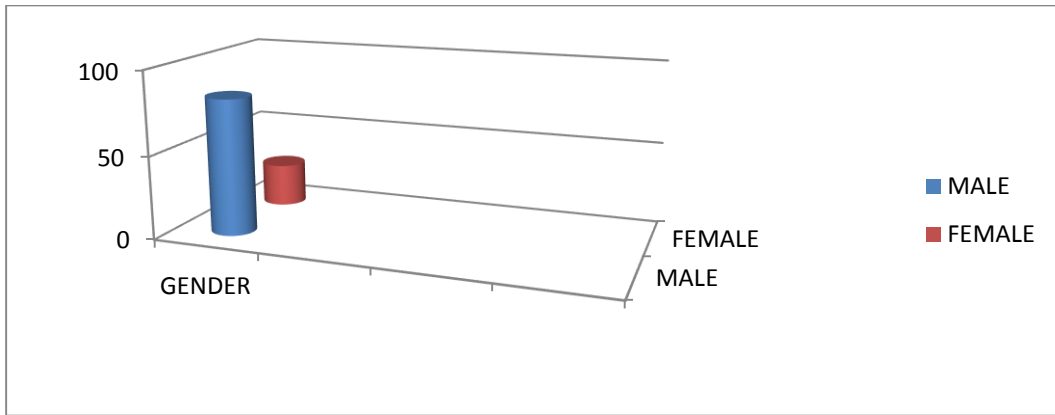


Figure 2. Gender of respondents.

Age of Participants

The participants were required to indicate their age either among: Under 30, 31 to 35, 36 to 40, 41 to 50 years and above 51 years. Table 4 shows the summary of the age of the participants.

Table 4
Age Distribution of the Participants

Ages	Frequency	Percent	Valid Percent	Cumulative Percent
30 years and under	12	11.1	11.1	11.1
31-35 years	26	24.1	24.1	35.2
36-40 years	17	15.7	15.7	50.9
41-50 years	23	21.3	21.3	72.2
51 years and above	30	27.8	27.8	100.0
Total	108	100.0	100.0	

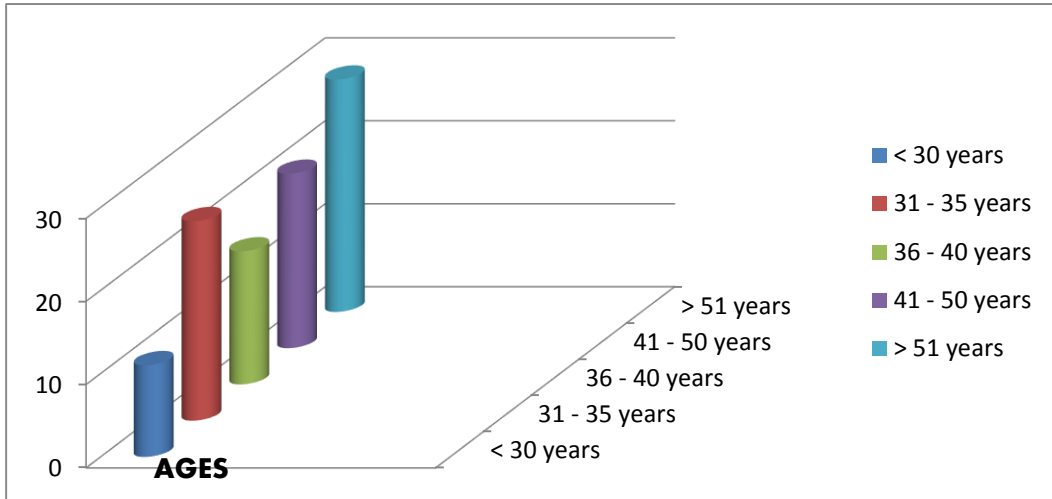


Figure 3. Ages of the participants.

Years of Service

The participants were required to indicate the number of years they have been working at the institutions. The result is as follows: from 1 to 3 (19%), from 3 to 6 years (24 %), from 6 to 10 years (23 %) and over 10 years (33 %). Table5 shows the comparison of this demographic information.

Table 5

Number of Years of Service in the Institution

Categories	Frequency	Percent	Valid Percent	Cumulative Percent
1-3 years	21	19.4	19.4	19.4
3-6 years	26	24.1	24.1	43.5
6-10 years	25	23.1	23.1	66.7
over 10 years	36	33.3	33.3	100.0
Total	108	100.0	100.0	

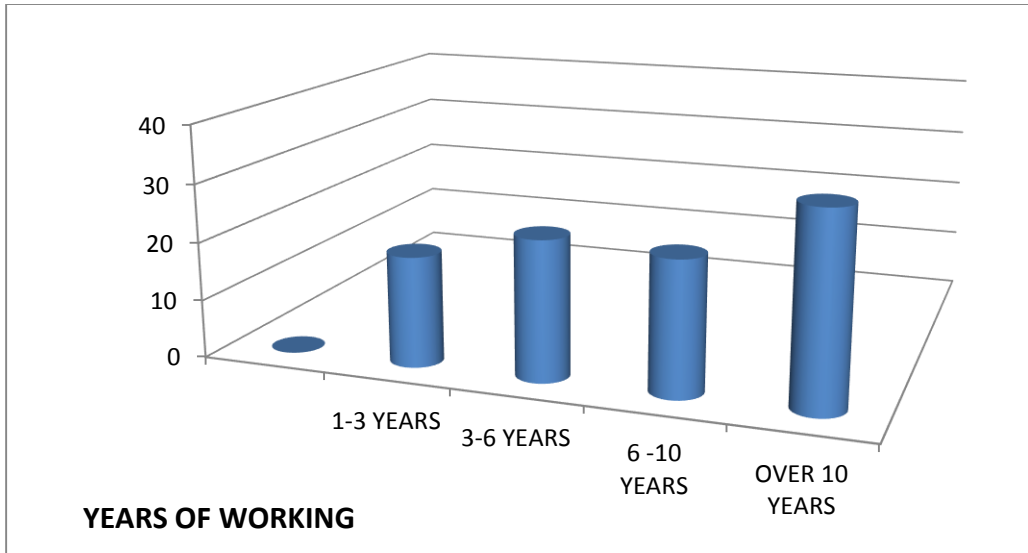


Figure 4. Years of service of the participants.

Employment Status

The participants were required to indicate the employment status whether full time or part time. Table 6 shows that out of 108 participants, 88.9% were workers in Adventist institutions working full time and, 11.1 % were working part time. The figure below compares these results.

Table 6

Employment Status of the Participants

Time	Frequency	Percent	Valid Percent	Cumulative Percent
Full-time	96	88.9	88.9	88.9
Part-time	12	11.1	11.1	100.0
Total	108	100.0	100.0	

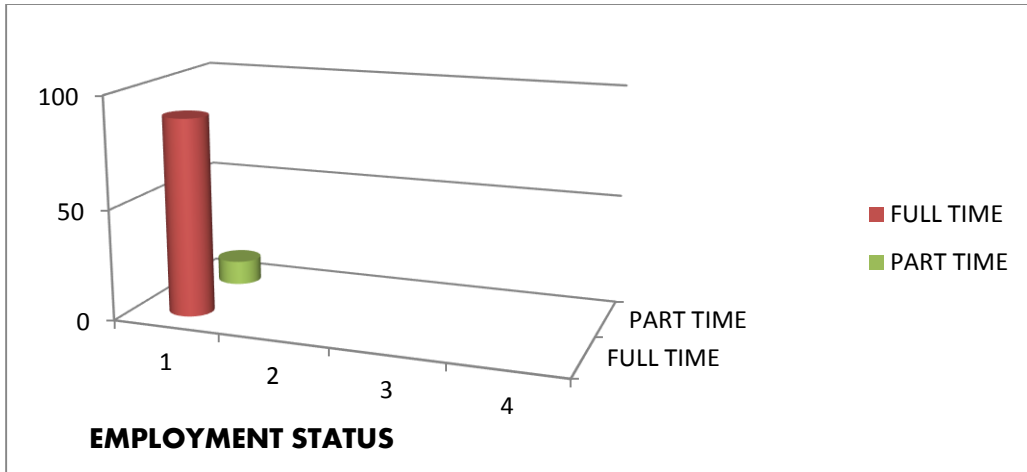


Figure 5. Employment status of the participants.

Educational Qualification

The respondents were asked to indicate their educational level or qualification as follows: Bachelor, Master, Doctorate, Professor or others. Table 7 gives a summary of the participants' educational qualifications. It shows that out of 108 participants, 59.3% of workers in Adventist institutions were in Bachelor's degree level, 25% were holding Master's degree, 3.7% were holding Doctorate degrees, and 11% were Professors. Figure 6 shows clearly these results.

Table 7

Highest Educational Qualification

Qualification	Frequency	Percent	Valid Percent	Cumulative Percent
Bachelor's degree	64	59.3	59.3	59.3
Master's degree	27	25.0	25.0	84.3
Doctorate	4	3.7	3.7	88.0
Professor	12	11.1	11.1	99.1
Others	1	.9	.9	100.0
Total	108	100.0	100.0	

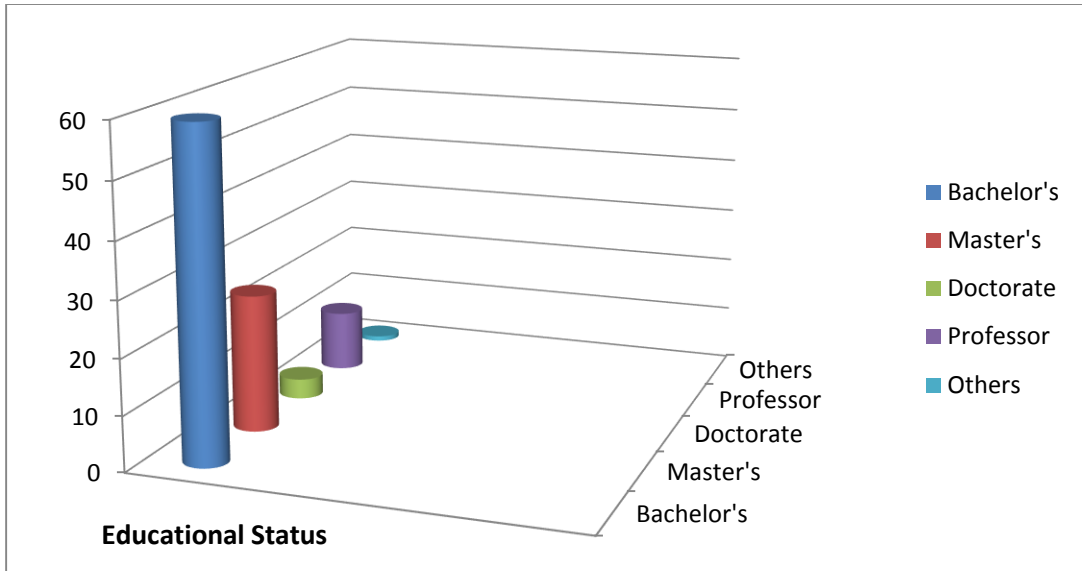


Figure 6. Educational status of the participants.

Body Weight and Oral Health Status

Research question 1: What is the body weight and oral health status of workers in Seventh-day Adventist institutions in Rwanda?

In order to obtain the Body Mass Index of the participant, a Karada scan scale was used and the results are show in Table 8.

Table 8

Weight Classification According to BMI

BMI	Frequency	Percent
Normal	34	31.4
Overweight	64	59.2
Underweight	10	9.4
Total	108	100.0

The statistical analysis shown in the Table 8 indicates that among 108 participants 31.4 % had normal BMI (normal weight), 59.2% were with BMI over

24.9 (overweight), and 9.4% were with BMI less than 18.5 (underweight). This difference of BMI also is shown in Figure 7. According to the World Health Organization, 65% of the world's population live in countries where overweight and obesity kill more people than underweight and more than 10% of the world's adult population in overall were obese (WHO., 2009). These findings is consistent with the world statistics, which shows Rwanda as one of the countries in Sub Saharan Africa where dietary factors brought about by the nutrition transition from low-fat, low-caloric diet to high fat, high caloric diet, result to the emergence of nutrition related non-communicable diseases. (Abraham et al., 2011).

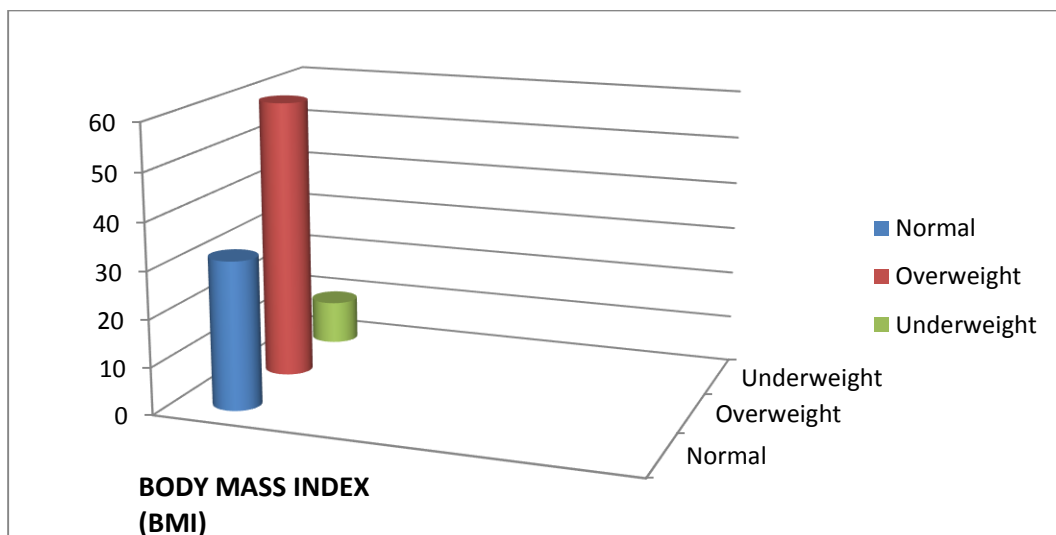


Figure 7: Body Mass Index (BMI) of the participants.

Table 9

Body Mass Index (BMI) of the Participants

BMI	N	Minimum	Maximum	Mean	Std. Deviation
Body mass index	108	16	38	25.82	4.726
N (list wise)	108				

Table 9 shows the descriptive statistics of BMI. The minimum BMI considered underweight was 16 and the maximum was 38 considered obese with the mean BMI of 25.82. The standard deviation was 4.7 which shows heterogeneity of the data as graphically presented in figure 8.

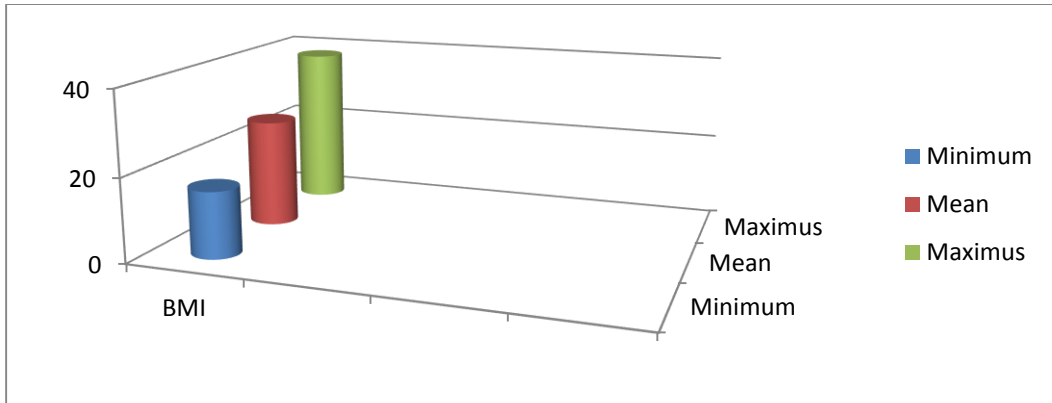


Figure 8. BMI of the participants.

Decay, Missing, Filled Teeth Index (DMFT Index)

The 108 participants were examined on their oral health status, first using the DMFT index. Decay, missing, filled teeth were counted in order to measure the prevalence of dental caries. Table 10 shows the scores based on the caries index.

Table 10

Score DMFT Index (Prevalence of Caries)

Score	Frequency	Percent
very low	21	19.4
low	19	17.6
moderate	22	20.4
high	16	14.8
very high	30	27.8
Total	108	100.0

Table 10 shows that 42.6% of the participants had high and very high prevalence of caries, while 37% had low and very low prevalence of caries. Around 20.4 % of the participants had moderate prevalence of caries. Prevalence of oral caries in the whole population based of oral caries index calculation was 4.6, which is interpreted as “high prevalence”. The prevalence in the group with normal BMI was 4.41 and is interpreted as “moderate prevalence”. The group with low BMI showed a 4.6 prevalence and is interpreted as “high prevalence”, while in the group of high BMI showed 4.8 prevalence and is interpreted as “high prevalence”. Figure 9 graphically shows the findings.

WHO (2012) reported oral health data for 40 countries out of the 46 countries in the African continent. The DMFT (decay, missing, filled, teeth) index ranged from 0.0 to 6.6 and more. Half of the 40 countries had an index of 1.3, and Rwanda was in second lowest prevalence of caries (Da Silveira, 2012). The finding of this research study showed unexpected results since Rwanda was the second lowest among African countries in oral caries index. Hence, it implies that oral caries has increased in a matter of few years.

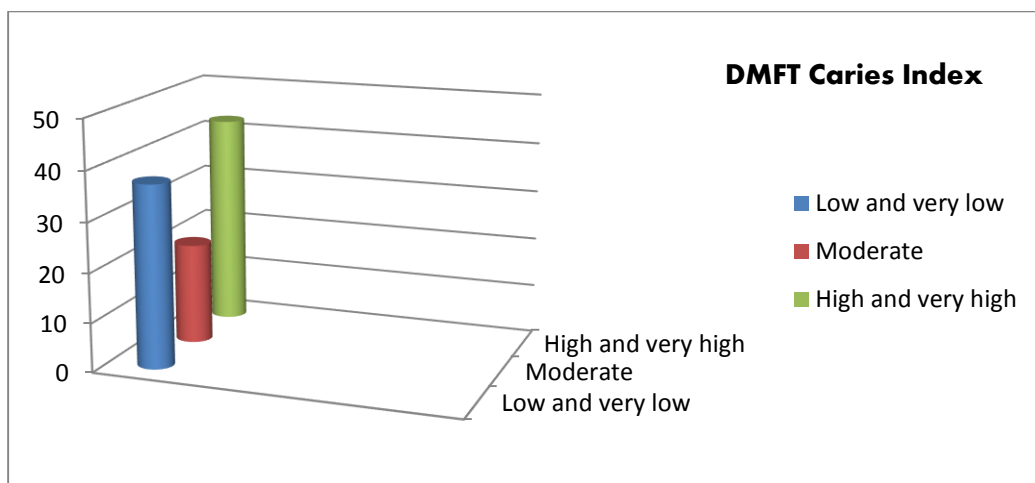


Figure 9. DMFT caries index of the participants.

Periodontal Index

Oral health showing periodontal diseases status was also examined by the researcher. Table 11 shows the findings where periodontal disease is classified from normal to periodontal disease, from mild gingivitis, gingivitis, mild periodontitis, and periodontitis.

Table 11

Periodontal Disease

Score	Frequency	Percent
Normal	11	10.2
Mild gingivitis	35	32.4
Gingivitis	37	34.3
Mild periodontitis	19	17.6
Periodontitis	6	5.6
Total	108	100.0

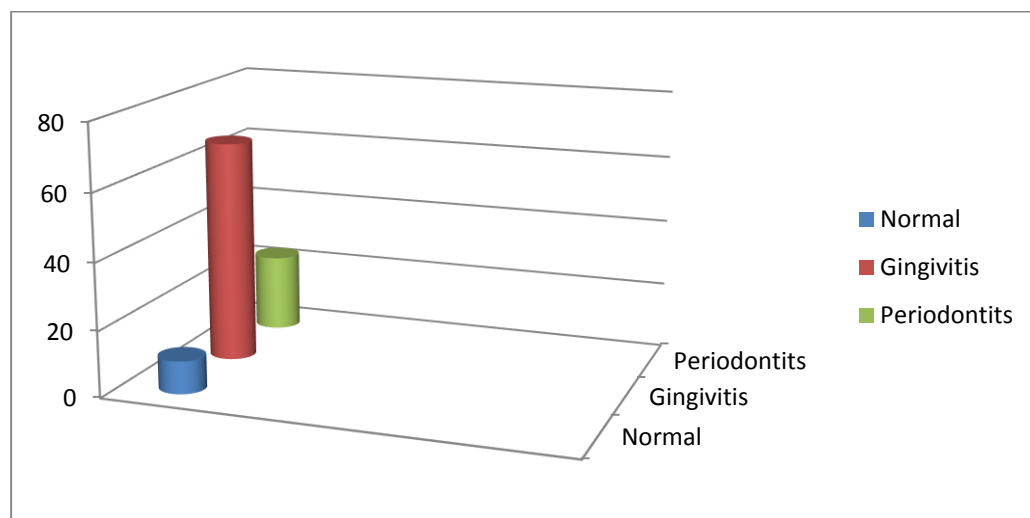


Figure 10. Periodontal index.

The oral health status of most of the participants was poor. Table 11 shows that the most frequent periodontal disease was gingivitis and mild gingivitis affecting 66% of the total participants, while only 10% do not have any of the disease. Studies done by the World Health Organization in 2009 showed that in Africa early periodontitis is prevalent and Rwanda was not an exception. Periodontitis is not suppose to be a problem in Africa due to low intake of processed sugar (Sulum, 2009). Figure 10 shows the differences in percentages of these diseases in three groups: normal, gingivitis and periodontitis.

Lifestyle of Workers

Research question 2: What is the lifestyle of workers in SDA institutions in Rwanda in terms of?

a. Diet

b. Physical activity

c. Stress

In this section of the questionnaire there were 5 options to chose, from 0 = never, 1= almost never, 2= rarely, 3 = sometimes, 4= often, and 5 = always. The participants were asked to ticked according to the questions. In the section of diet there are seven sub variables as follows: fruit and vegetables, fats, starchy food, sugar salt, drinks and eating habits.

Diet

Fruits and Vegetables. As shown in Table 12, regarding fruits and vegetables, the question was focused on the variety and frequency of eating this kind of food. It shows number 3 (sometimes) as a mean, which reveals that the participants ate in low quantity and in less frequency when compared to what is the for a healthy lifestyle. Nevertheless, the standard deviation shows heterogeneity and high

variability of answers among the participants, revealing that some of the participants gets more benefits than others.

Table 12

Fruits & Vegetables - Descriptive Statistics

Questions about fruit and vegetable	N	Minimum	Maximum	Mean	Std. Deviation
Do you eat at least 5 portions of fruit and vegetables per day?	108	0	5	2.39	1.296
Do you eat more than 4 different varieties of fruit each week?	108	0	5	2.52	1.384
Do you eat more than 4 different varieties of vegetables each week?	108	0	5	2.70	1.396
Fruits and vegetables	108	.00	4.67	2.5370	1.10398
Valid N (list wise)	108				

For most vegetables and fruits they have a gentler effect on blood sugar and insulin, which helps keep hunger at bay, these foods have bountiful benefits for disease prevention, and there is also evidence that they can help prevent weight gain (Ledoux et al., 2011). Of course, the calories from whole fruits and vegetables do not disappear, what is happening is that when people increase their intake of these foods, they cut back on calories from other foods. Fruits and vegetables are also high in water, which may help people feel fuller on fewer calories.

The Adventist Health Study-2 participated by 22, 434 SDA men and 38, 469 SDA women conducted in 2002 to 2006 showed that SDA who were pure vegans had a mean BMI of 23.6 and the lowest compared to other groups including those SDA who were lacto-ovo vegetarians (25.7), pesco-vegetarians (26.3), semi-vegetarians (27.3), and non-vegetarians (28.8). The study also showed that vegetarians from

various groups had a lower risk of type 2 diabetes than non-vegetarians. The study finally concluded that “the 5-unit BMI difference between vegans and non-vegetarians indicates a substantial potential of vegetarianism to protect against obesity.” (Tonstad et al., 2009).

Fats. In the sub-variable of fats in Table 13, the mean among the answers is 3 that correspond to sometimes, revealing that the participants do not really care about the quality of fats and the consequences of this kind of food to their health, yet the standard deviation shows high variability in the answers among the participants.

Table 13

Fats - Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Do you choose low fat product when available	108	0	5	2.94	1.670
Do you choose baked-steamed or grilled options when available rather than fried food?	108	0	5	2.57	1.636
Do you opt for lean cuts of meat or remove visible fats (like removing the skin of chicken)	108	0	5	2.23	1.960
Fats	108	.00	5.00	2.5802	1.27551
Valid N (listwise)	108				

In the Nurses’ Health Study, which followed 42,000 middle-age and older women for eight years, increased consumption of unhealthy trans fats especially and also saturated fats, were linked to weight gain. Increased consumption of healthy fats like monounsaturated and polyunsaturated fat was not salient. It is far more important to be aware in which type of fats is in our daily food than the amount (Field et al.,

2007). Carefully conducted clinical trials reveal that following a low-fat diet does not make it any easier to lose weight than following a moderate or high-fat diet. In fact, study volunteers who follow moderate or high-fat diets lose just as much weight, and in some studies a bit more, as those who follow low-fat diets. When it comes to disease prevention, low-fat diets don't appear to offer any special benefits in terms of body weight management (Sacks et al., 2009).

The Adventist Health Study-2 showed that SDA who were vegans had the lowest mean BMI (23.6) compared to other vegetarian groups who were described as vegetarians but still consumed animal products like milk and eggs (lacto-ovo), fish (pesco), and meat once in a while (semi). Moreover, those SDA in the study who were non-vegetarians had the highest mean BMI (28.8). The results indicated that a diet void or with the least animal fat and cholesterol content has the highest potential of protecting individuals from high BMI, overweight, and obesity. (Tornstad et al., 2009)

Starchy Foods. Table 14 shows that the overall mean for starchy foods consumption corresponds to sometimes which concludes that participants did not have whole meals and grains as their primary food choices. Nevertheless, the mean answer in the question about starchy food in the main meals reveals a mean of 4 that correspond to often, concluding that the participants were often eating in their main meals starchy food like potatoes, pasta, rice or bread, but not necessarily whole foods. The heterogeneity is still present in the standard deviation. The good news is that many of these foods that are beneficial for weight control also help prevent heart disease, diabetes, and other chronic diseases, so participants are more likely to prevent this diseases. Whole wheat, brown rice, brown sugar, and all similar foods especially in their less-processed forms are digested more slowly than refined grains. So they

have a gentler effect on blood sugar and insulin, making them as healthier food options. (Koh-Banerjee et al., 2007).

Table 14

Starchy Food- Descriptive Statistics

	N	Mini- mum	Maxi- mum	Mean	Std. Deviation
Do you base your main meals around starchy food (like potatoes, pasta, rice or bread)?	108	0	5	3.72	1.191
Do you choose whole meal bread rather than white?	108	0	5	2.57	1.730
Do you eat whole grain cereals with not added sugar?	108	0	5	2.63	1.722
Do you include pulses in your diet (like beans or lentils)?	108	0	5	3.76	1.484
Starchy Food	108	.75	5.00	3.1713	.94822
Valid N (listwise)	108				

Sugar. Sugar was measured using three questions where the findings are shown in Table 15. Results showed that participants were not used to consuming sugary foods, and they were inclined to buy brown sugar which is a good practice compared to white sugar. The overall mean for the questions on sugar corresponds to rarely which is translated to healthier dietary practice.

The study conducted in the United States assessed the home food environment in a population of low-income overweight and obese African American women, where several home food environment characteristics were significantly associated with higher quality diets. These included healthy shopping as in purchasing very low

quantities of sugar where in some cases sugar was not even in the list of items to buy, selecting healthy beverages (e.g., without added sugar), and healthier food preparation. This shows that weight gain is related to a different factor. (Hartman et al.,2015).

Table 15

Sugar - Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Sugar	108	.00	5.00	1.9846	.93660
Valid N (listwise)	108				

Salt. Table 16 shows that participants used very less quantities of salt. The mean answer to questions referring to salt consumption corresponds to almost never. This indicates that they know the consequences of having much salt in their food. The joint World Health Organization (WHO) and Food and Agriculture Organization (FAO) report on diet, nutrition, and the prevention of chronic diseases (WHO, 2003) stated that the population nutrient intake goal for salt should be <5 g/day. The results of this study showed that salt added to food during cooking is still the major source of salt intake. Participants did not eat pre prepared meals or add salt at the table. This indicates good eating habits and low risks to non communicable diseases.

Drinks. Table 17 shows that the participants opt for a variety of different drinks, including water at work with a mean of 3 corresponding to sometimes, avoiding sugary drinks with a mean of 2 corresponding to rarely, and energetic drinks with the mean of 0 corresponding to never. But participants are not drinking fruits and vegetable juices which are more beneficial for health, as shown in the mean answers which corresponds to rarely and almost never.

Table 16

Salt - Descriptive Statistics

	N	Mini- mum	Maxi- mum	Mean	Std. Deviation
Do you add salt to meals at the table?	108	0	5	1.31	1.495
Do you eat pre – prepared meals? (like ready meals, canned meat, canned vegetables)	108	0	5	.95	1.203
Salt	108	.00	5.00	1.134	1.14305
Valid N (listwise)	108				

A number of studies showed strong relationships between soft drinks intake and increasing body weight. Results of these studies also found that there are other related factors which included gender, age, type of beverage which should be studied further (Vertanian et al., 2007). Participants in this study do not take sugary and energetic drinks, but shows high consumption of milk which is known not only of its high nutritive value but also of its significant amount of fat which is related weight gain which is a common practice in many African countries (Golzarand et al., 2012).

Table 17

Drinks - Descriptive Statistics

	N	Mini- mum	Maxi- mum	Mean	Std. Deviation
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(Table continues...)

(Table continued...)

Do you drink plenty of fluids at regular intervals during the working day?	108	0	5	2.44	1.518
Do you opt for a variety of different drinks, including water at work?	108	0	5	3.30	1.292
Do you avoid sugary drinks?	108	0	5	2.69	1.666
Do you drink fruit juice at least 3 times a week (mango, pineapple, lemonade, etc)?	108	0	5	2.04	1.446
Do you drink a vegetable juice at least 2 times a week?	108	0	5	1.23	1.483
Do you drink whole milk at least 3 times a week?	108	0	5	2.18	1.761
Do you drink tea or coffee at least once a week?	108	0	5	2.22	2.070
Do you drink energy drinks at least once a week? (Red Bull, Rockstar, Full Throttle,etc.	108	0	5	.49	1.156
Valid N (listwise)	108				

Eating Habits. Table 18 presents the descriptive statistics on eating habits.

Table 18

Eating Habits - Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Do you skip breakfast more than once a week?	108	0	5	1.97	1.666
Do you skip lunch more than once a week?	108	0	5	1.50	1.398
Do you skip evening meals more than once a week?	108	0	5	1.68	1.552
Valid N (listwise)	108				

Table 18 shows that eating practices of workers in Adventist institutions in Rwanda.

Practices included participants sometimes or rarely skip meals like breakfast, lunch or supper which indicates good eating habits. A study (Horikawa et al., 2011) showed that despite culture or location of residence, there is always a strong relationship between skipping meals especially breakfast and body weight.

Physical Activity

The table below shows clearly that majority of the workers in Adventist institution in Rwanda did brisk walk at least 30 minutes a day that correspond to a lower amount of physical activity, nevertheless the standard deviation shows heterogeneity in the answers.

A study showed that low physical activity and low fitness level leads to gaining weight easily. It also showed that the effect of physical activity in the human body is not much significant as when it was combined with diet. Lack of physical activity and exercise combined with unhealthy dietary practices showed greater tendency particularly abdominal adiposity (Jakicic, 2009). The participants in this study were prone to gain weight due to lack of physical activity and the consequences could be also lead to lifestyle diseases.

An attained age survival analysis was conducted among 22,884 African American SDA participants of the Adventist Health Study 2 to find out the relationship between obesity and life expectancy. Results showed that “avoiding obesity promoted gains in life expectancy through at least the eight decade of life in black (SDA) adults. Evidence for weight control through plant-based diets and active living (vigorous exercise) was found in long-lived non obese (SDA) blacks (Singh et al., 2014).

Table 19

Physical Activity – Descriptive St

	N	Minimum	Maximum	Mean	Std. Deviation
Do you do brisk walk at least 30 minute a day (Low)	108	0	5	2.72	1.582
Do you do aerobic exercise, bicycling or jog at least 150 min per week (Moderate)	108	0	5	1.43	1.467
Do you run, play football, basket, swim including strength or resistant training at least 90 min per week (High)	108	0	5	1.33	1.600
Valid N (listwise)	108				

Stress

Stress was measured by 10 questions as shown in Table 20. The overall mean of the answers showed that the participants did not suffer constant stress and they were able to control their irritations. When people are under stress especially post-traumatic stress disorders, studies proved that they become overweight and obese due to excessive eating (Kubzansky et al., 2014).

Table 20

Stress - Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Stress	108	.40	3.70	1.9176	.66499
Valid N (listwise)	108				

Lifestyle Factors Influencing Body Weight

Research question 3: Which of the lifestyle factors significantly influence body weight among workers in Seventh-day Adventist institutions in Rwanda?

- a. Diet**
- b. Physical activity**
- c. Stress**

Relationship between Body Weight, Diet, Physical Activity and Stress

Ho₁: Lifestyle factors do not significantly influence body weight.

A correlation coefficient was used to summarize the relationship between the variables. A single number that falls between -1 and + 1 (Welkowitz et al., 2006).

Morgan et al. (2004) stated that:

- -1.0 (a perfect negative correlation)
- 0.0 (no correlation)
- +1.0 (a perfect positive correlation)

The hypothesis examined the correlation between diet, physical activity, and stress (independent variables) and body weight (dependent variable).

Table 21

Relationship Between Body Weight, Diet, and Stress

		Fruits and vegetables	Fats	Starchy Food	Sugar	Salt	Stress
Body mass index	Pearson Correlation	.221*	.191*	.043	-.008	.017	.082
	Sig. (2-tailed)	.022	.048	.656	.936	.858	.398
	N	108	108	108	108	108	108

*. Correlation is significant at the 0.05 level (2-tailed).

Pearson correlation analysis obtained as presented in Table 21 shows that there is significant relationship ($<.05$) between body mass index (dependent variable) and diet (independent variable), as shown in the P-value = .022 for fruits and vegetables and P-value = 0.48 for fats. It should be noted that correlation does not necessarily imply causality. Those who have higher body mass index tend to eat more fruits and vegetables. In a study conducted for a 4 year period from 1986 to 2006 in the United States among people who did not have any non-communicable disease showed that the more whole grains, whole fruit, and vegetables they ate, the less weight is gained. It is good to clarify that the fruits were whole fruits and in varieties and not as fruits in a form of juice (Dariush et al., 2011). Likewise, a study conducted in Australia showed that the women who were overweight and obese were meeting easily the five or even more portions of fruit and vegetables per day than the overweight and obese men, demonstrating that those who have higher BMI tend to meet the daily intake recommendations in easier way than those who have low BMI (Charlton et al., 2014). Those who eat fatty foods tend to have higher body mass index too. It shows that eating high concentrations of fats have positive correlation

with high BMI and consequently are harmful to the heart, causing several heart diseases and even early death (Keskitalo et al., 2008).

A study published by Public Health Nutrition (2009) of Cambridge University Press investigated the lifestyle of Seventh-day Adventists and changes in BMI. Results showed that a prudent diet (which includes more fruits, vegetables, grains, nuts and legumes, and less alcohol, meat, sweetened drinks and coffee) and lifestyle prescription of SDA (which generally includes regular physical activity and low stress lifestyle practices) were found to be predictors of lower BMI.

Table 22

Relationship between Physical Activity and BMI.

		Do you do brisk walk at least 30 minute a day (Low)	Do you do aerobic exercise, bicycling or jog at least 150 min per week (Moderate)	Do you run, play football, basket, swim including strength or resistant training at least 90 min per week (High)
Body mass index	Pearson Correlation	-.236*	-.185	.073
	Sig. (2-tailed)	.014	.055	.450
	N	108	108	108

*. Correlation is significant at the 0.05 level (2-tailed).

Table 22 shows that there is a significant inverse relationship between low intensity physical activity (independent variable) and body mass index (dependent

variable) as shown in the P-value = .014 which is less than .05. Those who seldom walked briskly tend to have higher body mass index. This result was founded also in several studies demonstrating that people who did not have regular physical activity tend to gain weight easily and even counting the hours of not having any physical movement increases the risk to have higher BMI. In a study conducted in Australia, out of 3,392 participants, 62% of them watched TV in their leisure time. For those who watched TV for 1 to 2.5 hours, 93% were more likely to be overweight; while those who watched TV from 2.5 to 4 hours, 83% were more likely to be obese. If the time spent on watching TV were spent exercising, weight gain could have been prevented (Salmon et al., 2000). There are no doubts that physical activity brings a lot of health benefits including long life.

There is no significant relationship between body mass index and the other factors mentioned in (a) and (b). Starchy food, sugar, salt and stress do not have direct influence on body mass index.

Body Weight and Oral Health Status

Research question 4: Is there a significant relationship between body weight and oral health status of workers in Seventh-day Adventist institutions in Rwanda?

H₀: There is no significant relationship between body weight and oral health status.

Pearson correlation analysis obtained presented in Table 23 shows that there is no significant relationship between body mass index (dependent variable) and oral diseases (dependent variable), as shown in P-value = .398, which is higher than < .05. A study supported that some dietary habits and malnutrition were linked with oral diseases specially in developing caries as the most common oral diseases (Burguess, 2015).

Table 23

Relationship Between Body Weight and Oral Status

		DFMT caries index
Body mass index	Pearson Correlation	.082
	Sig. (2-tailed)	.398
	N	108

Findings of this research shows that workers of SDA institutions in Rwanda generally practiced healthy lifestyle and have refrained from bad habits. These healthy lifestyle practices which are generally related to oral diseases included healthy dietary practices particularly less intake of sugary foods and soda or soft drinks. Oral health is particularly related to diet. Most studies support that soft drinks are acid producing foods which trigger oral diseases. Staple foods basically from starchy sources and more fruits and vegetables consumption showed low levels of dental caries and less gum diseases, combined with low sugary foods intake. These dietary practices were found to prevent oral diseases (Moinihan, 2005).

A research study conducted in Nigeria found no significant relationship between caries, periodontal disease and BMI. But increased weight was found to be a very good predictor of bleeding gums. The study also showed that those not eating potential cariogenic foods also were likely to eat more fatty foods that leads to gain weight but showed low prevalence of oral caries. Hence, the relationship between body weight and oral health depends on lifestyle particularly dietary habits (Sede & Ehizele, 2014)

A chi-square analysis was done to test the relationship between body mass index classified as normal and overweight with intensity of periodontitis (very low,

low, moderate, high, and very high) as well as the presence of oral health diseases (normal gingivitis, mild gingivitis, gingivitis, and mild periodontitis). The cross-tabulation of frequencies is shown in Tables 24 and 26.

Table 24

Classification - Scores of Cross Tabulation

		Score of Caries					Total	
		very low	low	moderate	high	very high		
B M I	Normal	Count	7	9	4	5	7	32
		Expected Count	6.0	5.7	6.3	5.3	8.7	32.0
		% within	21.9%	28.1%	12.5%	15.6%	21.9%	100.0%
	Overweight	Classification						
		% within Score	38.9%	52.9%	21.1%	31.3%	26.9%	33.3%
		Count	11	8	15	11	19	64
	Total	Expected Count	12.0	11.3	12.7	10.7	17.3	64.0
		% within	17.2%	12.5%	23.4%	17.2%	29.7%	100.0%
		Classification						
	Total	% within Score	61.1%	47.1%	78.9%	68.8%	73.1%	66.7%
Count		18	17	19	16	26	96	
Expected Count		18.0	17.0	19.0	16.0	26.0	96.0	
Total	% within	18.8%	17.7%	19.8%	16.7%	27.1%	100.0%	
	Classification							
Total	% within Score	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
	% within Score	%	%	%	%	%	%	

The chi square analysis shown in Table 24 reveals that there is no significant relationship between body weight and prevalence of caries disease. Nevertheless, descriptively in the cross tabulation it is observed that the overweight participants have numerically higher occurrence of oral caries compared to those with normal body weight.

Table 25

Relationship Between Body Weight and Prevalence of Caries

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.993 ^a	4	.288
Likelihood Ratio	4.924	4	.295
Linear-by-Linear Association	1.745	1	.186
N of Valid Cases	96		

Specifically, overweight participants have the highest caries prevalence with the figure 29.7% as compared with the rest of the participants. This shows that this group of participants that are overweight suffers most from oral diseases. However this difference is not significant, which may be due to the population size. Caries is a multifactorial disease but mostly diet plays an important role in developing this disease. Bad habits lead to being prone to caries; while good habits like eating three meals a day only, brushing teeth after every meal also help to prevent caries (Sheiham, 2006). Ninety nine per cent of the participants in this study have good educational background and occupied good work position at the SDA institutions in Rwanda. This can be the rationale of the insignificant result.

When people belong to high socioeconomic status and have good educational background, it can be expected that they also have good oral hygiene practices and are able to manage their body weight better than those in lower socioeconomic level. (Morries et al., 2007).

Statistically, Table 26 does not show significant relationship between body weight and periodontitis. Nevertheless, it can be observe that 46.9 % of the participants with normal weight have gingivitis and 34.4% of the overweight participants have mild gingivitis. These two percentages are the highest in the table

Table 26

Classification - Disease Cross Tabulation

BMI		Disease				Total
		Normal	Mild gingivitis	Gingivitis	Mild/periodontitis	
normal	Count	3	9	15	5	32
	Expected Count	2.7	10.3	12.0	7.0	32.0
	% within	9.4%	28.1%	46.9%	15.6%	100.0%
	Classification % within Disease	37.5%	29.0%	41.7%	23.8%	33.3%
Overweight	Count	5	22	21	16	64
	Expected Count	5.3	20.7	24.0	14.0	64.0
	% within	7.8%	34.4%	32.8%	25.0%	100.0%
	Classification % within Disease	62.5%	71.0%	58.3%	76.2%	66.7%
Total	Count	8	31	36	21	96
	Expected Count	8.0	31.0	36.0	21.0	96.0
	% within	8.3%	32.3%	37.5%	21.9%	100.0%
	Classification % within Disease	100.0%	100.0%	100.0%	100.0%	100.0%

Table 27

Chi-Square Tests

	<i>Value</i>	<i>df</i>	<i>Asymp. Sig. (2-sided)</i>
<i>Pearson Chi-Square</i>	2.303 ^a	3	.512
<i>Likelihood Ratio</i>	2.320	3	.509
<i>Linear-by-Linear Association</i>	.103	1	.748
<i>N of Valid Cases</i>	96		

which may conclude that both groups are affected by gingivitis diseases, regardless of their body weight status.

In a longitudinal and cross sectional survey done in the United States with five hundred subjects, results confirmed that excess body weight had relationship with chronic low inflammation which shows that those subjects with high BMI had gingivitis (Winston et al., 2002). When people have excess adipose tissues, some hormones are secreted that predispose people to inflammation. Hence, the link between overweight, obesity and oral gingivitis is seen (Pischon et al., 2007).

Gingivitis is a sign of poor oral hygiene where oral care plays an important role in the development of this disease. If people do not take care of this problem it may go further to periodontitis and eventually tooth lost. The more tartar that remain, the more the gums are irritated which easily lead to bleeding even during normal brushing (De Hann, Deinnlli, & Vasuthevan, 2005).

In conclusion, the second null hypothesis of this study is accepted. This shows that there is no significant relationship between body weight and oral health status among workers in SDA institutions in Rwanda. Nevertheless, the link between excess body weight and oral diseases is observed in this study and in other similar studies.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the summary of the findings. In addition, it presents the conclusion drawn from the findings and the recommendations for further study.

Summary

This research study focused on the relationship between lifestyle factors influencing body weight and their implication on oral diseases among workers at SDA institutions of Rwanda. Lifestyle factors that influenced body weight included diet, physical activity, and stress as independent variables; and the dependent variables were body weight and major oral diseases. Cluster sampling was used to identify the 140 participants who came voluntary from AUCA, ADRA and Rwanda SDA Union Conference. Questionnaires were used as an instrument of this study, measurement of BMI was done using the Karada scan, and the oral caries index to assess oral caries and periodontal diseases. Oral examination was scheduled at the Kigali Adventist Dental Clinic. Descriptive and inferential statistics were used to analyze the collected data from the questionnaires, Karada Scan scale, caries and periodontal index.

Using the SPSS software, Pearson product-moment and Chi Square correlation were computed to link factors that influence body weight with oral health status. Frequency distributions, percentages and means, and standard deviations of the variables were also computed.

The findings of this research are based on the research questions of this study. From the analysis of data collected the findings were as follows:

Research question 1: What are the body weight and oral health status of workers in Seventh day Adventist Institutions in Rwanda?

A calculation of BMI was done. The data collected was analyzed by using Microsoft Office Excel and SPSS computer Software. The findings showed that 64 participants were overweight (60.4%), while 34 participants had normal weight (31.4%), and 10 participants were underweight (9.4 %). The lowest BMI was 16, the highest was 38, and the mean BMI was 25.82.

Oral caries status of the participants based on DMFT oral caries index revealed that 21 participants had very low oral caries (19.4%), 19 participants had low oral caries (17.6 %), 22 participants had moderate oral caries (20.4%), 16 participants had high oral caries (14.8 %), and 30 participants had very high oral caries (27.8 %).

Further oral status of the participants revealed presence of periodontal diseases, gingivitis, and periodontitis. Periodontal diseases were not found in only 11 participants (10.2%). Mild gingivitis were found in 35 participants (32.4%) and gingivitis in 37 participants (34.3%). Mild periodontitis were found in 19 participants (17.6%) and periodontitis in 6 participants (5.6%).

Research question 2: What is the lifestyle of workers in SDA institutions in Rwanda in terms of diet, physical activity, and stress?

Dietary lifestyle of the participants revealed that the mean response to fruits and vegetables consumption was “sometimes” or “occasionally”, which shows that the amount and frequency of fruits and vegetable consumption is poor. The mean response to low fat dietary choices and intake was also “sometimes” or “occasionally”, which shows that participants do not really care about the quality of

fats in their diet. The mean response to healthy starchy foods choices was “sometimes” or “occasionally”, which means that choices for whole grain foods and their products was not a priority. However, regular consumption of starchy foods revealed an “often” or “always” mean response. The mean response to sugar consumption was “rarely”, which shows that participants consumed very low quantities of sugar. The mean response to salt consumption was “almost never”. The mean response to avoiding sugary drinks was “rarely”, which means that they consumed regularly sugary drinks, while they “never” drunk energetic drinks and health drinks such as fruits and vegetable juices. Dietary practices moreover revealed that the participants only “occasionally” skipped their main meals, which means that participants generally ate regular meals three times a day.

Regular physical activity or exercise lifestyle of the participants revealed a mean response of “rarely” to “sometimes”, which shows that the participants had poor physical exercise activities. However the standard deviation was heterogeneous.

Regarding stress, the overall response mean was 2, corresponding to rarely. The result showed that the participants do not suffer constant stress and that they are able to control their irritations.

Research question 3: Which of the lifestyle factors (diet, physical activity, and stress) significantly influence body weight among workers in Seventh-day Adventist Institutions in Rwanda?

The Pearson correlation analysis showed that there is significant relationships between body mass index and dietary consumption of fruits and vegetables (P-value = .22), and low fat dietary choices and consumption (P-value = .048). The P-value figures were < .05, therefore they showed that there are significant relationships. Likewise, regarding physical activity and exercise, there is a significant inverse

relationship between low intensity physical activity and body mass index (P-value =.014), which shows that those who seldom walk briskly tend to have higher body mass index.

There were no significant relationship between body mass index and the other factors not mentioned. Therefore, the null hypothesis is rejected and concludes that lifestyle factors significantly influenced body weight.

Research questions 4: Is there a significantly relationship between body weight and oral health status of workers in Seventh-day Adventist institutions in Rwanda?

The chi square analysis showed no significant relationship between body weight and prevalence of oral caries. The minimum expected count was 5.33 while finding showed .288. However, descriptively in the cross tabulation, it was observed that the overweight participants had the highest oral caries prevalence (29.7%). On periodontal diseases, findings did not show significant relationship between body weight and periodontitis.

Therefore, we concluded that there is no significant relationship between body weight and oral health status, therefore the null hypothesis two is accepted in this study.

Conclusions

From the findings of the study, the following conclusions were drawn:

1. Close to two-thirds of the workers in Rwanda SDA institutions were overweight (60.4%) having a BMI of >24.9. Oral status among the population showed high prevalence of oral caries (4.6) and gingivitis (66.7 %).
2. Unhealthy lifestyle practices of workers in Rwanda SDA institutions included insufficient consumption of fruits and vegetables in terms of amount and

frequency, poor choices and intake of quality dietary fats, high consumption of starchy foods which implies an unbalanced diet, and low physical activity and exercise. Healthy lifestyle practices on the other hand included low intake of sugar and salt in foods and drinks, regular daily meals, and stress as something they can manage.

3. Lifestyle factors that significantly influence body weight among workers in Rwanda SDA institutions included insufficient consumption of fruits and vegetables, poor choices and intake of quality dietary fats, and low physical activity and exercise.
4. There is no significant relationship between body weight and oral health status among workers in Rwanda SDA institutions.

Recommendations

In view of the findings and the conclusions of this study, the following recommendations are drawn to improve the health status of the workers in SDA institutions in Rwanda, public health practice, and future research related to the research topic.

To the workers in Adventist Institutions in Rwanda

The first recommendation is to promote awareness about healthy dietary practices among workers in SDA institutions in Rwanda, which would include primarily increased consumption of fruits and vegetables in terms of amount and frequency, healthy choices and intake of quality dietary fats, and balanced diet.

Promotions and incentives in doing physical activity among workers in SDA institutions in Rwanda is needed, more so, the facilities and the atmosphere of doing exercises be made available.

Human resource managers of Rwanda SDA institutions need to include assessment of health status of their workers and providing programs to address lifestyle related practices to avoid economic losses and have healthy, effective, and efficient workers who will be examples and witnesses for what the Seventh Day Adventist Church preaches about healthy lifestyle and living.

For Public Health Practice

Health care providers, especially SDA health practitioners in Rwanda need to address the issue of healthy lifestyle emphasizing on diet and physical activity. Health education and promotion programs are significant activities to promote healthy lifestyle, prevent and control undesirable weight, prevent and control oral diseases and other lifestyle related diseases. Dietary awareness have to focus on the significant role of carbohydrates and sugar, and fruits and vegetables in the diet.

For Future Researchers

There is a need for further studies related to the topic taking into account other variables, such as other factors included that may influence body weight that are mentioned in the literature review. It is also recommended to have a bigger research population or sample size to avoid bias and other errors, and to evaluate properly relationship between variables. Furthermore, similar studies are recommended to be conducted among rural SDA members in Rwanda for a different setting, and see a general picture on the issues covered in this study among SDA Church members in Rwanda.

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APPENDICES

APPENDIX A

RECORD FOR THE ORAL EXAMINATION OF ADVENTISTS IN INSTITUTIONS IN RWANDA

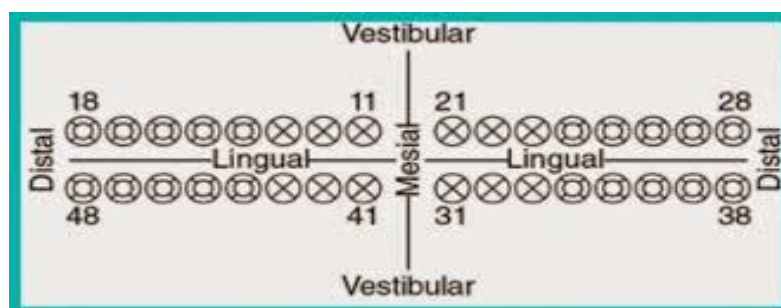
Code.....Age.....Sex.....

.....

Address.....Cell phone

number.....Date.....

Decay Missing Teeth Filled (DMTF)



Calculation of DMFT

1- For individual

DMF = D + M + F Mean DMF = Total DMF

Total No. of the subjects examined

Total score:

Maximum score: =DMFT = 32

Minimum score = Zero

Community Periodontal Index of Treatment Needs (CPITN)

Number of the teeth taken for periodontal examination

6 1 6 Superior arcade

6 1 6 Inferior arcade

C PTN score criteria:

0 No periodontal disease

1 Bleeding on probing

2 Calculus with plaque seen or felt by probing

3 Pathological pocket 4 – 5 mm

4 Pathological pocket 6 mm or more

x When only 1 tooth or no tooth are present

Total score :

APPENDIX B

QUESTIONNAIRE FOR WORKERS AT SDA INSTITUTION IN RWANDA

CODE _____

You are participating in a survey study aimed at getting information about the factors that influence body weight. Your views are highly valued as it will contribute to the improved health in the community.

Demographic Information

Kindly read the statements below and show your response by a tick or fill in the blanks for each statement below.

1. Your gender () Male () Female

2. What is your age?

() 30 years and under () 31 - 35 years () 36 - 40 years () 41- 50 years

() 51 and above years

3. Years number of working at your institution

() 1 – 3 years () 3-6 years () 6-10 years () Over 10 years

4. Employment status

() Full-time () Part-time

5. Highest educational qualification

() Bachelors Education () Master's Degree () Doctorate

() Professor () Others (specify) _____

This next will be done by the researcher:

Height..... weight.....

BMI.....

Information on the factors influencing body weight

Use the following scale to respond to the question. Indicate by ticking.
Never =0, Almost never =1, rarely = 2, Sometimes=3, Often=4, Always=5

Lifestyle factor : DIET	0	1	2	3	4	5
Fruit and vegetables						
1. Do you eat at least 5 portions of fruit and vegetables per day?	0	1	2	3	4	5
2. Do you eat more than 4 different varieties of fruit each week?	0	1	2	3	4	5
3. Do you eat more than 4 different varieties of vegetables each week?	0	1	2	3	4	5
Fat	0	1	2	3	4	5
1. Do you choose low fat product when available						
2. Do you choose baked- steamed or grilled options when available rather than fried food?	0	1	2	3	4	5
3. Do you opt for lean cuts of meat or remove visible fats (like removing the skin of chicken)	0	1	2	3	4	5
Starchy Food	0	1	2	3	4	5
1. Do you base your main meals around starchy food (like potatoes, pasta, rice or bread)						
2. Do you choose whole meal bread rather than white?	0	1	2	3	4	5
3. Do you eat whole grain cereals with not added sugar?	0	1	2	3	4	5
4. Do you include pulses in your diet (like beans or lentils)	0	1	2	3	4	5
Sugar	0	1	2	3	4	5
1. Do you eat cakes, sweets, chocolates or biscuits at work?						
2. Do you drink sweets drinks? (Like soda, canned drinks, etc)	0	1	2	3	4	5
3. Do you use brown sugar rather than white?	0	1	2	3	4	5
Salt	0	1	2	3	4	5
1. Do you add salt to meals at the table?						
2. Do you eat pre – prepared meals? (like ready meals, canned meat, canned vegetables)	0	1	2	3	4	5
Drinks	0	1	2	3	4	5
1. Do you drink plenty of fluids at regular intervals during the working day?						
2. Do you opt for a variety of different drinks, including water at work?	0	1	2	3	4	5

3. Do you avoid sugary drinks?	0	1	2	3	4	5
4. Do you drink fruit juice at least 3 times a week (Mango, pineapple, lemonade, etc)	0	1	2	3	4	5
5. Do you drink a vegetable juice at least 2 times a week?	0	1	2	3	4	5
6. Do you drink whole milk at least 3 times a week?	0	1	2	3	4	5
7. Do you drink tea or coffee at least once a week?	0	1	2	3	4	5
8. Do you drink energy drinks at least once a week? (Red Bull, Rock star, Full Throttle, etc.	0	1	2	3	4	5
Eating habits	0	1	2	3	4	5
1. Do you skip breakfast more than once a week?						
2. Do you skip lunch more than once a week?	0	1	2	3	4	5
3. Do you skip evening meals more than once a week?	0	1	2	3	4	5
Lifestyle factor : PHYSICAL ACTIVITY Intensity, frequency and time	0	1	2	3	4	5
1. Do you do brisk walk at least 30 minute a day (Low)						
2. Do you do aerobic exercise, bicycling or jog at least 150 min per week (Moderate)	0	1	2	3	4	5
3. Do you run, play football, basket, swim including strength or resistant training at least 90 min per week (High)	0	1	2	3	4	5
Lifestyle factor: STRESS	0	1	2	3	4	5
1. In the last month, have you been upset because of something that happened unexpectedly?						
2. In the last month, have you felt that you were unable to control the important things in your life?	0	1	2	3	4	5
3. In the last month, have you felt nervous and "stressed"?	0	1	2	3	4	5
4. In the last month, have you felt confident about your ability to handle your personal problems?	0	1	2	3	4	5
5. In the last month, have you felt that things were going your way?	0	1	2	3	4	5
6. In the last month, have you found that you could not cope with all the things that you had to do?	0	1	2	3	4	5
7. In the last month, have you been able to control irritations in your life?	0	1	2	3	4	5
8. In the last month, have you felt that you were on top of things?	0	1	2	3	4	5
9. In the last month, have you been angered because of things that were outside of your control?	0	1	2	3	4	5
10. In the last month, have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4	5

APPENDIX C

INFORMED CONSENT FORM

Dear Sir/Madame:

My name is Susana Tito, Dentist at SDA Dental Clinic of Kigali

I am a Master's student at University of Eastern Africa, Baraton, Kenya. I am doing a study on Public Health as a requirement to obtain my degree of Master of Public Health. My research study is to determine the Factors Influencing body weight among workers at Adventist Institutions Rwanda: Implication on major oral diseases. The participation in this study is completely voluntary.

You are requested to participate in filling a questionnaire and be ready for BMI measurements and oral examination by schedule, your views will be highly valued for this analysis. The information obtained will be treated with the utmost confidentiality and for the only purpose of this research where your anonymity will be safeguarded carefully.

Please, you are encouraged to inquire for any doubts concerning about this study.

Your participation will be highly appreciated.

I accept willingly to participate in this study

Thank-you for your cooperation!

Signature

APPENDIX D

LETTER FOR PILOT STUDY



OFFICE OF THE DIRECTOR OF GRADUATE STUDIES AND RESEARCH

UNIVERSITY OF EASTERN AFRICA, BARATON
P. O. Box 2500, Eldoret, Kenya

19 January 2015

Mr. Assiel Hategekimana
Director
Gahogo Adventist School Academy
Rwanda

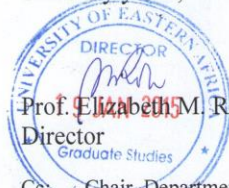
Re: PILOT STUDY OF RESEARCH INSTRUMENT

Dr. Susana J. Tito Mamani is a graduate student pursuing the degree **Master of Public Health** at the University of Eastern Africa, Baraton. She is currently writing her thesis entitled *Factors influencing body weight among workers in Seventh-day Adventist institutions in Rwanda: Implications on major oral diseases*.

To establish the reliability of her research instrument, Dr. Tito is conducting a pilot study. Kindly allow her to administer the questionnaire to all teachers and staff of your school.

Any assistance you will grant her will be greatly appreciated. May God richly bless you in all your undertakings.

Sincerely yours,



Prof. Elizabeth M. Role, PhD

Director

Cc: Chair, Department of Public Health
Office File

A SEVENTH-DAY ADVENTIST INSTITUTION OF HIGHER LEARNING
CHARTERED 1991

APPENDIX E

RELIABILITY OF THE QUESTIONNAIRE

Reliability (Diet)

Reliability Statistics

Cronbach's Alpha	N of Items
.749	26

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Do you eat at least 5 portions of fruit and vegetables per day?	66.2333	202.875	.391	.738
Do you eat more than 4 different varieties of fruit each week?	66.1333	192.533	.630	.724
Do you eat more than 4 different varieties of vegetables each week?	65.8000	189.890	.617	.722
Do you choose low fat product when available	65.7667	184.530	.699	.714
Do you choose baked- steamed or grilled options when available rather than fried food?	65.6333	194.654	.474	.730
Do you opt for lean cuts of meat or remove visible fats (like removing the skin of chicken)	66.3333	185.264	.488	.725
Do you base your main meals around starchy food (like potatoes, pasta, rice or bread)	64.5333	213.844	.027	.753
Do you choose whole meal bread rather than white?	66.1333	217.223	-.083	.764
Do you eat whole grain cereals with not added sugar?	65.8333	188.833	.588	.722
Do you include pulses in your diet (like beans or lentils)	64.8333	199.454	.346	.738
*Do you eat cakes, sweets, chocolates or biscuits at work?	64.9000	202.162	.285	.741
*Do you drink sweets drinks? (Like soda, canned drinks, etc)	66.0000	196.276	.365	.736
Do you use brown sugar rather than white?	65.1667	202.144	.214	.747
*Do you add salt to meals at the table?	64.9000	201.679	.267	.742

*Do you eat pre – prepared meals? (like ready meals, canned meat, canned vegetables)	64.6667	202.920	.268	.742
Do you drink plenty of fluids at regular intervals during the working day?	65.8333	201.661	.335	.739
Do you opt for a variety of different drinks, including water at work?	65.4000	202.662	.233	.745
Do you avoid sugary drinks?	65.8333	195.316	.390	.734
Do you drink fruit juice at least 3 times a week (Mango, pineapple, lemonade, etc)	66.0000	193.172	.450	.730
Do you drink a vegetable juice at least 2 times a week?	67.0333	203.826	.225	.745
Do you drink whole milk at least 3 times a week?	65.9000	209.748	.041	.761
*Do you drink tea or coffee at least once a week?	66.2000	215.614	-.064	.769
Do you drink energy drinks at least once a week? (Red Bull, Rockstar, Full Throttle, etc.	67.8000	211.821	.108	.750
*Do you skip breakfast more than once a week?	65.9667	203.482	.200	.747
*Do you skip lunch more than once a week?	64.5667	211.426	.094	.751
*Do you skip evening meals more than once a week?	64.9333	216.892	-.077	.764

Reliability (Stress)

Reliability Statistics

Cronbach's Alpha	N of Items
.638	10

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
In the last month, how often have you been upset because of something that happened unexpectedly?	16.2500	27.355	.564	.543
In the last month, how often have you felt that you were unable to control the important things in your life?	16.6875	32.673	.465	.588
In the last month, how often have you felt nervous and "stressed"?	15.9375	31.802	.345	.604
*In the last month, how often have you felt confident about your ability to handle your personal problems?	16.5625	33.028	.244	.628
*In the last month, how often have you felt that things were going your way?	16.0625	33.544	.222	.633
In the last month, how often have you found that you could not cope with all the things that you had to do?	16.3438	32.039	.458	.585
*In the last month, how often have you been able to control irritations in your life?	16.6875	36.286	.068	.663
*In the last month, how often have you felt that you were on top of things?	15.9063	35.765	.135	.646

In the last month, how often have you been angered because of things that were outside of your control?	16.0938	30.539	.482	.574
In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	16.8750	36.435	.122	.646

APPENDIX F

ETHICAL APPROVAL LETTER



**OFFICE OF THE DIRECTOR OF GRADUATE STUDIES
AND RESEARCH**

UNIVERSITY OF EASTERN AFRICA, BARATON

P. O. Box 2500-30100, Eldoret, Kenya, East Africa

4 February, 2015

Susana Judith Tito Mamani
Department of Public Health
UEAB

Dear Susana

Re: ETHICS CLEARANCE FOR THESIS PROPOSAL (REC: UEAB/010/002/2015)

Your thesis proposal entitled "*Factors influencing body weight among workers at Seventh Day Adventist institutions in Rwanda: Implications on major oral diseases*" was discussed by the Research Ethics Committee (REC) of the University and your request for ethics clearance was granted approval.

This approval is for one year effective 4 February 2015 until 4 February 2016. For any extension beyond this time period, you will need to apply to this committee one month prior to expiry date.

We wish you success in your research.

Sincerely yours,

A handwritten signature in blue ink that reads "Jackie Obey-Gear".

Mrs. Jackie Obey - Gear
Chairperson, Research Ethics Committee



A SEVENTH-DAY ADVENTIST INSTITUTION OF H IGH ER LEARNING
CHARTERED 1991

APPENDIX G

TIME TABLE

Activities	<i>Oct/14</i>	<i>Nov/14</i>	<i>Dec/14</i>	<i>Mar/15</i>	<i>April/15</i>	<i>May/15</i>	<i>June/15</i>
Presentation of research topic							
Developing of research proposal							
Defending research proposal and ethical approval							
Data collection							
Data Analysis							
Oral examination of thesis							
Writing final report							

Curriculum Vitae'

Susana Judith Tito Mamani



PERSONAL

Full Name: Susana Judith Tito Mamani

INFORMATION

Date of Birth: 20 September 1978
Place of Birth: La Paz – Bolivia (South America)
Passport Number: 2479183
Gender: Female
Nationality: Bolivian
Marital Status: Married
Emergency Contact: Valentin Omonte (+254726174022)
Church Affiliation: Seventh – Day Adventist (Baptized)

EDUCATION

From September, 2013: Master in Public Health (MPH)
University of Eastern Africa, Baraton.

01 August, 2008 Universidad Mayor de San Andres, Bolivia
Post graduate in Superior Education (To become a Lecturer).

September, 2003 Universidad Mayor de San Andres

Dentist Degree (Academic Excellence Award)

December 1996 Colegio Adventista Miraflores (High School)

WORK

2003-2009 Self employed

EXPERIENCE

March, 2001 – December, 2001.

Universidad Mayor de San Andres

Reader for a Lecture of Pediatric Odontologist

2009 – 2011 University of Eastern Africa Baraton , Kenya

Volunteer Missionary at Jeremic Hospital UEAB

From January 2012 as Surgeon Dentist in Dental Clinic at

Jeremic Hospital - University of Eastern Africa Baraton

MEMBERSHIP

Bolivian Dentistry Society (Bolivia)

HOBBIES

Play basketball

Sing songs

At church: Children Ministries

Women Ministries

Youth Ministry (Pathfinders and Master Guide)