HEALTH INDICATORS AND NUTRITIONAL PROFILE OF STAFF AT A TRAINING INSTITUTION AS A FOUNDATION FOR THE DEVELOPMENT OF NUTRITION WELLNESS EDUCATION MATERIAL

By

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Dissertation submitted in fulfilment of the requirements of the Master of Applied Science in Food and Nutrition in the Department of Food and Nutrition Consumer Science, Faculty of Applied Sciences at the Durban University of Technology

2016

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DECLARATION

This work has not been previously accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

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DEDICATION

I dedicate this dissertation to God, my Gurus Sri Mahavatar Babaji, Sri Swami Vishwananda and Swami Vishwachakradharananda, the Divine Mother and my family. To my beloved parents, for instilling perseverance and belief in the richness of learning. To my brother, for always encouraging me and just believing in me.

ABSTRACT

Background: The occurrence of absenteeism observed at the Coastal KZN FET College is very large. However, absenteeism of this magnitude is not inconsistent with observations from other educational institutions and work places around the world. Generally, absenteeism is coupled to the absence of good health, the presence of one or more non-communicable disease and the paucity of physical exercise undertaken by the personnel. Absenteeism in the work place results in avoidable financial costs to the employer, the employee, and the country as a whole.

The wealth of literature shows that health concerns concerning adults are diet related. Diabetes, heart disease, hypertension, obesity, cancer and other non-communicable diseases (NCD's) are increasing at an alarming rate, daily. A double-burden plagues South Africa: on the one hand there is over-nutrition (an excessive consumption of nutrients); while on the other there is under-nutrition (an insufficient intake of nutrients by certain groups of individuals). Factors such as urbanisation, globalisation, physical inactivity and consumer financial buying power have a significant influence on these health concerns.

Aim: The data gathered in this study will be used to develop nutrition wellness education material as a component of a wellness programme for staff members at the Swinton Campus of the KZN Coastal FET College in Mobeni.

Methodology: A needs analysis was undertaken to determine whether nutrition wellness education material as a component of a wellness programme for the institution was appropriate. Three 24-hour recall questionnaires gathered from the staff, data on eating habits and nutrient intake were undertaken/collected. A food frequency questionnaire collected data on the frequency and variety of foods eaten. A health questionnaire gathered data on self-reported illnesses, consumption of alcohol, and smoking habits. The demographics of the group, living conditions, and amount of money earned and spent on food was assessed through a socio-demographic questionnaire. Anthropometric measurements assessed included blood pressure, waist circumference, BMI and Waist-to-height-ratio (WHtR).

Results: The sample consisted of 138 participants of which 44% (n=61) were men and 56% (n=77) were women. Less than 50% of the respondents were food secure: only 65 persons (47.1%) in the sample always had money to purchase food. In this group 63.93% of the men and 71.43% of the woman were obese. Subsequently 86% of the women exceeded the waist cut-off point of 88cm while 16.39% of the men were above the 102cm cut-off point. Findings revealed that 42.62% of the men and 25.9% of the women had pre-hypertension while 8.20% of the men and 5.90% of the women were hypertensive.

This study indicated that this group was nutrient deficient. The fruit and vegetable intake was between 134.44g - 175.69g per day for men and 124.00g - 183.30g per day for women. Energy, dietary fibre, vitamin A, vitamin D, calcium, magnesium and iodine were below the nutrient adequacy ratio. There were positive correlations between age and systolic blood pressure, waist circumference and systolic blood pressure, waist circumference and diastolic blood pressure and waist-to-height ratio and BMI.

Conclusion: Central obesity and to a lesser extent hypertension as well as deficiencies in nutrients and minerals were present in this group. Although the participants indicated a good variety of food, the quality and quantities consumed were not adequate. A link between diet, physical activity and diseases of lifestyle has been demonstrated. A need for nutrition education as a component of the wellness programme is indicated.

Nutrition education is important both within and outside the workplace. To make lifestyle changes it is essential that education and knowledge is made available. Behavioural habits including eating habits are principally learnt. If bad behaviour habits can be learnt, good behaviour habits can also be instilled. The proposed intervention is aimed at reducing the incidence of absenteeism and decreasing the presence of non-communicable diseases. It is important for staff members at a FET college to be present in the classroom so that education of quality can be conveyed to learners. Further, the good health of staff members facilitates the ability of teachers to perform their important task of educating young minds at all educational institutions.

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GLOSSARY OF TERMS

AAFP	American family physician
AIDS	Acquired immune deficiency syndrome
AIE	Adcorp employment Index
AIHW	Australian institute of health and welfare
AMDR	Acceptable macronutrient distribution ranges
BMI	Body mass index
BNF	British nutrition foundation
BP	Blood pressure
CDC	Centre for disease control and prevention
CDD	Centre for democratic development
CDL	Chronic diseases of lifestyle
CHD	Coronary heart disease
COPD	Chronic obstructive pulmonary disease
CVD	Cardiovascular disease
DBP	Diastolic blood pressure
DOH	Department of Health
DRI	Dietary reference intake
DUT	Durban University of Technology
EAR	Estimated average requirement
EUFIC	European food Information council
FAO	Food and agricultural organisation
FBDG	Food based dietary guidelines
FET	Further education and training
FFI	Food fortification initiative
FFQ	Food frequency questionnaire

FGDS	Food group diversity score
FVS	Food variety score
GINA	The global initiative for asthma
GOLD	Global initiative for chronic obstructive lung disease (GOLD)
GPA	Global plan of action
HIV	Human immunodeficiency virus
HSF	Heart and stroke foundation
HSPH	Harvard school of public health
IHD	Ischaemic heart disease
IoM	Institute of medicine
KAP	Knowledge, attitude and practice
KZN	Kwa-Zulu Natal
LDLC	Low density lipoprotein cholesterol
Mg	Milligram
MRC	Medical research council
MUFA	Monounsaturated fatty acid
NCD	Non-communicable disease
NHANES	National health and nutrition examination survey
NHS	National health service
NICUS	The nutrition information centre of the University of Stellenbosch
NIH	The national institutes of health
NIP	Nutrition intervention programme
Puma	Polyunsaturated fatty acid
PURE	Prospective urban rural epidemiology
RDA	Recommended daily allowance

SA	South Africa
SADHS	South African Demographic and Health Survey
SAJCN	South African Journal of Clinical Nutrition
SAMJ	South African Medical Journal
SANHANES	South African National Health and Nutrition Examination Survey
SASPI	South African Stroke Prevention Initiative
SBP	Systolic blood pressure
SD	Standard deviation
SFA	Saturated fatty acid
SMART	Specific, measureable, attainable, realistic and time-bound
SPSS	Statistical packages for the social sciences
SSA	sub-Saharan Africa
STATSA	Statistics South Africa
TB	Tuberculosis
UL	Tolerable upper intake level
USA	United States of America
USDA	United States Department of Agriculture
WC	Waist circumference
WFP	World Food Programme
WHO	World Health Organisation

LIST OF SYMBOLS

SYMBOL	
>	Greater than
≥	Greater than and equals to
<	Less than
≤	Less than and equal to
%	Percent
±	Plus or minus
=	Equal to
♀	Women
♂	Men
µg	Microgram
*	Estimated energy requirements
≈	AI

CHAPTER 1: THE PROBLEM AND ITS SETTING

1.1 Introduction

Malnutrition occurs when a person consumes nutrients in a ratio that is imbalanced. The lack of nutrients in the diet results in nutritional deficiencies in the consumer. In developing countries including South Africa insufficient nutrients in the diet, and nutritional deficiencies in the population are prevalent. Further, malnutrition affects an individual's sense of hope, health, productivity, and well- being (Kapoor and Anand 2002).

Developing countries are currently undergoing various types of changes. These transitions have caused both communicable and non-communicable diseases to become a burden. Previously, in developing countries under-nutrition was the prominent condition, today there exists a double burden of both over-nutrition and under-nutrition (Africa Harvest 2010).

Increasing dietary fat intake accompanied by decreased physical activity patterns are contributing to the higher prevalence of obesity (Kruger, Puone and Senekal 2005). For a number of years the impact of lifestyle diseases on labour supply, enterprise productivity and economic growth in South Africa have been recognised by the Department of Labour (Arndt and Lewis 2000).

In the past 50 years the average per capita dietary fat consumption of black adults has increased from 16.4% to 26.2% of the total energy ingested: a relative increase of 9.7%. At the same time carbohydrate intake has decreased from 69.3% to 61.7% of the total energy consumed: a decrease of 10.9% (Bourne, Lambert and Steyn 2002).

The estimated cost caused by decreased production and to the replacement of workers on sick leave at a South African sugar mill amounted to R9500-00 per worker per annum (Morris, Burdge and Cheevers 2000).

The Actuarial Society of South Africa's Demographic and Health Model showed that in 2001 536 deaths that could be ascribed to non-communicable diseases occurred per day. Many of the deaths occurred amongst middle aged employees before the end of their possible productive lives. The loss of experienced manpower contributes to South Africa's financial burdens (Bradshaw 2010).

The loss of health and life has an impact on an entire society; not only on individuals, families and the labour market (Arndt and Lewis 2000).

1.2 BURDEN OF DISEASE AS A BACKGROUND TO THE STUDY

1.2.1 A Global Perspective

The Centre for Disease Control and Prevention (CDC) states that recently many changes regarding health have taken place within the world: A greater number of people now live in urban areas as opposed to those who live in rural areas. A larger percentage of the population is over-weight, compared with being under-weight, than before. Non-communicable diseases (NCDs) such as hypertension, chronic lung disease, stroke, cancer, diabetes and heart disease kill more people globally than infectious diseases such as Acquired Immune Deficiency Syndrome (AIDS) do. The risk factors of unhealthy diets, the presence of cholesterol, high blood pressure, physical inactivity, tobacco use, and harmful use of alcohol, are shared by four of these diseases (Centre for disease control and prevention 2014a). Similar findings were found in Australia where the prevalence of chronic disease was attributed to diet, physical inactivity and the consumption of alcohol (AIHW 2014).

A global burden of disease study conducted in 2010 found that 70% of Australians presented with a chronic disease (Australian Institute of Health and Welfare (AIHW 2014). In addition an increase in health care costs and expenditure due to chronic diseases such as cardiovascular disease were observed. Working individuals between the ages of 25-64 years reported a minimum of one chronic disease per person during the 2004-2005 study (Steed and Stevens 2011).

In India the presence of cardiovascular disease as well as other diseases is increasing. Cardiovascular disease and stroke in the productive years of Indians affects the country’s economy and the individual’s well-being. Indians are becoming susceptible to these diseases at an earlier age when compared with their western counterpart (DELOITTE 2011).

The Centre for Workplace Health at St Mary’s University College stated that in the United Kingdom in 2008 175 million working days were lost due to sick leave. Factors such as drinking, smoking and obesity had an impact on the health of working persons (National Health Service 2008).

1.2.2 An African Perspective

In Botswana 37% of total deaths are caused by NCDs. The four main risk factors for non-communicable disease are: raised blood pressure, smoking, consumption of alcohol and

obesity. At present 61.7% of the population living in urban areas suffer from the presence of these risk factors (WHO 2014).

In Tanzania similar observations were noted. A major change in dietary behaviour is taking place due to the transition from rural to urban living conditions. Globalisation also plays its role. Although diet was the main risk factor for non-communicable diseases, other risk factors such as obesity, smoking, alcohol consumption, high cholesterol levels and hypertension were also present (Mayige *et al.* 2012).

Research done in Mombasa, Kenya showed that the most common risk factors for non-communicable diseases were hypertension and physical inactivity. Hypertension and physical inactivity are common risk factors for cardiovascular disease, obesity and stroke as well as for other diseases (Tawa, Frantz and Waggie 2011).

1.2.3 A South African Perspective

The percentage of deaths caused by NCDs in South Africa are presented in Figure 1.1. Forty three percent of the deaths are attributed to NCDs. The World Health Organisation (WHO) estimates that the probability of dying from NCDs between the ages of 30 and 70 years is 27% (WHO 2014). The work force in South Africa partly falls in this age range.

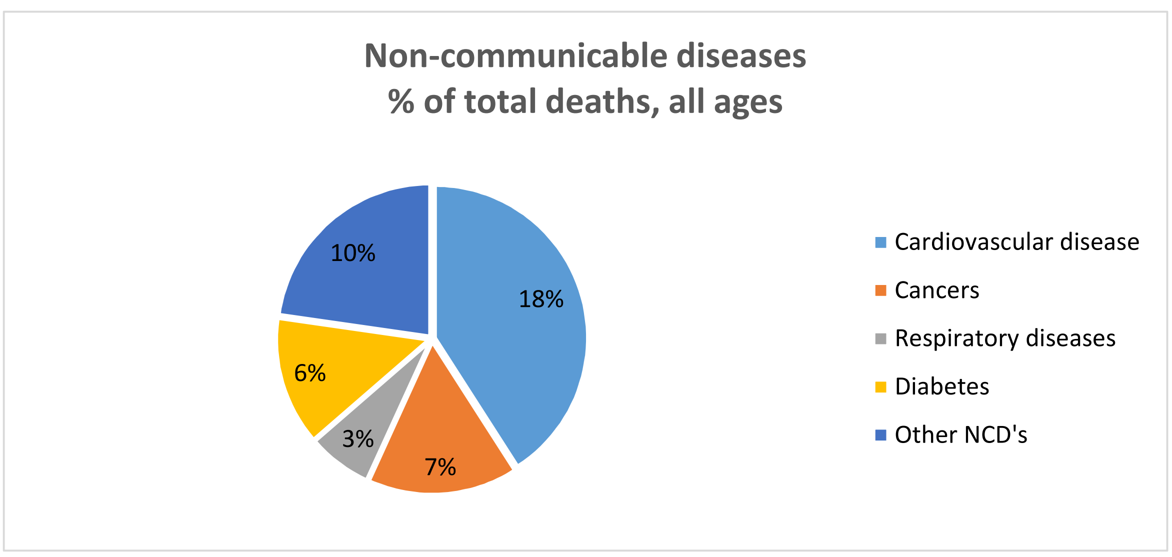


Figure 1.1: Percentage deaths by Non-Communicable Diseases in South Africa (WHO 2014)

Unhealthy lifestyles are aggravated by the forces associated with ageing, rapid urbanisation, and globalisation. The globalisation of diets has resulted in raised blood pressure, elevated

blood lipid levels, overweight, obesity and increased blood glucose levels in individuals. These conditions could lead to cardiovascular disease (Steyn 2005d).

The above mentioned developments are seen in countries undergoing changes in nutrition and eating habits, from traditional, high-fibre, low-fat, high-carbohydrate diets to ones with higher fat and sugar intakes and lower carbohydrate and fibre intakes as well as high salt intakes (Popkin 2001).

Shifts to diets containing more fat accompanied by lowered physical activity patterns contribute to a higher prevalence of obesity (Kruger, Puone and Senekal 2005). The Department of Labour has recognised for a number of years the impact diseases of lifestyle have on labour supply, enterprise productivity and economic growth in South Africa (Arndt and Lewis 2000).

Chronic diseases of lifestyle such as heart disease, hypertension, high cholesterol, cancer, diabetes, lung and nervous system disorders come at a significant cost to the individual and employer. Companies cannot afford to wait until the long term effects of disease manifests into physical disease. A more proactive approach is essential. This means putting interventions in place to protect employers and employees against the negative effects of diseases of lifestyle (Steyl 2011).

A survey conducted by Van Eeden and Jordaan (2008) estimates that South Africa is losing around 12 billion Rand per annum due to employee absenteeism in the workplace. It was also suggested that the cost of absenteeism doesn't only include an employee's salary for the day, but also includes finding a temporary replacement, as well as loss of productivity. This complex pattern of diseases in South Africa places high demands on health services (Pillay 2009).

Table 1.1: Total number of people aged 25 years and older diagnosed with Diabetes in South Africa (STATSA 2011)

Variable	**Total number aged 25 years and older diagnosed with diabetes**	**Number of people taking diabetes medication**
Age group		
25–34	39 248	32 669
35–44	113 974	107 877
45–54	264 165	242 274
55–64	366 357	351 100
65+	363 562	350 401

Data on the number of people who are using diabetes medication within the different age groups is presented in Table 1.1. The number of people taking diabetes medication increased until 65 years of age. Results from the General Household survey indicated that 5.7% of people 25 years and older were diagnosed with diabetes from the Kwazulu Natal province. This was the second highest number recorded after the Western Cape where the percentage recorded was 6.8% (STATSA 2011).

1.3 THE CONCEPT OF WELLNESS AND OPTIMUM HEALTH AS A BACKGROUND TO THIS STUDY

"Wellness" is defined by Larson as a new model in health care (Larson 1999 cited in Myers and Sweeney 2004). Wellness of an employee is a total approach that improves the quality of an individual's life, health and psychological strengths in a proactive and positive way (Witmer and Sweeney 1992).

As a result of the presence of chronic diseases of lifestyle it has been shown that there is a tremendous need to develop and evaluate health promotion programmes in the workplace. The majority of people spend one third of their waking hours at work. Providing health related programmes at work is thought to be the key to reducing the risk of diseases as well as reducing health care costs of a nation (Steyn 2005a).

The World Health Organisation (WHO) has defined optimum health as a state of complete physical, mental and social well-being and not merely the absence of disease (Burton 2010). To attain this overall wellness and to improve the wellness dispositions of employees a sharper, more focused approach is needed. Implementation of strategic health and wellness programs contributing to holistic wellness, might reduce sick leave in organisations whilst increasing profitability at the same time (Steyn *et al.* 2009).

1.4 RATIONAL AND MOTIVATION

It is estimated that by 2020 60% of the global burden of disease will be caused by chronic non-communicable diseases, most of which are diet related. The chronic diseases of lifestyle such as heart disease, hypertension, high cholesterol, cancer, diabetes, lung and nervous system disorders are costly for both the employer and the employee. Companies cannot afford to allow potential diseases to develop into a disease which becomes debilitating to the employee. A proactive approach and a plan to protect the employer and the employee against the effects of these non-communicable diseases is needed (Steyl 2003).

The WHO estimates that non-communicable diseases will become the cause of mortality globally within the next few years. It has been shown that there is a marked decline in annual and disability medical cost, disability days, sick leave and health care costs, workers compensation since wellness programs have been implemented (Steyl 2003).

In a nutrition intervention in the workplace, it was observed that greater focus needed to be directed to achieving overall wellness. Implementation of health and wellness programmes contributing to overall wellness could reduce sick leave in organisations whilst increasing profitability (Steyn *et al.* 2009).

Compounding the problems of inadequate diagnosis and poor management of NCDs and their risk factors is the multicultural nature of the population in South Africa. The intervention models and materials developed in Western societies are, therefore, frequently inappropriate for people with different lifestyles, habits and practices. This means that there is a need to develop and test culturally-appropriate interventions and personnel education materials for specific target groups and situations in South Africa (WHO 2009).

1.4.1 Awareness of their Wellness Status by the College staff

The awareness of his/her state of "wellness" is the responsibility of each and every staff member. If a state of wellness was achieved at all times, the staff members would be able to perform their duties optimally with a reduced rate of absenteeism. Wellness days have been conducted once a year at the college but these have been limited in scope. During the wellness day, blood pressure, blood sugar levels and Body Mass Index (BMI) was measured, but very little feedback was provided. Staff members were given figures with no accompanying explanation; and no eating plans to assist in achieving wellness. There were no follow up checks done or feedback given until the next wellness day the following year. No records were kept of these clinical checks, so there was also no recorded history which could assist staff members to further achieve wellness.

The challenge calls for a structured, well thought out programme to evaluate the situation by applying the principles contained in the Wellness Programme developed at various academic and other institutions.

The study reported upon in this dissertation, forms the basis for a better understanding of what nutrition and non-communicable disease status can mean for a better wellness status for each member of the college's staff. Collectively an improvement in the understanding and achievement of each individual's wellness status will ensure the collective wellness and performance of the educational institution concerned.

Table 1.2: Studies conducted in the field of wellness programmes and burden of disease during the last 10 years in South Africa.

AUTHOR AND REFERENCE	STUDY POPULATION	MEASURING INSTRUMENTS	SUMMARIZED RESULTS
Kolbe-Alexander, Buckmaster, Nossel, Dreyer, Bull, Noakes and Lambert (2008) **Chronic disease risk factors, healthy days and medical claims in South African employees presenting for health risk screening**	1954 Employees	Demographic lifestyle questionnaire assessing smoking status, habitual physical activity, nutrition and self-reported health status.	• Mean systolic and diastolic blood pressure were normal while 12% were classified as hypertensive. • 86% consumed less than 5 or more servings of fruit and vegetables. • The mean BMI for the total group was 25.5 +5.3 with 32% of the employees were classified as overweight (25-29.9), 16% as obese (BMI ≥ 30) and 44% were normal weight.
Oldewage-Theron and Egal (2012) **Impact of nutrition education on nutrition knowledge of public school educators in South Africa: A pilot study**	23 Life orientation educators and district managers	• Baseline survey to identify the problem • Nutrition manuals developed based on survey results	• Nutrition education formed (97.8%) of the life orientation syllabus. • The majority (60.0%) spent an hour on nutrition education per week. • There was an indicated by the majority (97.8%) that a need for nutrition education existed in schools. • While there were 26.3% who claimed that they heard of the FBDG, 100% could not name one. • Knowledge of NE improved significantly after the NEP. Mean scores increased from 63.3±30.2% to 80.6±21.1%.
Kolbe-Alexander, Proper, Lambert, Van Wier, Pillay, Nossel, Adonis and Van Mechelen (2012) **Working on wellness (WOW): A worksite health promotion intervention programme**	928 employees	• Short fat questionnaire to assess habitual intake of fruit and vegetables. • Health risk assessment questionnaire with demographic variables and lifestyle measures of	• In the discussion a need for a worksite intervention programme targeting CVD and its risk factors were identified

		general dietary habits, alcohol consumption and habitual physical activity	
Joubert, Norman, Bradshaw, Goedecke, Steyn, Puoane and the Comparative Risk Assessment Collaborative Group (2007) **Estimating the burden of disease attributable to excess body weight in South Africa in 2000**	Over 310 000 participants	• Comparative risk assessment method was used • South African demographic and health survey data from 1998 was re-analysed	• The proportion of DALYs due to excess body weight was twice as high for women (3.9%) than men (1.9%) • In females type 2 diabetes accounted for the highest number of deaths while IHD accounted for the most attributable deaths in males. • Most deaths occurred amongst men in the 45-49 age group while for women it occurred in the 60-69 age group and increased with age. • Excess body weight accounted for 4.2% total male deaths and 10.1% total female deaths in South Africa in 2000
HRSC (Human Sciences Research Council) (HRSC 2012) **The South African National Health and Nutrition Survey (SANHANES) in 2012**	25 532 individuals	• Questionnaire based interview, physical examination and biomarker testing.	• Ages 15 and older- 10.4% were prehypertensive while 10.2% had hypertension. • One in four at national level had high serum levels (23.0%) while (28.8%) had LDL cholesterol). • One in five people was diagnosed with diabetes (9.5%). • Findings showed that 27.9% males and 45.2% females were physically unfit. • Overweight and obesity were higher in females (39.2%) than males (24.8%). • The study found that 68.2% females and 20.2% males had a waist circumference that put them at risk for metabolic syndrome. • One in five people consumed a diet low in fruit and vegetables (25.5%), high in sugar

			((19.7%) and high in fat (18.3%).
South Africa Demographic and Health Survey 2003 (DOH 2004)	• 8,115 adults	• Household questionnaire • Women's questionnaire • Men's questionnaire • Adult Health questionnaire	• One third men (31%) and (8%) women smoke daily. • Findings show that (23%) women and (9%) men are obese. • Findings also show that (29%) women and (21%) men are overweight. • Results revealed that (18.2%) between the ages of 45 and 54 suffered from high blood pressure (self-reported). • There were (7%), ages 65+ that suffered from angina/ heart attack (self-reported). • In the 55-64 age category, (4.8%) suffered from stroke (self-reported). • In the 45-54 age category (6.3%) suffered blood cholesterol. • Findings showed that (7.0%) in the 55-64 age category suffered from diabetes.

1.5 RESEARCH AIM

The main aim of this study was to determine the socio-demographic profile, food intake patterns, nutrition and health status of staff at the Swinton Campus of the Coastal Further Education and Training (FET) College in Mobeni in order to create a foundation for the development of nutritional wellness educational material that may, when implemented, improve the nutritional knowledge and dietary intake behaviour of staff.

1.5.1 Specific objectives

To measure the dietary intake and the health status of the staff members at the Swinton Campus of the Coastal FET College by:-

- Determining the socio-demographic and health profile of the staff members.
- Evaluating the food choices as well as dietary intake behaviour of the staff members by using quantitative food frequency questionnaires (FFQ).
- Using a 24-hour recall method as a reference measurement.
- Determining the need for nutrition wellness educational material using the results of the above questionnaires.
- Testing the nutrition wellness education material for face and content validity.

1.6 FRAMEWORK OF THE STUDY

The framework of the study is represented in Figure 1.2 below.

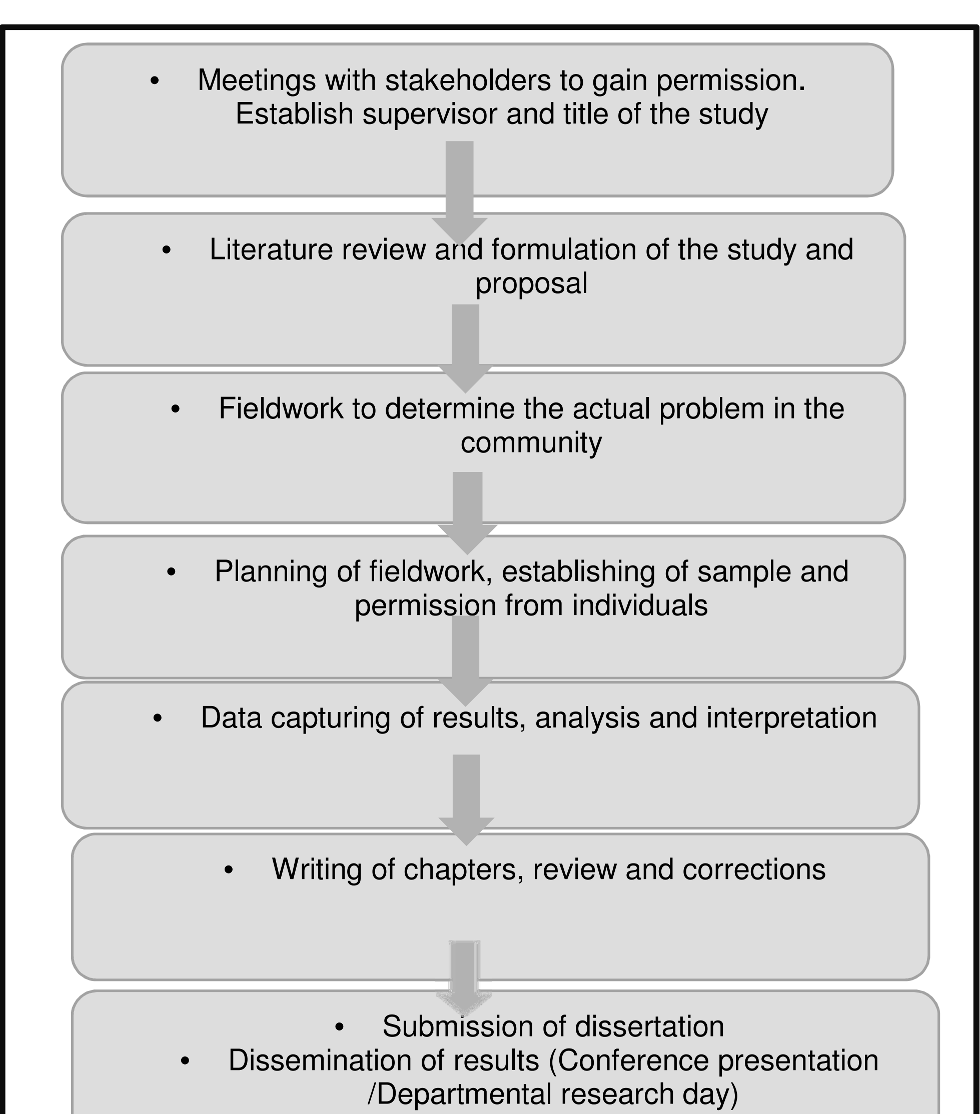


Figure: 1.2: Flow of the study

1.7 THE PURPOSE OF THE CURRENT RESEARCH PROGRAMME

1. To measure and evaluate, by means of evidence based observations, the nutritional aspect of the Wellness paradigm as experienced by the 170 staff members at the FET College.
2. To remedy the observed lack of wellness amongst the 170 staff members at the college. It has been proposed that an investigation be undertaken to gather evidence-based information to support the observed wellness shortfall, and to quantitatively measure and determine the present standard/level of wellness with specific regard to the nutritional aspects of wellness.
3. Based on the results of this scientific study, nutritional nutrition wellness education material will be developed, as a component of a wellness programme to raise the nutrition wellness-standard of the staff.

1.8 STRUCTURE OF THE DISSERTATION

This study consists of five chapters which are outlined below in Figure 1.3:-

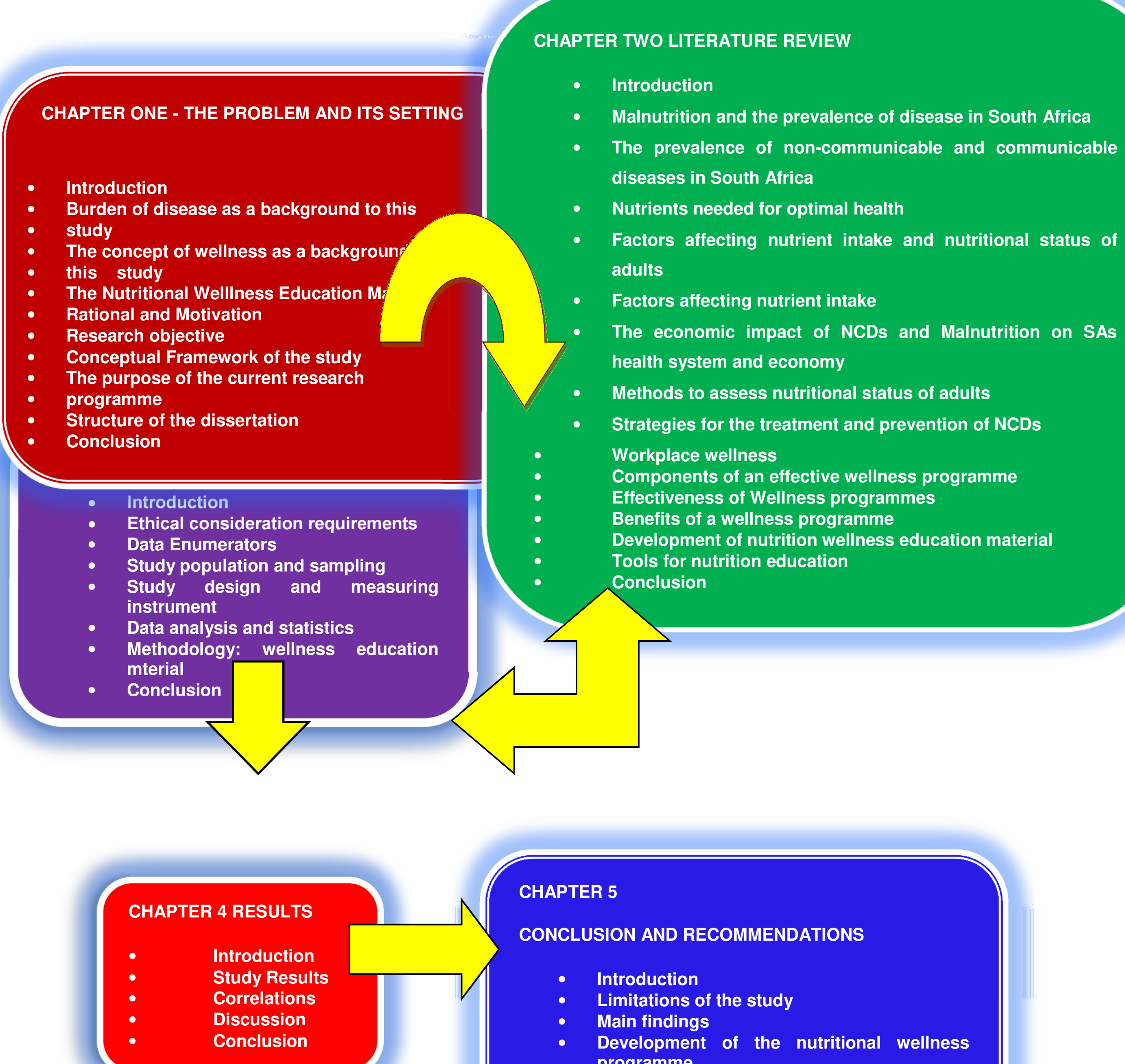


Figure: 1.3 Structure of dissertation

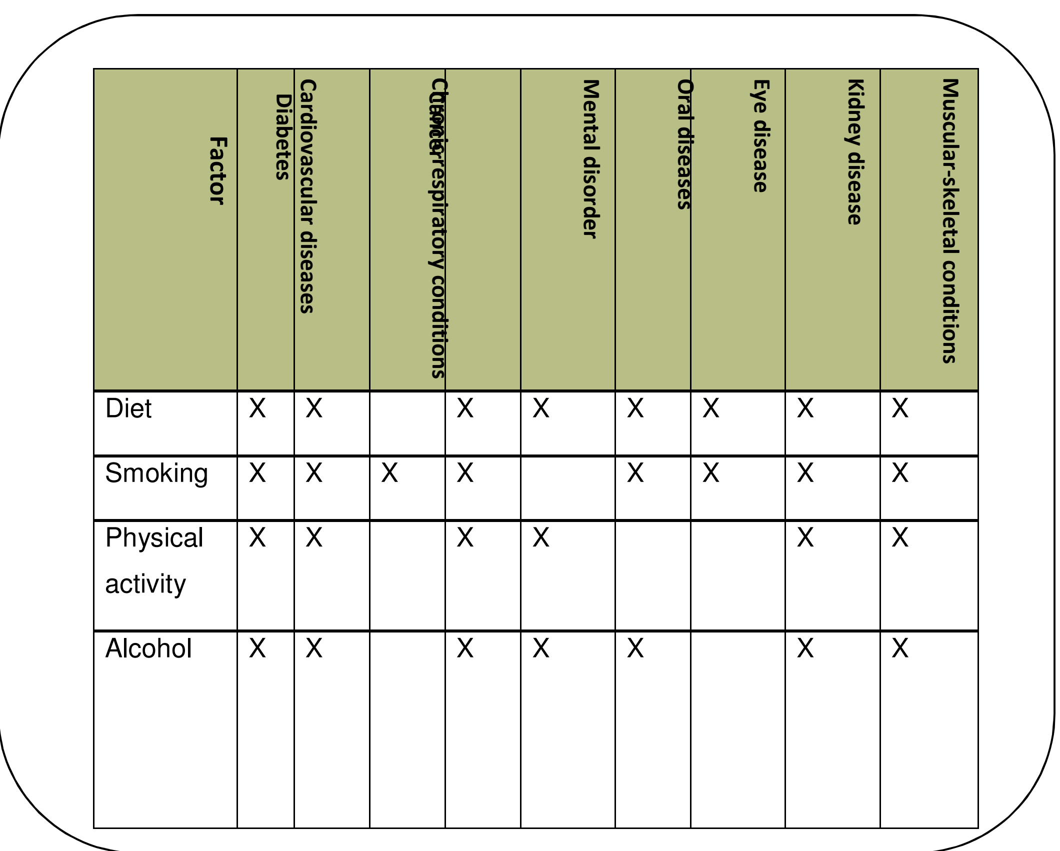
1.9 CONCLUSION

It is estimated that by 2030, 75% of the global burden of diseases will be caused by chronic NCDs, most of which are diet related. Since most people spend a considerable amount of time at the workplace, the workplace becomes a good place to implement interventions such as wellness programmes (Department of Health 2013).

CHAPTER 2- LITERATURE REVIEW

2.1 Introduction

The prevalence of non-communicable diseases in South Africa has increased considerably over the past years and is a growing concern. The World Health Organisation mentions that thirty eight million people are killed by NCDs each year. NCDs such as cardiovascular disease, diabetes, cancer and chronic respiratory disease are the four main causes of death, accounting for 82% of deaths in the World (WHO 2015). Common risk factors for NCDs are physical inactivity, cholesterol, unhealthy diets, tobacco use and alcohol consumption. In figure 2.1 it can be seen that NCDS have one or more of these risk factors (DOH 2013; WHO 2014).



Factor	Diabetes	Cardiovascular diseases	Chronic respiratory conditions	Cancer	Mental disorder	Oral diseases	Eye disease	Kidney disease	Muscular-skeletal conditions
Diet	X	X		X	X	X	X	X	X
Smoking	X	X	X	X		X	X	X	X
Physical activity	X	X		X	X			X	X
Alcohol	X	X		X	X	X		X	X

Figure 2.1: Common Risk Factors for Non-Communicable (DOH 2013)

In South Africa 40% of total deaths is attributed to NCDs. Figure 2.2 presents the percentage deaths by the four main non-communicable diseases in South Africa.

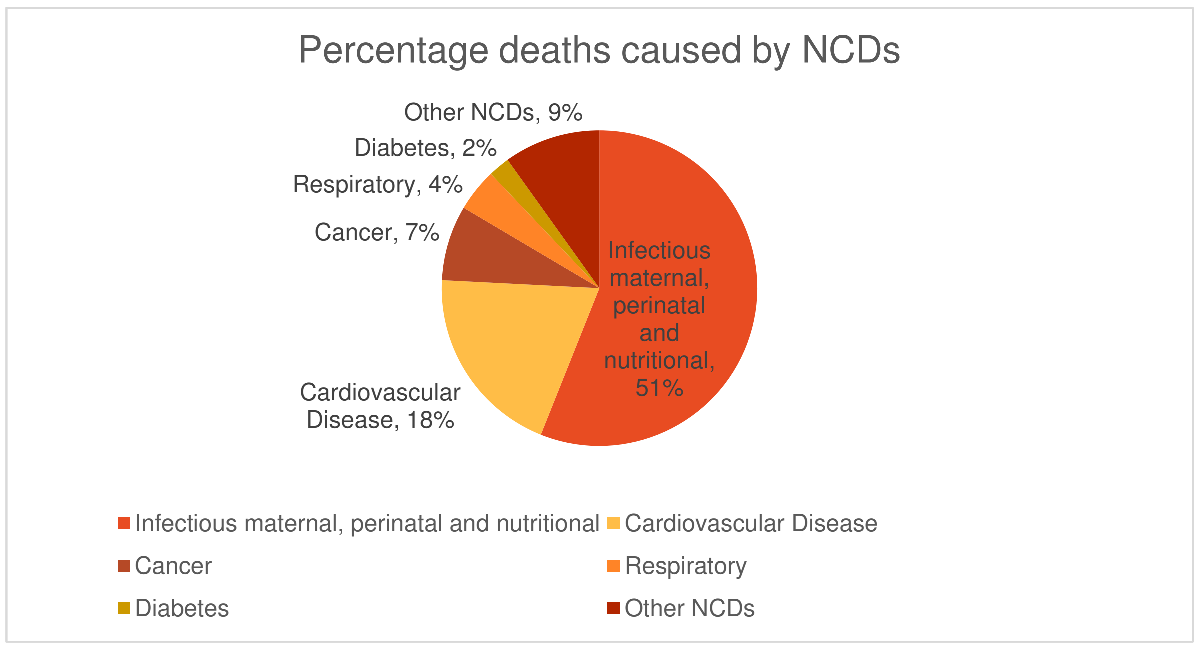


Figure 2.2: Percentage deaths caused by NCDs (DOH 2013)

This chapter outlines the nutritional requirements of adults, the factors affecting nutrient intake and nutritional status of adults, the impact of non-communicable diseases on adults in the workplace, costs of absenteeism to companies and the need for wellness programmes in targeting the management and control of non-communicable diseases.

2.2 MALNUTITION AND THE PREVALENCE OF DISEASE IN SOUTH AFRICA

The term malnutrition refers to both over-nutrition and under-nutrition. The World Food Programme (WFP) defines malnutrition as “one’s physical function that is hindered to a point where the person can no longer maintain body performances such as growth, lactation, pregnancy, physical activity, resistance and recovery from disease” (WFP 2014).

In most developing countries such as South Africa, undernutrition is common while emerging NCDs such as obesity, heart disease, cancer and diabetes are becoming the leading cause of death and disability. Many countries face the double burden of both over-nutrition where people are consuming too much nutrients leading to obesity and other chronic diseases and undernutrition with calorie and micronutrient deficiencies. Infectious diseases together with

child and maternal undernutrition are still plaguing nations with serious economic and social development implications (FAO 2004).

The World Health Organisation (WHO 2003) and (Steyn 2005d) state that this "nutrition transition" is linked to factors such as global changes, urbanisation and economic development. These urbanised diets are high in fat, sugar and processed food. There are also lifestyle implications where physical activity is reduced .

2.2.1 Over-nutrition

Over-nutrition as described by the National Health Service as the intake of too much nutrients. Over-nutrition is a risk factor for overweight and obesity when the intake of nutrients exceeds expenditure. This means that the consumption of nutrients are high, but there is little or no physical activity (Blake, Zhou and Batt 2013).

Obesity and overweight are widespread in today's society. Kennedy states that the focus needs to change from individual lifestyle choices such as diet and physical activity to environmental barriers and individual choice to achieve healthier lifestyles (Kennedy 2011).

Trail (2006) states that obesity and overweight in adults is due to a high energy intake. According to the FAO factors that contribute to over-nutrition are poor eating habits, increased portion size, and poor fruit and vegetable consumption. High intakes of processed foods and unhealthy snacks are also contributing factors (Trail 2006).

Obesity is also caused by more people using public transport, long working hours, being sedentary at work, use of TV's, computers, and other leisure activities that are passive and require little or no physical activity (Steyn and Damasceno 2006).

2.2.2 Under-nutrition

Under-nutrition is described as any individual that does not receive enough nutrients. Under-nutrition is mainly associated with developing countries since most people are food insecure and receive insufficient nutrients to maintain the body. Micronutrient deficiencies such as Vitamin A and Iron in children and women of childbearing age are prevalent in South Africa (NHS 2012i).

Statistics show that two billion women and children are anaemic, 250 million children suffer from Vitamin A deficiency and 2 billion people are at risk from iodine deficiencies (Chopra

2002). For this reason South Africa has compulsory fortification in cereal based products to limit some of these micronutrient deficiencies (Chopra 2002).

2.3 THE PREVALENCE OF NON-COMMUNICABLE AND COMMUNICABLE DISEASES IN SOUTH AFRICA

The World Health Organisation describes NCDs or (lifestyle diseases) as diseases that are not contagious like infectious diseases. The four main non-communicable diseases as listed by the WHO are cancer, respiratory diseases, diabetes and cardiovascular diseases (WHO 2015). Chronic illness on the other hand, is described as a disease that has lasted three months or more (Steyn 2005d).

2.3.1 Non-Communicable diseases

Throughout the world there is a growing concern that NCD's kill over 35 million people each year. More than sixty percent of NCD-related deaths are in middle and low income countries, and nearly thirty of those deaths occur before age 60 as reported by the Centre for Disease Control and prevention in 2011 (CDC 2011b).

The Heart and Stroke Foundation of South Africa states that the country has one of the highest incidences of hypertension in the world. Currently over six million people suffer from hypertension. Due to this many people in South Africa are more likely to suffer from a stroke or heart disease. Statistics show that 270 strokes occur daily in South Africa (Seedat 2014).

Steyn mentions that the burden of diseases in South Africa has a serious impact on management and prevention of non-communicable diseases, risk factors as well as unhealthy lifestyles that is cost effective. South Africa has a population that is poverty stricken, while being plagued by urbanisation, industrialisation and a westernised population that has brought emerging chronic diseases (Steyn 2005c).

Healthy aging involves the interaction between lifestyle choices, the environment and healthy genes. The most modifiable as outlined by Kennedy were lifestyle factors such as diet and physical activity (Kennedy 2011).

2.3.1.1 Hypertension

Blood pressure is defined as blood that is kept constantly flowing throughout the body by pressure of the blood in the arteries. An increase in blood pressure takes place when the large arteries in the body become less elastic and hard, while the smaller ones become narrow (Seedat 2014).

An increase in blood pressure usually does not come with any signs and is therefore known as a 'silent killer'. Currently 25% of South Africans who are between the ages of 15 and 64 suffer from hypertension. This is the age group of the South Africa's workforce. Hypertension is a major cause of kidney failure, heart attacks, strokes and premature death (Seedat 2014) and (Steyn 2005b).

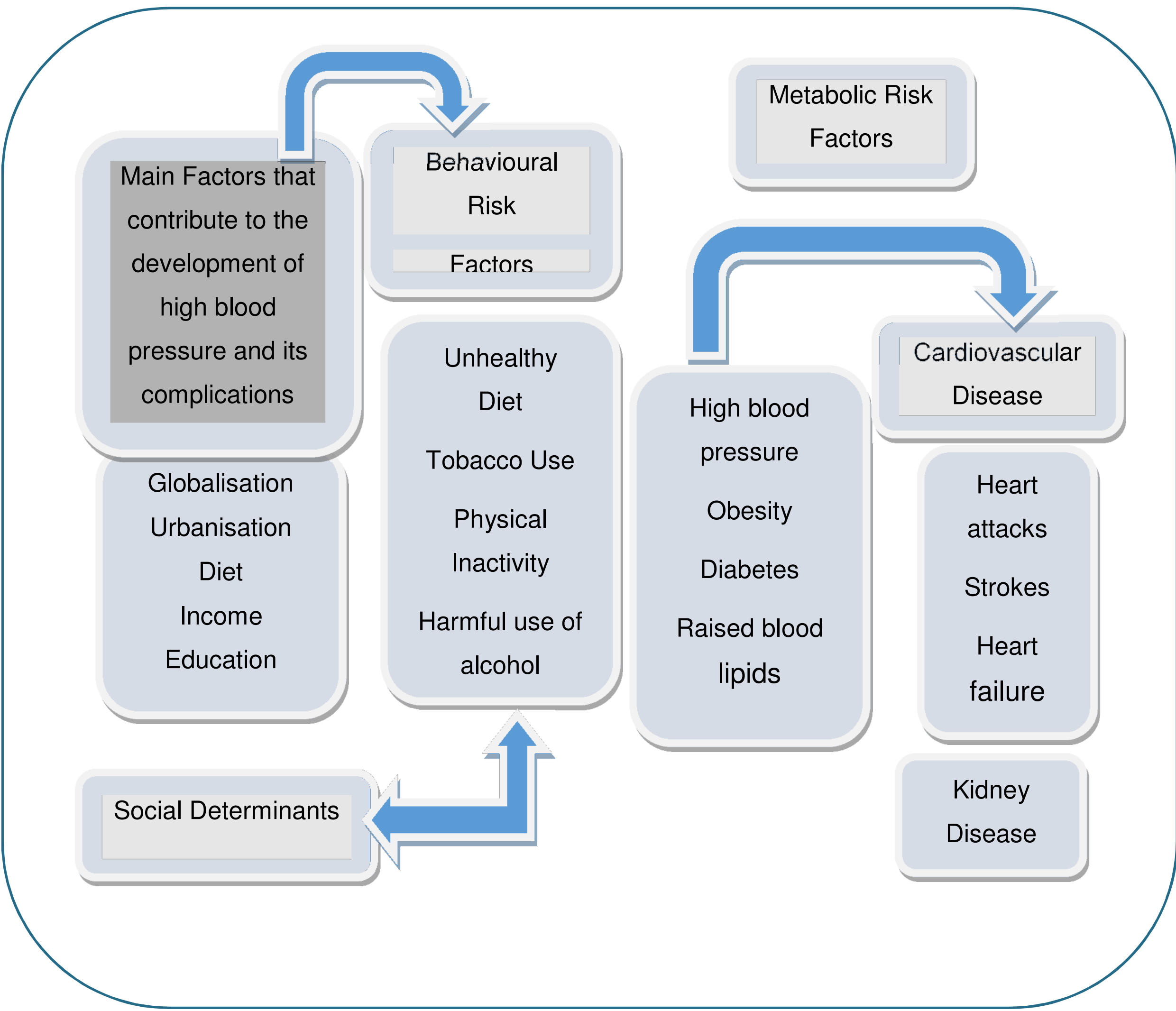


Figure 2.3: Factors that contribute to hypertension adapted from WHO (2015)

Figure 2.3 show the main factors that contribute to the development of hypertension and its complications (WHO 2015). The main factors are social determinants, cardiovascular disease, behavioural risk factors and metabolic risk factors.

Table 2.1: Blood Pressure Categories (Seedat 2014)

A guide of blood pressure levels:	
Normal	<120/80 to 129/84
High Normal	130/85 to 139/89
Hypertension:	
- mild	140/90 to 159/99
-moderate	160/100 to 179/109
- severe	>180/110

Table 2.1 indicates the blood pressure categories for systolic and diastolic blood pressure. In a study done by Van Rooyen *et al.* (2000) in the North West Province of South Africa, it was found that hypertension was highest in those individuals that moved from the rural areas into the urban areas. The study also showed that there was a higher intake of salt, while fruit and vegetable intake was low.

Salt was originally used by people as a preservative and add taste to food. However, too much salt is being added to food, especially flavouring cubes to make food taste better (Puoane *et al.* 2008) and (Steyn and Damasceno 2006).

Studies emphasise the cost effectiveness of lifestyle and drug management in reducing cardiovascular disease risk in developed and less developed regions of the world, and the importance of improved BP control is needed (Battersby 2013).

2.3.1.2 Cardiovascular disease

Atherosclerosis is a process described by the British Nutrition Foundation (BNF) as a process where the blood vessels in the body become thinner. This occurs when fat from the blood in the body builds up in the blood vessel walls. This causes restricted blood flow to the heart during exercise (angina). Large clots can also form within blood vessels. These are called thrombosis. Thrombosis can be responsible for causing heart attacks where the blood supply is cut-off (BNF 2015).

2.3.1.3 Coronary heart disease

Coronary heart disease (CHD) is the build-up of fatty deposits inside the walls of the blood vessels over time, the process of which is called atherosclerosis. There is no single cause of the disease but there are many risk factors such as cigarette smoking, a lack of exercise, hypertension, raised cholesterol and diabetes (Steyn 2007).

2.3.1.4 Obesity

Overweight and obesity are defined as fat build up in the body that is detrimental to health (WHO 2014). Body mass index (BMI) is weight-for-height that is used to categorise overweight and obesity in adults. It is an individual's weight in kilograms divisible by the square of the individual’s height in meters (kg/m^2).

The World Health Organisation definition for obesity in adults is:

- A person with a BMI that is more than or equal to 25 is overweight
- A person with a BMI that is equal to or more than 30 is obese.

As mentioned at the beginning of chapter two Goedecke, Jennings and Lambert (2005) and Steyn and Damasceno (2006) state that obesity occurs when energy intake is more than energy expenditure. The energy that has not been utilised by the body gets stored in fat cells. This is caused by little or no exercise. The problem of obesity is fast growing with ±1.3 billion individuals being obese or overweight. South Africa, is also not the only country that is prone to obesity, other developing countries such as South America and Mexico are also at risk.

In South Africa more than fifty percent of women and almost thirty percent of men have a body mass index $\geq 25 kg/m^2$. The diseases linked to the effects of obesity are type 2 diabetes, heart disease, certain types of cancer and hypertension. Accumulation of fat in the abdominal area, is related to non-communicable diseases such as diabetes, hypertension, dyslipidaemia and atherosclerosis (Goedecke, Jennings and Lambert 2005).

2.3.1.5 Cancer

Cancer is a disease that can affect any part of the body. Malignant tumours and neoplasms are other terms used. Cancer is the accelerated formation of cells that are abnormal in nature. These cells increase in size and spread and stifle the body and its organs (metastasis). In most cases metastasis is the main cause of death from cancer (WHO 2014).

Dietary factors and ageing can contribute to the development of cancer (WHO 2014). Lifestyle factors such as smoking and alcohol which are common in urban areas, are also risk factors for cancer. Cancer is one of the major causes of death in South Africa. However the type of cancers vary between high income and low income communities (Norman, Mqoqi and Sitas 2005).

2.3.1.6 Diabetes Mellitus

Diabetes is defined by (Norris and Pettifor 2009); (BNF 2015) as a long term disease caused when the pancreas cannot produce enough insulin. Insulin is a hormone that controls the amount of sugar levels in the body. Increased blood sugar (hyperglycaemia) occurs when diabetes is not controlled and causes damage to the nerves, blood vessels and organs in the body (BNF 2015); (WHO 2015).

The symptoms of diabetes are thrush, blurred vision, wounds that heal slowly, weight loss, frequent urination, increased thirst and increased intake of liquids (BNF 2015).

Diabetes is classified into the following types as outlined by the World Health Organisation (WHO 2006):

- Type 1 diabetes is where the hormone insulin cannot be naturally synthesised by the body.
- Type 2 diabetes is insulin cannot be used by the body. Most people suffer from type 2 diabetes. An increase in weight and a lack of physical activity are contributing factor.
- Gestational diabetes is increased blood sugar levels that occurs during pregnancy.

2.3.1.7 Osteoporosis

Hough (2005) defines osteoporosis as a skeletal disease where individuals have a low bone density or weakened bone tissue that makes bones fragile and increases the risk for fractures.

A low dietary intake of bone minerals such as calcium, phosphorus and vitamin D results in fractures and bone loss (Pinheiro *et al.* 2009). Osteoporosis is a common and costly disease, which affects one out of every four post-menopausal caucasian women. Studies have shown that one fifth of women with hip fractures die within a year of the fracture. In South Africa the care for people with hip fractures is estimated around R50 000 per patient (Hough 2005).

2.3.1.8 Stroke

In developing countries such as in sub-Saharan Africa (SSA) two thirds of people suffer from stroke. Currently 50% of survivors are chronically disabled. There is growing incidence of stroke in developing countries due to what is known as the "health transition". In South Africa the migration of people from rural to urban areas in search of work (Urbanisation) has led to an increase in risk factors for vascular disease and stroke (Connor and Bryer 2005).

A review on stroke studies has shown that nutrition and diet can be used in the prevention and control of stroke risk factors (Foroughi *et al.* 2013). In a South African Stroke Prevention Initiative study (SASPI) it was found that stroke was a risk factor for raised blood pressure. See figure 2.4 below.

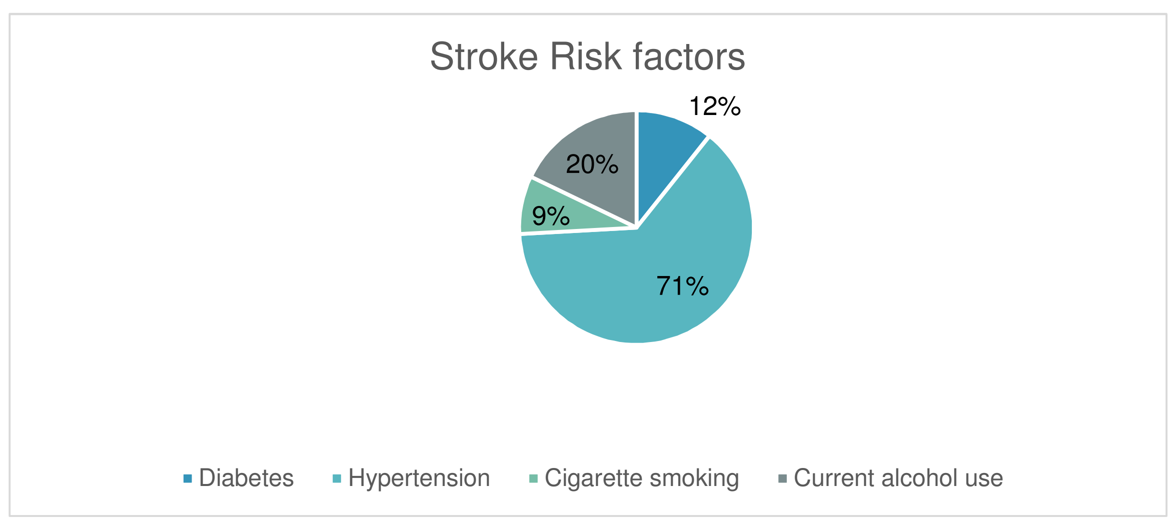


Figure 2.4: Stroke Risk Factors

2.3.1.9 Dyslipidemia

Dyslipidaemia is described as low density lipoproteins or low levels of high density lipoprotein cholesterol by the American Family Physician (AAFP 2011). In South Africa dyslipidemia is a risk factor for cardiovascular disease. Currently those that have adopted a westernised diet and HIV is also becoming at risk (Maritz 2005).

An increase in obesity and diabetes is also known as diabesity. At present there has been a huge increase in diabesity in developed countries and developing countries such as South Africa. Diabesity has also become a risk factor for dyslipidemia (Maritz 2005).

2.3.2 COMMUNICABLE DISEASES

2.3.2.1 HIV and AIDS

Sub-Saharan Africa has a high incidence of HIV and AIDS. In South Africa, HIV and AIDS is one of the leading causes of death (Mswela 2009). HIV affects the immune system in the body and makes it weaker. Reduced appetite and diarrhoea which are symptoms of HIV also cause malnutrition. However, having balanced nutrition will assist in preventing malnutrition. Malnutrition acts as a catalyst for HIV into AIDS. Duggal, Chugh and Duggal (2011) states that HIV and AIDS effects not just the nutrition intake of the victim but also the family concerned due to lack of income with the bread- winner being ill. Poor nutrition can also influence the lifespan of a victim (Duggal, Chugh and Duggal 2011).

2.3.2.2 Tuberculosis

Mycobacterium tuberculosis is a communicable bacteria causing disease (WHO 2014). Malnutrition increases the chance of infection in the body. An individual suffering from the disease has a reduced appetite and there is malabsorption of micro and macro nutrients (Gupta *et al.* 2009). Tuberculosis (TB) is a disease in South Africa that affects poor communities, miners and workers. TB has been among the leading causes of death in South Africa, accounting for more than 5 percent of all deaths in 2000. HIV/AIDS has also increased the occurrence of TB, with TB being the common disease among HIV-positive people who have low resistance (Bradshaw *et al.* 2005).

2.3.2.3 Chronic Respiratory Diseases

Asthma and chronic bronchitis/ chronic obstructive pulmonary disease (COPD) are common diseases that affect the respiratory system in the body (Erhlich and Jithoo 2005).

COPD as stated by Erhlich and Jithoo 2005) is mainly caused by tobacco smoking. Ehrlich and Jithoo (2005) suggested that in South Africa, the pattern of asthma and COPD is common in areas where there are a lot of factories and industries. These areas are high in pollution, poverty, smoking, and numerous communicable diseases.

2.4 NUTRIENTS NEEDED FOR OPTIMAL HEALTH

Nutrients are essential to supply the body with energy and help with growth and upkeep of the body. The correct intake and balance of nutrients in the body aids in good health and well-being and benefits an individual from being free from disease (NICUS 2003a).

South Africa is made up of areas that are developed and areas in the process of being developed in terms of its economy and population. South Africa consists of an urban population that is constantly growing, as well as a big rural population (Steyn 2005e). Nutrition is an important factor in health and development of all countries of the world and South Africa is no exception. Better nutrition and diet improves the health of infants, children and the health of mothers. It creates stronger immune systems, safer pregnancies and a lower risk of non-communicable diseases. Healthy ageing and longevity are also results of good balanced nutrition (Steyn *et al.* 2009).

In many ways, people that migrate from rural to urban areas have to adapt their lifestyles to the urban way of living. Four of the main lifestyle changes outlined by (Steyn 2005b) and (CDC 2011b) in this regard are:

- Change from being active to a sedentary lifestyle
- Eating habits changed from healthy to not so healthy
- The use of tobacco increased
- More alcohol was consumed in urban areas

This was a change from living in rural areas where transport is not readily available and walking was essential. Diets have moved from traditional nutritious meals to meals that were high in salt, sugar, fat and have little or no nutrients. This was partly due to the increase of fast foods being readily available to consumers that are convenient, and relatively low to medium-priced. With globalisation and imports coming into South Africa there is now more variety to choose from (Steyn 2005a).

2.4.1 Recommended Dietary Intakes (DRIs) for Adults

The Institute of Medicine (IoM 2004) formulated the DRIs. These were developed by the United States to improve the quality of life and increase optimum health and were compiled by (NICUS 2003a) for use in this study.

The DRI framework as designed by the NICUS (2003) and outlines the following:

- The idea is to use the DRIs as a guide that can be adapted for various situations.
- Having the correct balance of nutrients to reduce the incidence of disease.
- These can be used as a foundation for the desired outcome, and
- Providing approximations for the consumption of nutrients.

The term DRIs refers to a set of four nutrient-based reference values. Every DRI refers to an average daily intake of nutrients and the daily intake for each and every individual will include deviations over days. It is however vital that the dietary intake over a given period of time will be nutritionally balanced .

2.4.1.1 The four reference values:

- Estimated average requirement (EAR) is defined as the percentage of approximate nutrient intake by the different genders at different stages of the life cycle.
- Recommended daily allowance (RDA) is defined as individual dietary intake for every individual, whether male or female, regardless of age.
- Adequate intake (AI) when an EAR cannot be created based on scientific evidence. This is when AI is used. Diets of individuals with optimum health are looked at and approximations created.
- Tolerable upper intake level (UL) can be described as the exhausted nutrient intake by an individual that does not have much effect on the health (NICUS 2003a).

2.5 FUNCTIONS AND SOURCES OF NUTRIENTS

2.5.1 Macronutrients

The intake of macronutrients such as fats and carbohydrates, play a part in the risk of non-communicable diseases. Moderate levels of these nutrients can be consumed without major effects on health. However, the risk of disease is prevalent with the consumption of macronutrients being above or below the recommended intake (NICUS 2003b).

The Acceptable Micronutrient Distribution Ranges (AMDR) for carbohydrate and fats is estimated to be 20-30% and 45-65% and the AMDR for protein is 10-35%, 5-20% and 10-30% for energy for all adults (NICUS 2003a).

- **Energy intake of Adults**

The British Nutrition Foundation states that energy is obtained from the drinks and food that is consumed. The amount of energy that each of these macronutrients provides differs. Fat is the most energy dense nutrient (BNF 2014).

The DRIs for energy as listed in the DRI intakes of the nutrition information from the IoM (2004) and NICUS (2003) for adults are listed in Table 2.2 that follows:-

Table 2.2: DRI Energy (IoM 2004);(NICUS 2003a)

Energy		
Gender	**Age**	**KJ per day**
Male	19-70	(12881)
Female	19-70	(10093)
Female (pregnant)	19-50(1st trimester)	(10093)
Female (pregnant)	19-50(2nd trimester)	(11521)
Females (pregnant)	19-50(3rd trimester)	(911991)
Females (lactating)	19-50(1st 6 months)	(11479)
Females (lactating)	19-50(2nd 6 months)	(11773)

The estimated energy requirement (EER) is the estimated energy that is required for a healthy individual, taking into account age, gender, weight, height and exercise. To calculate the EER for individuals with a normal body weight: BMI 18.5-25kg/m² 0-100 years. Below are the different physical activity categories (NICUS 2003a).

Physical Activity Level (PAL) Categories

Sedentary PAL ≥ 1.0 - < 1.4
Low active PAL ≥ 1.4 - < 1.6
Active PAL ≥ 1.6 - < 1.9
Very active PAL ≥ 1.9 - < 2.5

2.5.1.1 Carbohydrate

Carbohydrates are the main source of energy in the body. Sources of carbohydrates are cereals, bread, pasta's, potatoes, rice (NHS 2012h). The DRIs for carbohydrates as listed in the DRI intakes of the IoM (2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.3: DRIs Carbohydrates (IoM 2004);(NICUS 2003a)

Carbohydrate Requirements-EAR		
Gender	**Age**	**g/day**
Male	19-70	100
Female	19-70	100
Female (pregnant)	19-50	135
Female (lactating)	19-50	160

2.5.1.2 Total fibre

Fibre which is also known as roughage or bulk, describes a group of indigestible carbohydrate called polysaccharides. Foods that are rich in fibre include, fruit and vegetables, whole wheat bread, pastas and rice. The main function of fibre is that it prevents constipation, reduces the risk of coronary heart disease and it also assists in maintaining normal blood glucose levels (Vorster 2013).

The DRIs for total fibre as listed in the DRI intakes of the IoM (2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.4: DRIs Total Fibre (IoM 2004);(NICUS 2003a)

Total Fibre Requirements- AÏ		
Gender	**Age**	**g/day**
Male	19-50	38
	50-70	30
Female	19-50	25
	50-70	21
Female (pregnant)	19-50	28
Female (lactating)	19-50	29

2.5.1.3 Total fat (Lipids)

The fats and oils in foods belong to a group called lipids. Lipids are commonly called “fats” (Brown 2011). The main food sources for total fat are invisible fat in fish and shellfish, baked goods, nuts and seeds, full cream milk, butter, margarine, fat in meat and poultry products. The main function of total fat is energy. The acceptable micronutrient distribution ranges for all adults, male and female, including pregnant and lactating women is 20-35% of daily energy contribution (IoM 2004); (NICUS 2003a).

2.5.1.4 N-6 polyunsaturated fatty acids (linoleic acid)

It is also required for normal skin function. Linoleic acid can be found in nuts, seeds and vegetable oils such as soybean, sunflower and corn oil (Brown 2011).

The DRIs for n-6 polyunsaturates as listed in the DRI intakes of IoM (2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.5: DRIs n-6 polyunsaturated fatty acids

N-6 Requirements-AI		
Gender	**Age**	**mg/day**
Male	19-50	17
Male	51-70	14
Female	19-50	12
Female	51-70	11
Female(pregnant and lactating)	19-50	13

2.5.1.5 N-3 polyunsaturated fatty acids ($_a$ linolenic acid)

Linolenic acid can be found in vegetable oils such as in soya beans, canola and flax seed oil, fish oils, fatty fish, with smaller amounts in meat and eggs (IoM 2004; NICUS 2003a).

The DRIs for n-3 polyunsaturates as listed in the DRI intakes of IoM (2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.6: DRIs n-3 (IoM 2004);(NICUS 2003a)

N-3 Requirements-AI		
Gender	**Age**	**mg/day**
Male	19-70	1.6
Female	19-70	1.1
Female pregnant	19-50	1.4
Female lactating	19-50	13

2.5.1.6 Saturated, trans fatty acids, and cholesterol

Sources of cholesterol include liver, eggs and egg containing foods. Sources of trans fatty acids are brick margarines and foods containing hydrogenated or partially hydrogenated vegetable fats (Brown 2011).

2.5.1.7 Protein

Proteins derive their name from the Greek word proteos, which means “of prime importance” (Brown 2011). Protein is the structural component in the body, and functions as enzymes, in membranes and as some hormones (NICUS 2003a).

Food sources from animal protein are meat, poultry, fish, eggs, milk, cheese and yoghurt. These foods provide all the 9 essential amino acids in the correct amounts needed by the body, and for this reason are called “complete proteins”. Selected food sources from plant protein are legumes, grains, nuts, seeds and vegetables, tend to be deficient in one or more essential amino acids and are called “incomplete proteins” (Brown 2011).

The DRIs for protein as listed in the DRI intakes of the IoM (2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.7: DRIs Protein (IoM 2004);(NICUS 2003a)

Protein Requirements		
Gender	**Age**	**RDA/day**
Male	19-70	0.66
Female	19-70	0.66
Female pregnant	19-50	088
Female lactating	19-50	1.05

2.5.1.8 Water

Water is an essential nutrient and plays an important part in the body’s processes, with functions as maintaining body temperature, components of cells, shock absorber, lubricant, solvent and carrier of various compounds, nutrients and waste products. Total fluid intake includes fluids consumed as beverages (milk, tea, coffee, juice, sweetened beverages and water (Van Graan *et al.* 2013).

The recommended intake according to the South African Food Based Dietary Guidelines (FBDG’s) is 6-8 glasses of water per day. Another important function of water is to prevent dehydration in the body. Dehydration is defined as the loss of water to the extent where normal bodily functions become affected. Mild dehydration does not disturb homeostasis and the

balance of water in the body returns to normal. Severe dehydration, however, disrupts homeostasis and results in a number of symptoms associated with dehydration (Van Graan *et al.* 2013).

2.5.2 Micronutrients

Micronutrients have an important role to play in health and disease. Apart from the prevention of deficiencies, the fast developing field of immuno nutrition looks at the importance of foods, nutrition and micronutrients in therapy and disease prevention. Micronutrients play a key role in preventing NCDs (Visser 2010).

2.5.2.1 Vitamin A (Retinol)

Vitamin A is important in the adult diet for the following reasons, immunity against infections, improved night vision, healthy skin and linings. Good sources of vitamin A are cheese, carrots, eggs, low-fat spreads and yoghurt. Liver is a particularly rich source of vitamin A (Brown 2011).

The DRIs for vitamin A as listed in the DRI intakes of the IoM (2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.8: DRIs Vitamin A (IoM 2004);(NICUS 2003a)

Vitamin A requirements EAR		
Gender	**Age**	**µg/day**
Male	19-70	625
Female	19-70	500
Female (pregnant)	19-50	550
Female (lactating)	19-50	900

2.5.2.2 Vitamin D (Calciferol)

Vitamin D is important for bones and teeth. A lack of vitamin D can lead to osteomalacia (softening of the bones) in adults (NIH 2014). Most Vitamin D comes from the skin absorbing sunlight. Vitamin D is also found in a small number of foods. Food sources as given by the

NHS are, mackerel, salmon which are oily fish, eggs, fat spreads, breakfast cereals that are fortified and powdered milk (NHS 2012k).

The DRIs for vitamin D as listed in the DRI intakes of the nutrition information from the IoM (2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.9: DRIs Vitamin D (IoM 2004);(NICUS 2003a)

Vitamin D requirements AI		
Gender	**Age**	**µg/day**
Male	19-50	5.0
Male	51-70	10
Female	19-50	5.0
Female	51-70	10
Female (pregnant and lactating)	19-50	5.0

2.5.2.3 Vitamin E ($_a$-tocoperol)

Vitamin E is found in a wide variety of foods. Food sources are plant oils such as corn, olive oil and soya. Other sources are, wheat germ, nuts and seeds (Brown 2011). The function of vitamin E is to protect the cell membranes and maintain cell structure (NHS 2012l).

The DRIs for vitamin E as listed in the DRI intakes of the IoM (2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.10: DRIs Vitamin E (IoM 2004);(NICUS 2003a)

Vitamin E Requirements EAR		
Gender	**Age**	**Mg per day**
Male	19-70	12
Female	19-70	12
Female (pregnant)	19-50	12
Female (lactating)	51-70	16

2.5.2.4 Vitamin K

Vitamin K is needed for blood clotting and helps with wound healing. Sources of vitamin K are, cereals, vegetable oils, green leafy vegetables such as spinach and broccoli (Brown 2011).

The DRIs for vitamin K as listed in the DRI intakes of the nutrition information from the IoM (2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.11: DRIs Vitamin K (IoM 2004);(NICUS 2003a)

Vitamin K Requirements AI		
Gender	**Age**	**µg per day**
Male	19-70	120
Female	19-70	90
Female(pregnant and lactating)	19-50	90

2.5.3 Water Soluble Vitamins

2.5.3.1 Vitamin B1 (Thiamin)

Thiamin has several important functions such as slow releasing energy, and a healthy nervous system (NHS 2012a). Food sources of thiamin are fortified breakfast cereals, wholegrain bread, eggs, peas, fresh and dried fruit as well as vegetables (NHS 2012a).

The DRIs for vitamin B1 as listed in the DRI intakes of the nutrition information from the IoM (2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.12: DRIs Vitamin B1 (IoM 2004);(NICUS 2003a)

Vitamin B1 Requirements EAR		
Gender	**Age**	**mg per day**
Male	19-70	1.0
Female	19-70	0.9
Female (pregnant/lactating)	19-50	1.2

2.5.3.2 Vitamin B2 (Riboflavin)

The functions of riboflavin is to keep the nervous system, eyes and skin healthy, and assist with energy release from carbohydrates. Food sources are rice, eggs, milk and fortified breakfast cereals (NHS 2012a).

The DRIs for vitamin B2 as listed in the DRI intakes of the nutrition information from the IoM (2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.13: DRIs Vitamin B2 (IoM 2004);(NICUS 2003a)

Vitamin B2 Requirements EAR		
Gender	**Age**	**mg per day**
Male	19-70	1.1
Female	19-70	0.9
Female (pregnant)	19-50	1.2
Female (lactating)	51-70	1.3

2.5.3.3 Vitamin B3 (Niacin)

Niacin is important for a healthy digestive and nervous systems and energy release from food. Sources are maize flour, wheat flour, fish, meat, eggs and milk (NHS 2012a).

The DRIs for vitamin B3 as listed in the DRI intakes of the IoM (2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.14: DRIs Vitamin B3 (IoM 2004);(NICUS 2003a)

Vitamin B3 Requirements EAR		
Gender	**Age**	**mg NE/per day**
Male	19-70	12
Female	19-70	11
Female(pregnant)	19-50	14
Female(lactating)	51-70	13

2.5.3.4 Vitamin B6 (Pyridoxine)

Vitamin B6 is important for haemoglobin and allows the body to store and use energy from carbohydrates and proteins that are present in the food. Food sources are fortified breakfast

cereals, bread, pork, eggs, milk, soya beans, vegetables, potatoes, peanuts, whole cereals, fish and poultry (NHS 2012a).

The DRIs for vitamin B6 as listed in the DRI intakes of the nutrition information from the IoM (2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.15: DRIs Vitamin B6 (IoM 2004);(NICUS 2003a)

Vitamin B6 Requirements EAR		
Gender	**Age**	**mg per day**
Male	19-50	1.1
Male	51-70	1.4
Female	19-50	1.1
Female	51-70	1.3
Female(pregnant)	19-50	1.6
Female (lactating)	51-70	1.7

2.5.3.5 Folic acid

Folic acid together with vitamin B12 is important for healthy red blood cells. Sources are, asparagus, spinach, liver, brussel sprouts, broccoli, peas, chick peas, brown rice and fortified cereals (NHS 2012f).

The DRIs for folic acid as listed in the DRI intakes of the nutrition information from the IoM (2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.16: DRIs Folic Acid (IoM 2004);(NICUS 2003a)

Folic Acid Requirements EAR		
Gender	**Age**	**µg dietary FE per day**
Male	19-70	320
Female	19-70	320
Female (pregnant)	19-50	520
Female (lactating)	51-70	450

2.5.3.6 Vitamin B12 (Cobalamin)

Vitamin B12 is important for the formation of red blood cells and keeping the nervous system healthy. Food sources are eggs, cheese, milk, cod, meat, salmon and fortified breakfast cereals (NHS 2012a).

The DRIs for vitamin B12 as listed in the DRI intakes of the nutrition information from the IoM (2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.17: DRIs Vitamin B12 (IoM 2004);(NICUS 2003a)

Vitamin B12 Requirements EAR		
Gender	Age	**µg per day**
Male	19-50	2.0
Male	51-70	2.0
Female	19-50	2.0
Female	51-70	2.0
Female (pregnant)	19-50	2.2
Female (lactating)	19-50	2.4

2.5.3.7 Pantothenic Acid

Pantothenic acid is important for energy release from the food that we eat. Food sources are whole grains, broccoli, kidney, eggs, porridge, potatoes, beef and chicken (NHS 2012f). Breakfast cereals are also a good source if they have been fortified with pantothenic acid (NHS 2012f).

The DRIs for pantothenic acid as listed in the DRI intakes of the nutrition information from the IoM (2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.18: DRIs Pantothenic Acid (IoM 2004);(NICUS 2003a)

Pantothenic Acid Requirements AI		
Gender	**Age**	**mg per day**
Male	19-70	5.0
Female	19-70	5.0
Female(Pregnant)	19-50	6.0
Female(lactating)	19-50	7.0

2.5.3.8 Biotin

Biotin is an important coenzyme in many essential metabolic enzymes. Sources are egg yolks, liver, corn and intestinal bacteria (NHS 2012f).

The DRIs for biotin as listed in the DRI intakes of the nutrition information from the IoM (2004) and NICUS (2003) for adults, are listed in the table below:-

Table 2.19: DRIs Biotin (IoM 2004);(NICUS 2003a)

Biotin Requirements AÏ		
Gender	**Age**	**µg per day**
Male	19-70	30
Female	19-70	30
Female (pregnant)	19-50	30
Female (lactating)	51-70	35

2.5.3.9 Vitamin C (Ascorbic acid)

Vitamin C is important for healing of wounds, healthy connective tissue and healthy protection of cells. Sources are brussel sprouts, potatoes, broccoli, blackcurrants, strawberries, red and green peppers, oranges and orange juice (NHS 2012j).

The DRIs for vitamin C as listed in the DRI intakes of the nutrition information from the IoM (2004) and NICUS (2003) for adults, are listed in the table below:-

Table 2.20: DRIs Vitamin C (IoM 2004);(NICUS 2003a)

Vitamin C Requirements EAR		
Gender	**Age**	**mg per day**
Male	19-70	75
Female	19-70	60
Female (pregnant)	19-50	70
Female (lactating)	51-70	100

2.5.4 Minerals

2.5.4.1 Calcium

The main sources of calcium are dairy products which include milk and milk products, cream, yoghurt, margarine, butter (NHS 2012m). Calcium is needed by adults for strong bones and teeth. Calcium however is also important for skeletal bone preservation in adults to prevent osteoporosis later in life.

The DRIs for calcium as listed in the DRI intakes of the nutrition information from the IoM (2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.21: DRIs Calcium (IoM 2004);(NICUS 2003a)

Calcium Requirements AI			
Gender	**Age**	**AI**	**mg/day**
Male	19-50	1000	2500
Male	50-70	1200	2500
Female	19-50	1000	2500
Female	51-70	1200	2500
Female(pregnant and lactating)	19-50	1000 1000 (lactating)	2500

2.5.4.2 Phosphorus

Phosphorus is a mineral that helps build strong bones and teeth and helps release energy from food. Sources are oats, rice, bread, poultry, fish, dairy products and red meat (NHS 2012g).

The DRIs for phosphorus as listed in the DRI intakes of the nutrition information from the IoM (2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.22: DRIs Phosphorus (IoM 2004);(NICUS 2003a)

Phosphorus Requirements EAR		
Gender	**Age**	**mg/day**
Male	19-70	580
Female	19-50	580
Female(pregnant and lactating)	19-50	580

2.5.4.3 Magnesium

Magnesium is important for energy release of food, and production of hormones. Sources are dairy, fish, meat, bread, brown rice, nuts and green, leafy vegetables such as spinach (NHS 2012e).

The DRIs for magnesium as listed in the DRI intakes of the nutrition information from the IoM (2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.23: DRIs Magnesium (IoM 2004);(NICUS 2003a)

Magnesium Requirements EAR		
Gender	**Age**	**mg/day**
Male	19-30	330
Male	31-70	350
Female	19-30	255
Female	31-70	265
Female (pregnant)	19-30	290[d]
Female (pregnant)	31-50	300
Female (lactating)	19-30	255
Female (lactating)	31-50	265

2.5.5 Trace Elements

2.5.5.1 Iron

Iron helps make red blood cells which are responsible for carrying oxygen around the body. Sources are most dark green leafy vegetables, soybean flour, fortified breakfast cereals, brown rice, dried apricots, nuts, beans, meat and liver (NHS 2012d).

The DRIs for iron as listed in the DRI intakes of the nutrition information from the IoM(2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.24: DRIs Iron (IoM 2004);(NICUS 2003a)

Iron Requirements EAR		
Gender	**Age**	**mg/day**
Male	19-70	6.0
Female	19-50	8.1
Female	51-70	5.0
Female(Pregnant)	19-50	22
Female(lactating)	19-50	6.5

2.5.5.2 Zinc

Zinc is important for making new cells and enzymes. It helps the body to process protein, fat and carbohydrate in food and assists in healing of wounds. Sources are: wheat germ, bread, cheese, milk, shellfish and meal (NHS 2012n).

The DRIs for zinc as listed in the DRI intakes of the nutrition information from the IoM (2004) and NICUS (2003) for adults, are listed in the table below:-

Table 2.25: DRIs Zinc (IoM 2004);(NICUS 2003a)

Zinc Requirements EAR		
Gender	**Age**	**mg/day**
Male	19-70	9.4
Female	19-70	6.8
Female(pregnant)	19-50	9.5
Female(lactating)	19-50	10.4

2.5.5.3 Iodine

Iodine is important for the functioning of the thyroid gland. Sources are shellfish, sea fish (NHS 2012c).

The DRIs for iodine as listed in the DRI intakes of the nutrition information from the IoM (2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.26: DRIs Iodine (IoM 2004);(NICUS 2003a)

Iodine Requirements EAR		
Gender	**Age**	**µg/day**
Male	19-70	95

Female	19-70	95
Female (pregnant)	19-50	160
Female (lactating)	19-50	209

2.5.5.4 Selenium

The importance of selenium, a trace element is that it is important for the body's immune system and reproduction. Sources are eggs, meat, fish and Brazil nuts (NHS 2012f).

The DRIs for selenium as listed in the DRI intakes of the nutrition information from the IoM (2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.27: DRIs Selenium (IoM 2004);(NICUS 2003a)

Selenium Requirements EAR		
Gender	**Age**	**µg/day**
Male and Female	19-70	45
Female (pregnant)	19-50	49
Female (lactating)	19-50	59

2.5.5.5 Chromium

In small amounts chromium is important for the digestion of food. Important sources are spices, potatoes, broccoli, lentils, wholemeal bread, whole oats and meat (NHS 2012b).

The DRIs for chromium as listed in the DRI intakes of the nutrition information from the IoM (2004) and NICUS (2003) for adults are listed in the table below:-

Table 2.28: DRIs chromium (IoM 2004);(NICUS 2003a)

Chromium Requirements AI		
Gender	**Age**	**µg/day**
Male	19-50	35
Male	51-60	30
Female	19-50	25
Female	51-70	20
Female(pregnancy)	19-50	30
Female(lactating)	19-50	45

2.6 FACTORS AFFECTING NUTRIENT INTAKE AND NUTRITIONAL STATUS OF ADULTS

2.6.1 Smoking/Alcohol

World over, the largest public threat killing six million people a year is tobacco. It is estimated that one person dies every six seconds due to tobacco, which accounts for one in ten adult deaths. Fifty percent of current users of tobacco will die of tobacco related diseases. In South Africa however, due to strict legislation tobacco control was implemented to curb obesity and physical inactivity (WHO 2014).

However, even with strict control the Heart and Stroke Foundation (Seedat 2014) of South Africa found that smoking was responsible for more than half of all deaths before the age of sixty. The lifespan of most smokers is shortened by 13-14 years. If individual's could refrain from smoking, there will be almost a 60% reduction in lung cancer deaths, almost 40% reduction in Chronic Obstructive Pulmonary Disease (COPD) deaths, one fifth reduction in TB deaths and 23% reduction in vascular deaths (Yussuf 2005).

Alcohol abuse is among the top causes of mortality and disability in South Africa after sexually transmitted diseases (Matzopoulos 2013).

Infectious diseases are also caused by alcohol abuse. In South Africa, alcohol is one of highest abused substance disorders. Abuse of alcohol lends itself to addiction, crime and violence. South Africans consume billions of litres of alcohol per year. Compared to other countries South Africans consume more alcohol per person per annum (WHO 2011).

2.6.2 Physical activity

WHO (2014) defines physical activity as any kinetic movement that requires energy. This includes, household chores such as sweeping etc., playing, travelling, and recreational pursuits.

The term "physical activity" should not be mixed with "exercise", as exercise is more structured, planned and repetitive and is aimed at physical fitness. The WHO recommends for adults, at least one hundred and fifty minutes of moderate to intense physical activity per week. Moderate and intense exercise brings numerous health benefits. The World Health Organisation states that non-communicable diseases such as diabetes, breast and colon cancers and ischaemic heart disease are caused by physical inactivity. Benefits of regular physical activity are improved bone and functional health (WHO 2014).

Studies have shown that regular exercise can prevent diseases such as colon cancer, coronary heart disease (CHD), diabetes, obesity (NICUS 2003a).

Overweight and obesity in South Africa is one of high prevalence and increasing daily due to a lifestyle behaviour that is destructive. Obesity and overweight, is the result of energy consumption that outweighs output and expenditure, in other words, too much food is eaten and there is a low physical activity levels (Botha *et al.* 2013).

2.6.3 Urbanisation

Urbanisation is the migration of people from rural areas into city areas in search for employment and better living conditions. Urbanisation presents a change in diet from traditional diets that are high in starch and fruit and vegetables, to an intake that is high in meat, salt, cholesterol and sugar but low in fibre (Vorster, Badham and Venter 2013). This increases the emergence of cardiovascular disease and hypertension and other NCD's among the new urban dwellers. Also in rural areas people walk for long distances as compared to people residing in urban areas, transport becomes readily available so people tend to do less aerobic exercise. In a study done in South Africa by Steyn, it was found that people who spent a long time in urban areas, rates of hypertension, diabetes, and tobacco use were significantly higher (Steyn 2005a).

In a study done with Kenyan Luo migrants, it was found that migrants who had low blood pressure in the rural area had an increase in blood pressure within six to twelve months (Steyn 2005a).

2.6.4 Diet

Apart from diet changes through urbanisation, the diet of South Africans over the past thirty years has changed considerably. Snack bars, noodles and ready-meals use has increased by 40% between 2005 and 2010. There has also been an increased consumption of Coca Cola products from 130 per person each year in 1992, to 254 per person each year in 2010 (Battersby 2013).

Steyn (2005a) states that since South Africa's first democratic elections in 1994, there has been greater variety of food that is available to South Africans, both in supermarkets with raw ingredients to variety in menu items due to an increased exposure to international communities.

The WHO/FAO recommends that trends in South Africa such as a low fruit and vegetable intake, high alcohol intake, low calcium intake, high-energy, low-fibre consumption and a

high fat diet are not desirable. This is due to the fact these are important risk factors for non-communicable diseases (WHO 2003).

2.6.5 Globalisation

Globalisation as defined as the "the flow of information, goods, capital and people across political and economic boundaries" (Tullao 2002).

The emerging risk factor of cardiovascular disease in South Africa has been influenced by globalisation and the media. Globalisation has influenced nutrition intake among South Africans. For example, advertisements from the soft drink company Coca Cola and fast foods such as McDonald's have caused diet changes among Africans from healthy to not so healthy. Imports from international countries that provide South Africans with cheaper food options puts local farmers, who grow staple foods that are more expensive, out of work since most people look for cheaper options as opposed to what's healthier (Steyn 2005a).

2.6.6 Socio-economic Factors

Non-communicable diseases are commonly associated with poverty. Socially disadvantaged and vulnerable people become sick and have a higher mortality rate than people in higher social classes. This is due to the exposure to unwholesome food, tobacco and partial access to health care. However, high income groups are also at risk for NCD's but have access to health services and can afford products and services to protect from these risks (WHO 2015).

Economics, demographics, well-being and development are important in the consumption of nutrients and the diet and ultimately the risk of NCD's among South Africans (Bradshaw *et al.* 2005).

2.6.7 Metabolic/physiological risk factors

The National Institute of Health defines metabolic syndrome as factors that affect or increase the incidence of coronary heart disease, diabetes and stroke, smoking, obesity and a lack of exercise. In the bodies normal functioning there are biochemical processes that take place (metabolic) and risk factors are habits and traits that increase the risk of developing disease (Molleutze and Levitt 2005).

2.6.8 Socio-cultural factors

In South Africa, the different cultures have different views on body image. Within the black South African community an overweight body type is seen as a positive attribute and being

well while thin gives the impression of disease. This is seen as being beautiful, healthy, happy and not being HIV positive. However within the white community the ideal body size among adolescent girls were smaller than that of mixed race and black girls (Goedecke, Jennings and Lambert 2005).

2.6.9 Food Security and Socioeconomic status

The 2012 South African National Health and Nutrition Examination Survey (SANHANES) indicated that non-communicable diseases that are related to diet are prevalent in South Africans (Shisana *et al.* 2013).

In 2013 research done by the Battersby (2013), showed that 45.6% households were food secure but these numbers dropped to 31.5% in urban areas and 30.2% in rural areas (Battersby 2013). Low dietary diversity, high sugar and fat intakes, low fruit and vegetable intake were noted during this time. Urban geography influences food security in South Africa and increases economic opportunities. The more money people earn, the greater the variety and quality in the diet. Foods that are less time consuming are used such as processed food items (Battersby 2013).

2.6.10 Education

Overweight and obesity is related to one's level of education. The national South African Demographic Health Survey (SADHS) found that the way women saw themselves in terms of body weight correlated with the level of education (DOH 2004).

Higher BMI among black African women was also associated with a low education status (Goedecke, Jennings and Lambert 2005).

Education and income are related since the better educated the individuals, the lower the body weight, since they are better educated about health and the risks of being obese. People that were better educated were more equipped to understand nutrition and healthy eating (Trail 2006).

A study done by Oldewage-Theron and Egal (2013) identified a gap in the health of South African educators with nutrition knowledge and behaviour. It was found that the amount of nutrition knowledge of educators could impact on the delivery of nutrition and health messages to learners in schools.

2.6.11 Parity

Parity is described by the CDC in the USA as a number of times a woman has been pregnant for 20 weeks or more. Parity is shown to have a relation to long term health status among women (Goedecke, Jennings and Lambert 2005).

Weng *et al.* (2004) suggested that parity was closely associated with obesity. In a retirement study, there was a 7% increase in risk of overweight in American women that was recorded for each additional child while a 4% increase in obesity risk were recorded in men.

A study done by Stockholm pregnancy and weight development found that body weight that was acquired during pregnancy becomes a predictor for sustained weight gain after twelve months of child birth (Gunderson, Abrams and Selvin 2000).

Increased lifestyle such as changes in meal plans, diet and exercise were reported in women who retained weight following the birth of a child (Goedecke, Jennings and Lambert 2005).

2.7 FACTORS AFFECTING NUTRIENT INTAKE

Meat, milk, grains, nuts, vegetables and fruits were the only foods available for consumption many years ago. Today, food companies offer thousands of packaged and prepared foods, many of which are mixtures of these basic ingredients and often include artificial ingredients as well. The variety of foods now available can make it more difficult, rather than easier, to plan a nutritious diet (Brown 2011).

Brown (2011) states that people choose food and beverage based on how the food looks and tastes, health, culture, religion, psychological needs, social needs and budget. When people choose a particular food, it is evaluated by smell, looks, sound and taste. Sensory criteria is more important to most consumers than other criteria when it comes to what a person chooses to eat or drink.

2.7.1 Stress Factors

Stressful work can trigger individuals to choose foods that are high in fat and sugar, it also encourages eating at the desk or workstations and skipping of meals. Below is a list of stress related situations at the workplace identified by the Discovery Healthy Company Index Survey done in 2012. As listed in figure 2.5 below, employees have a lot of stress to deal with at the workplace, which lends itself to unhealthy food choices, to deal with these stressful situations (European Food Information Council (EUFIC 2005).

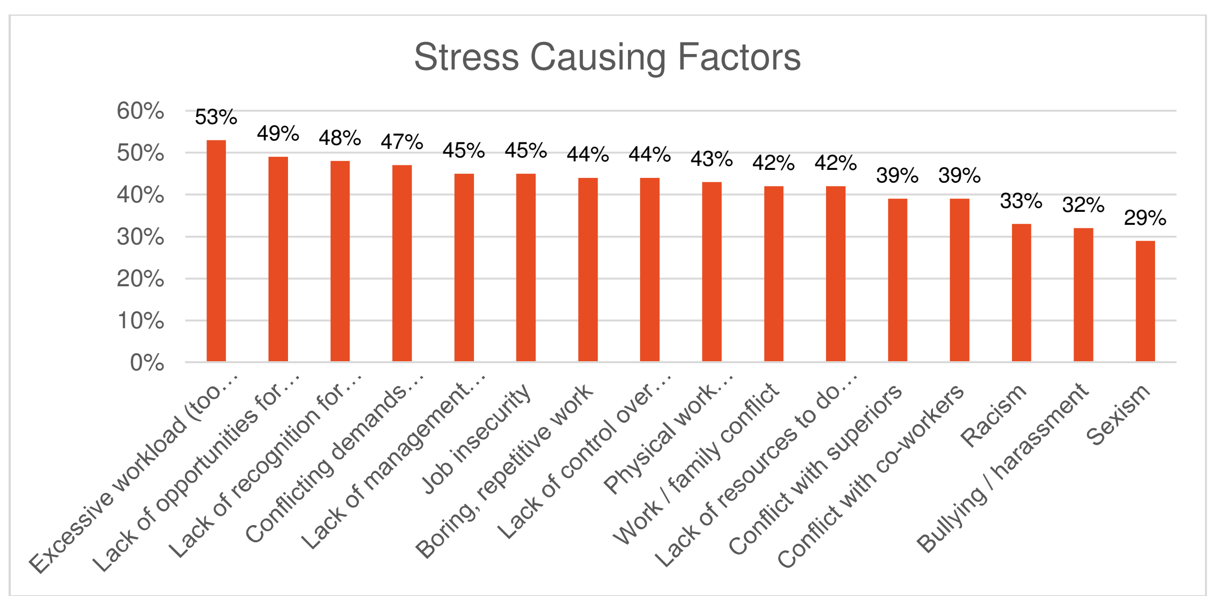


Figure 2.5: Stressful situations experienced at the Workplace in South Africa-Discovery (Nossel 2012) Healthy Company Index (2012) ranked from most stressful to least stressful.

Weight gain can be associated with high levels of stress (Overgaard *et al.* 2004). Research done in South Africa found that urbanisation and associated stress has led to the increased incidence of non-communicable diseases (Overgaard *et al.* 2004).

2.7.2 Psychosocial Factors

Eating habits are very much influenced by the behaviours of others, it can influence the amount consumed as well as the type of food eaten. People tend to have a similar diet to those in their social network. Eating with others is part of a social event. Eating with others gives a sense of belonging and may encourage pressure in eating and drinking outside of one's normal dietary behaviour or intake. It can also encourage eating foods with extra calories which could lead to weight gain (EUFIC 2005; Brown 2011).

Refined foods are made with white flour, sugar, salt and fat. Some research has found that these foods are hard to resist. The brain does not recognise the reward system that is linked to calorie intake, so this can cause an individual to eat even when one is not hungry. Also eating foods high in sugar and fat changes the brains thinking and can promote over-eating. With numerous food choices to make every day, it is difficult to resist temptations of food during the day. Some people find certain foods rewarding and therefore find themselves vulnerable to certain foods. This is also not constant, the same individuals can be more vulnerable at some times than others. Blood glucose levels of individuals also fluctuate during the day, when blood glucose levels are low, some people make impulsive food choices, even though one knows that certain foods are unhealthy for you (EUFIC 2005).

Brown (2011) states that social and psychological factors strongly influence food habits. For most people, the thought of knowing that food is available provides a sense of being secure. Social conscience and peer pressure also influence food choices (Brown 2011).

Psychological needs intertwine with social factors when foods are used more for a display of hospitality or status rather than for just nourishment. Caviar is just fish eggs to some people, but is esteemed by many others as a delicacy (Brown 2011).

2.7.3 Environmental Factors

The food environment has changed dramatically over time. There is more variety available, increased portions sizes and less healthy is more and more readily available. At present foods that are available to employees at the workplace, tuck-shops, cafeterias and take-away are foods that are to be limited (EUFIC 2005).

2.7.3.1 Advertisements

Trail (2006) states that the greater the nutritional knowledge the more informed food choices one makes. Most advertisements are based on food products such as soft drinks, confectionery, fast foods, pre-sugared breakfast cereals and savoury snacks. Most of these are unhealthy and offer little nutrients.

In South Africa, advertisements that are on every day for so many times a day at specific times of the day or during certain events may influence beverage and food choice (Vorster, Badham and Venter 2013).

In a food and advertisement experiment among Yale University students, it was found that more snacks and food was eaten during the advertisement breaks that were not products that were being marketed during that time (Harris, Bargh and Brownell 2009).

2.7.3.2 Fast foods

Fast food is usually eaten in an informal building. Delivery of foods is very fast from point of ordering and many fast food operations are franchises and commonly have a specialty such as burgers, pizzas, fried chicken and a fixed menu. This has influenced the diet of many South Africans, these foods are high in saturated fat and salt, sugar and are processed. These products are energy dense and have little or no fibre or nutrition (Steyn, Labadarios and Nel 2012).

In a study done among Saudi girls in Riyadh ages 19-29 it was found that 95.4% consume fast foods and 79.1% consume fast foods on a weekly basis. The main kind of fast foods consumed were burgers and soft drinks (ALFaris *et al.* 2015).

Similarly, in a study done on estimations of calorie intake in the USA among adults in various restaurants and fast food outlets, it was found that two-thirds of consumers thought that the meal that was being eaten consisted of fewer calories (Block *et al.* 2013).

2.7.4 Food Cost

Cost is a very important limiting factor in food purchase and ultimately, one's diet. Cost helps determine the types of foods and brands that are bought and how often an individual is able to visit a restaurant, for example- A shortage of time for food preparation or eating out can result in a higher use of convenience foods and "fast foods", even though they are more expensive and far less nutritious (EUFIC 2005).

2.7.5 Food Labels

Vorster, Badham and Venter (2013) states that labels on food packaging may be standardised, quality controlled and provide useful information, but unfortunately this is not understood by many consumers. Food labels can guide consumers on ingredients and choices and consuming the correct portion sizes.

However fresh food that is prepared may not provide the consumer with nutrition information. Many South African consumers have little or no understanding of how these foods contribute nutritionally to a healthy or unhealthy diet (Vorster, Badham and Venter 2013).

2.8 THE ECONOMIC IMPACT OF NCDS AND MALNUTRITION ON SOUTH AFRICA'S WORKPLACE, HEALTH SYSTEM AND ECONOMY.

South Africa is a diverse country with regards to income ranging from middle and high income areas, rural farms and rural areas and deprived per-urban areas. Change in political, social and economic factors has resulted in urbanisation and a change in health behaviour and diet (Steyn *et al.* 2005).

In areas where there are low income earners, costs of dealing with diseases causes further poverty. The increasing costs of NCDs, expensive treatments that are over a long period of time and loss of income earners, are also increasing the number of people who are poverty stricken which hampers development (WHO 2015).

Alcohol, is the most widely used harmful drug in South Africa (Norman, Bradshaw and Schneider 2000). It is estimated that the cost of alcohol to the national and provincial health departments is at R6 billion per annum with regards to health sub programmes such as emergency transport, coroner services, hospitals, tuberculosis and forensic services. It was also estimated that R17 billion was allocated by national and provincial government for expenditures relating to addressing alcohol-related harms (Matzopoulos 2013).

Medications for diabetes are often found to be the largest component of expenditure. Spending on medications represented from 32%-62% of total money spent on diabetes care in various countries around the world (STATSA 2011)

There are many reasons for people being absent from work. In genuine cases where an individual is off sick, the workplace itself may be implicated in absenteeism (Adcorp Employment Index (AEI 2012).

Sick leave absence, has been on the increase in South Africa over the past decade. In 2011 research showed that 3.4% of workers were off sick at any time. It was noted that 3.4 million workers were absent from work due to sickness during the year, an increase from 0.7 million that was recorded in 2010, an increase of 3.97%. The study also revealed that between 2009 and 2011 had used up the maximum sick leave days. With 25% of the South African workforce taking their full allowance of sick leave, economists state that absenteeism is a major problem with regards to productivity (AEI 2012).

The Center for Democratic Development (CDD) in Ghana found that 47% of teachers were absent at least once a week Els and Marx (2014) states that medical schemes contribution rates are constantly rising. The 2012-2013 Annual report of the Council for Medical schemes reveals that employees must expect an average of 10% increase in medical scheme contributions each year. This means that employees are getting less medical benefits as medical aid contributions that are constantly rising and unaffordable. For most employers absenteeism, increase in healthcare costs, NCD's, disability and labour unrests is becoming difficult to manage (Els and Marx 2014).

Basic education Minister Angie Motshekga stated that South African teachers were absent over seven million days collectively for the previous year. The 2011 study showed that teachers in the North West taught only 52 of the 140 daily lessons scheduled for the year (40%) compared with 78 percent in Botswana (Spaull 2012). The issue of absenteeism was found to be mostly around government workers who were absent due to health, where just over thirty percent of workers are absent during a year, compared to almost ten percent in the private sector (AEI 2012).

2.9 METHODS TO ASSESS THE NUTRITIONAL STATUS OF ADULTS

2.9.1 24- hour Recall

A 24-hour recall questionnaire is used to capture food intake for the past 24 hours, the participant is requested to recall and stipulate all the foods and beverages consumed in that time. This information is gathered by an interview process.

One 24-hour recall does not represent the usual diet of an individual but can be used for creating estimate mean intakes. However more than one 24-hour recall can be used to access an individual's typical diet (Rankin 2008; Coulston, Boushey and Ferruzzi 2013).

Advantages of 24-hour recalls are low respondent burden, food-intake patterns are not altered, one does not have to be literate, and the interview process is quick. Disadvantages of 24-hour recalls is that one 24-hour recall cannot represent an individual's habitual intake, this method relies on the interviewee's ability to correctly remember what was consumed, recall bias is possible where the interviewee might have selective recall of food items (Coulston, Boushey and Ferruzzi 2013).

2.9.2 Food frequency questionnaire

With the food frequency questionnaire participants are given a list of foods to select ones that were eaten over a certain period of time. Information is collected on the amount of times the food item is consumed. It however does not look at the preparation method or how much of each food item was consumed (WFP 2008).

Many FFQs also incorporate portion size questions or specify portion sizes as part of each question. Overall nutrient intake estimates are derived by summarizing of all foods, the products of the reported frequency of each food by the amount of nutrient in a specified (or assumed) serving of that food to produce an estimated daily intake of nutrients, dietary constituents, and food groups (FAO 2004).

2.9.3 Health questionnaire

Health questionnaires are important for detecting nutrient intake as well as suspected infections, family history of disease, smoking and drinking patterns, level of physical activity, and the number of deaths in the past year, this information can be used to plan health interventions (Kruger, Puone and Senekal 2005).

2.9.4 Anthropometric Measurements

Cheserek *et al*. (2012) states that anthropometric studies can help identify nutritional problems such as undernutrition and over-nutrition. Anthropometric indicators can define the extent of the problems and can be targeted by appropriate interventions.

2.9.5 BMI (Body Mass Index)

BMI refers to a person's weight in relation to height. BMI is calculated by taking the person's weight and dividing it by the height in square metres (CDC 2014b). The WHO, concluded that the cut-off points of BMI should be retained as international classifications, but also suggested that a BMI $\geq 23 kg/m^2$ could be used as a public-health action point. This is important for determining overweight and obesity (CDC 2014b). The recommended WHO cut-off points are discussed in chapter 3.

For most people weight does not remain the same depending on circumstances and diet. When investigating the health of an individual, looking at the amount of weight gained or lost is helpful as the height of an adult is not likely to change. In studies that are controlled where the same participants are followed and height would not be changing, weight can be used for screening and evaluation purposes. More than one measurement is needed for evaluating changes (Oldewage-Theron and Kruger 2008b; Coghill 2003).

2.9.6 Blood pressure

Blood pressure can be described as a force that sends the blood against the walls of the arteries in the body. Blood pressure is made up of systolic and diastolic measurements. Diastolic pressure occurs when the heart rests between beats and is the lower reading while systolic pressure occurs when the heart muscle contracts and sends blood through the body. To do this a higher pressure is needed. This is why the systolic blood pressure reading is the higher figure (Steyn 2005b). Hence blood pressure is recorded systolic/diastolic (SBP/DBP) (Seedat 2014). Blood pressure is taken when there is a rest between beats (Steyn 2005b).

One quarter of South African adults suffer from hypertension. Having high blood pressure can cause heart attacks, strokes, failing of the kidneys and eventually death. Therefore it is important blood pressure is checked regularly (Heart and Stroke Foundation (HSF) 2013). Blood pressure measurements and categories are discussed in chapter 3.

2.10 STRATEGIES FOR THE TREATMENT AND PREVENTION OF MALNUTRITION AND NON-COMMUNICABLE DISEASES IN SOUTH AFRICA

2.10.1 Strategies to reduce Malnutrition, Obesity and Anaemia (Steyn *et al.* 2005)

Table 2.29: Strategies to reduce Malnutrition, Obesity and Anaemia

Strategies to Reduce the double burden of malnutrition	Strategies to reduce obesity	Strategies to improve iron-deficiency Anaemia
Improve nutrition knowledge.	Improve nutrition education.	Eat more fruit and vegetables.
Promote healthy snacks at the workplace and a home-made packed lunch.	Promote healthier snacks at the workplace as well as a home-made packed lunch.	Improve nutritional status of woman of childbearing age.
Decrease the consumption of fizzy drinks.	Fruit and vegetables should be promoted at the workplace.	Promote the use of fortified foods.
Increase water consumption.	Healthier options should be provided with regards to fast foods. Fast food outlets should provide food that are less energy dense and have a low Trans fatty acids.	Promote a variety in the diet.
Promote a variety of animal source protein in the diet.	Reduce the amount of fizzy drinks in the diet.	Promote breastfeeding for the first six months.
The consumption of red meat should be reduced for overweight and obesity	Increase the amount of water consumed in the diet.	
Fruit and vegetables should be made available at the workplace.	Low fat dairy product consumption should be encouraged.	
	Promote dietary diversity of animal source protein and the consumption of red meat should be reduced.	

As seen in the table 2.29, strategies for the treatment of malnutrition and NCD's such as obesity and malnutrition are similar and can be implemented.

Steyn (2005d) emphasises that nutrition and related chronic diseases in South Africa is still a neglected topic and needs to be addressed at many levels. Although the Department of Health (DOH) focuses mainly on undernutrition in South Africa, the Department of Health has set goals for nutrient related NCD's such as type 2 diabetes, obesity, ischaemic heart disease and hypertension. The current prevalence of overweight is between 19-26% for males and females, while obesity occurs in between 9-30% male and females in South Africa (DOH 2013).

Well thought-out interventions that are low cost for use for every individual is required. Workplace interventions can have a positive impact on NCD risk factors (Cahill, Moher and Lancaster 2008; Burton 2010).

Non-communicable diseases is a pressing issue for South Africans and workplace interventions can have an impact on both the individual as well as those around them that can affect lifestyle behaviours.

2.10.2 The Health care system in South Africa

An effective CDL health-care programme is made up of two areas and targets two different groups within a society. The first area is to prevent the onset of CDL risk factors. The target is to prevent communities from adopting a lifestyle that is unhealthy (Steyn 2005d).

Table 2.30: Prevention, Diagnosis and Management of Non communicable diseases, adapted from the Lifetime perspective on the development and management of Non Communicable Diseases (Steyn 2005a).

Primordial prevention	**Primary prevention, early diagnosis, cost-effective management**	**Primary prevention, early diagnosis, cost-effective management**
Target group whole population	Target group high-risk patients	Target group high-risk patients
Unhealthy lifestyle	CDL Risk factors	CDL morbidity and end organ damage
• The foods consumed • Being addicted to tobacco • Not enough aerobic exercise	• Obesity • Hypertension • Tobacco addiction • Diabetes • Hyperlipidaemia	• Cardiovascular disease • Renal disease • Eye disease • Respiratory disease

The second area is to identify people within society that are at risk for developing CDL with the aim of treatment and prevention of risk factors that is cost-effective. This will help to prevent strokes, heart attacks, and renal impairment and helps prevent damage to organs in the body (Steyn 2005d).

2.10.3 Fortification of food

Food fortification is an intervention to provide vitamins and minerals in the diet in an attempt to curb deficiencies (Food Fortification Initiative (FFI) 2014). During processing and preparation of food such as rice and wheat, some vitamins and minerals are lost (Brown 2011).

Besides fortification of maize and wheat flour, other product such as cooking oil, sugar, salt and other staple foods are fortified. Fortification is important for countries such as South Africa in aiming to address mineral and vitamin deficiencies in the country (FFI 2014).

2.10.4 Supplementation

Supplementation can provide one or more nutrient to vulnerable individuals or groups. The results are quick and it is a known strategy to address certain deficiencies such as folate in pregnant and lactating women and young children and Vitamin A. Supplements however, are costly and are there are no sustainable programmes for addressing malnutrition fortifying Africa's future (FFI 2014).

The World Health Organisation's strategies to prevent and control NCD's are for countries to implement anti-tobacco measures, to promote diet, physical activity and health in a bid for communities to reduce disease and deaths, and to reduce the harmful effects of alcohol (WHO 2011).

2.10.5 Government Initiatives

The South African Declaration for Prevention and Control of Non-communicable diseases (DOH 2013) in its strategic plan for the prevention and control of NCDs has committed to goals and targets by the end of 2020. Listed below are the 2020 goals and targets for South Africa:

1. Reduce the incidence of dying prematurely by one quarter;
2. Tobacco use can be lessened by one fifth;
3. Alcohol consumption to be lessened by one fifth;
4. The intake of sodium to be lessened to less than 5g;
5. To lessen the number of people who are obese and overweight by ten percent;
6. To lessen the number of people suffering from hypertension;
7. To improve the amount of exercise
8. Screening of all women that have sexually transmitted diseases for cervical cancer
9. To increase the control of the number of individuals with hypertension, asthma and diabetes by one third.
10. To increase the diagnosis of people with mental disorders.

2.11 WORKPLACE WELLNESS

Workplace wellness is described as improving the employees life together with psychological strengths in a proactive and positive way (Witmer and Sweeney 1992).

A major concern for South Africa is that obesity is an important risk factor for developing hypertension, diabetes and cardiovascular disease. Within the African continent South Africa is the industrial hub with large business practices. The workplace can be used to target this burden (Steyn and Damasceno 2006). The term 'health promotion in the workplace' addresses people's health and how it is influenced (CDC 2013). The main function of a nutritional educational support material, is to reduce NCD's and increase the well-being and health of South Africans. This can be done by good portion control, eating a balanced diet, maintaining a healthy body weight, improving nutritional knowledge and making use of the South African Based Dietary guidelines to ensure correct food choices.

2.12 COMPONENTS/ELEMENTS OF EFFECTIVE /SUCCESSFUL WELLNESS PROGRAMMES

Nutrition interventions in the workplace: Evidence of best practice studies showed that best practice outcomes had one or more of the elements indicated in table 2.32 in a workplace intervention programme (Steyn *et al.* 2009). According to the World Health Organisation successful workplace wellness programmes or workplace health programmes (Quintiliani 2008) have all the elements below.

Table 2.31: Components/Elements of Effective / Successful Wellness Programmes

COMPONENTS OF AN EFFECTIVE WELLNESS PROGRAMMES (Quintiliani 2008)	**ELEMENTS OF SUCCESSFUL WELLNESS PROGRAMMES (Steyn *et al.* 2009)**
• Clear objectives and goals linking programmes to the objectives of the business. • Communication that is effective. • Support from management. • Using the employees on all levels from development of the programme to implementation of the programme. • Changing the programme to what is socially acceptable and giving social support (tailor-made programmes). • Offering incentives to make people follow the programme. • Ensure that participants become self-involved	• The employees were involved from the planning stage to the outcome stage of the programme concerned. • Nutrition education is given to participants by Dieticians. • There was an increase in the availability of healthy food options in cafeterias and canteens. • Vending machines had healthier food options that were preferentially priced. • Feedback was given that was tailored. • The programme was presented using multimedia

2.13 EFFECTIVENESS OF WELLNESS PROGRAMMES

A study done on worksite health promotion stated that workplace health programmes can reduce medical and absenteeism costs by 25-30% over a three years, six months' timescale (Chapman cited in (Steed and Stevens 2011).

Similarly, a study done by the WHO showed an over 25% decrease in health costs and sick absenteeism. According to the WHO workplace health promotion focuses on factors such as improving health and lifestyle, environment, the family, the home and commuting conditions (WHO 2014).

In a web based lifestyle intervention study done among Italian factory workers it was found that one specific group had the highest waist circumference, was the least active, had the highest number of smokers and had the highest rate of absenteeism. The study showed there was a significant correlation between the healthy lifestyle index (HI) and absenteeism (Lucini *et al.* 2014).

A review done by Mhurchu, Aston and Jebb (2010), evaluated the impact of workplace interventions on employee diets. From the sixteen reviews that were conducted, it was found that there were positive changes in the consumption of fruit and vegetables and fat intake.

In a worksite telephone-based weight management programme, it was found that almost half of the participants lost weight. There was also a general improvement in eating patterns, overall health and physical activity (Terry *et al* 2011).

In the nutrition interventions in the workplace: evidence of best practice study, it was found that in a low-intensity nutrition intervention in Belgium , which was to decrease cholesterol levels and fat intake, there was a marked improvement in nutritional knowledge. In the United States of America, the working well trial which was aimed at cancer prevention through diet and smoking cessation.

The trial showed an increase in the intake of fruit and vegetables and lower fat intakes at six and twelve months. Results also showed that the more nutrition education workshops attended, the greater the nutritional knowledge. In the changing risk factors for chronic diseases study done to improve fruit and vegetable intake, physical activity, BP and BMI in South Auckland, New Zealand, there was also a marked improvement in nutritional knowledge. In a coronary health development project in the USA, done on cognitive understanding of healthy behaviour, it was found that there was a difference in the fruit and vegetable intake, physical activity and total fat. The project consisted of lectures, textbooks, guided shopping and individual assessment goals. In the treatwell 5-a-day study done in Massachusetts USA, to reduce fat intake and increase the consumption of fruit and

vegetables, there was a significant improvement on the fruit and vegetable intake (Steyn 2009).

Moreover, in a 10 week multimodal nutrition education intervention in four Malaysian universities, interventions included brochures, conventional lectures and text messages as nutrition education tools. It was found that energy, calcium, vitamin C, thiamine, fruit and vegetables, fish, eggs and dairy product consumption increased while the consumption of processed foods decreased (Sharil, Dali and Lua 2013).

2.14 BENEFITS OF A WELLNESS PROGRAMMES

Wellness programmes benefit both the employer and employee. Table 2.33 presents the benefits of wellness programmes.

Table 2.32: Benefits of Wellness Programmes (WHO 2014)

To the organization	To the employee
A health and safety programme that is well managed	A healthy and safe environment to work in
An image is one of caring and being positive	Self-esteem is improved
Morale of the staff is improved	Stress is reduced
Staff turnover is decreased	Morale is improved
Absenteeism is decreased	Job satisfaction is increased
Productivity is increased	Health protection skills are improved
Health care/insurance costs are reduced	Health is improved
Risk of fines and litigation are reduced	Sense of well-being is improved

2.15 Development of Nutrition Wellness Education Material

"Workplace wellness" refers to programmes designed to improve the health and well-being of employees (and their families) in order to improve an organisation's or businesses performance and reduce costs. Most wellness programmes are designed to address poor nutrition, obesity, smoking and alcohol use and abuse and physical inactivity (Schweyer 2011) and (Steyn *et al.* 2009). Figure 2.6 illustrates the scheme for programme planning:-

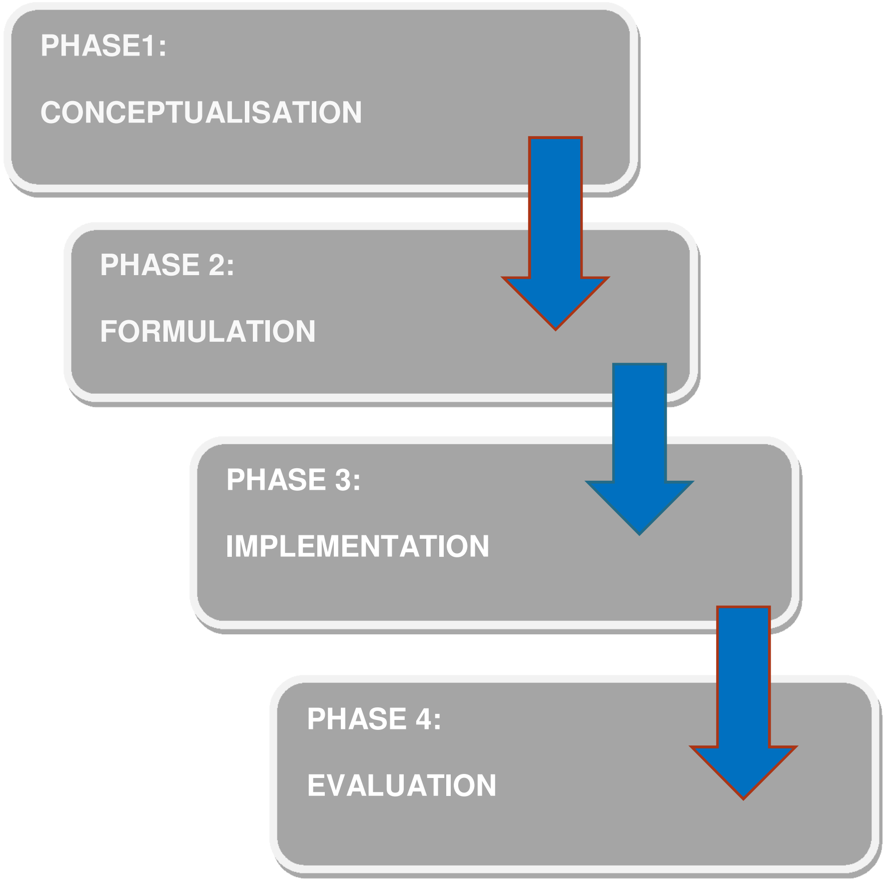


Figure 2.6: Scheme for Programme Planning, including Conceptualisation, Formulation, Implementation and Evaluation (FAO 1995d, 1995b, 1995a, 1995c).

2.15.1 Planning Nutrition Education Interventions

2.15.1.1 Phase one: Conceptualisation

Planning and development of nutrition education programmes should start with an assessment of health problems and nutritional status and is phase one of the scheme for programme planning as presented in figure 2.6. Various methods can be used such as a literature of data that is available, observations, interviews, surveys (KAP), knowledge, attitude and practice survey. Problems need to first be identified before an appropriate plan of action can be developed and implemented (FAO 1995a; Stuart and Achterberg 1997; Contento 2010).

The planning stage should include all aspects of the programme. Clear objectives and goals must be set, including the approach and strategies for development and implementation. Assessment is important to develop specific objectives which eventually will be used to steer the programme. Understanding of a specific target group is important. Cultural beliefs and

traditions needs to be taken into consideration during planning and preparation (FAO 1995a; Stuart and Achterberg 1997).

2.15.1.2 Phase Two: Formulation

Designing a goal creates an awareness of the end result. Goals are wide and needs to address the desired outcome such as behaviour and knowledge (Stuart and Achterberg 1997).

Creating objectives that are specific and measureable ensures that the evaluation process becomes easier since the results can be measured to assess the outcomes. Objectives should however, be obtainable and realistic (Stuart and Achterberg 1997; CDC 2011a).

The cultural and education background needs to be considered when developing resources for training and teaching. Active techniques such as demonstrations and supervised practice assists individuals to learn while practicing and helps to show understanding of the knowledge and skill being taught (FAO 1995d; Stuart and Achterberg 1997). Training manuals or toolkits should have only specific material that is needed (Bandura 2001). During this phase testing of messages and tools should take place to ensure valid and reliable material.

2.15.1.3 Phase Three: Implementation

In this phase support material needs to be produced. Those that are involved in the implementation process need to be adequately trained. Training should include how to deliver messages effectively using the resources that were developed and produced (FAO 1995b; Stuart and Achterberg 1997). During the implementation process the designed training manuals or booklets need to be implemented also (Contento 2010).

2.15.1.4 Phase Four: Monitoring and Evaluation

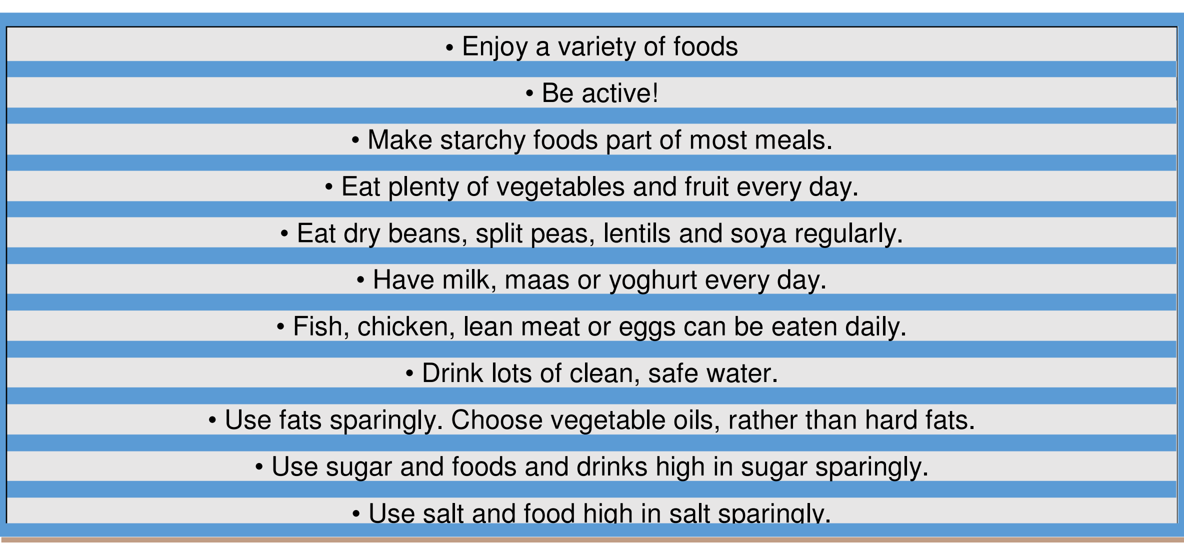
Evaluation and monitoring are extremely important since these two main functions are to develop and improve the activities in the programme. The participants as well as study assistant need to be involved in the evaluation process, since both were directly involved from the beginning of the study (FAO 1995c; Stuart and Achterberg 1997). During the evaluation process the objectives need to be assessed to see whether these have been achieved (CDC 2011a; Contento 2010).

2.16 TOOLS FOR NUTRITION EDUCATION

2.16.1 Food Based Dietary Guidelines (FBDGs)

These guidelines have been designed by the Nutrition Society, association of Dietetics in South Africa, Medical Research Council, industry and the Department of Health (DOH 2012).

The South African FBDGs are science based guidelines that are drawn up to create a more positive health and lifestyle guidelines for people. These are aimed at protecting against the development of NCD's by improving diets to meet nutrient and energy requirements of the general population (Vorster, Badham and Venter 2013)



- Enjoy a variety of foods
- Be active!
- Make starchy foods part of most meals.
- Eat plenty of vegetables and fruit every day.
- Eat dry beans, split peas, lentils and soya regularly.
- Have milk, maas or yoghurt every day.
- Fish, chicken, lean meat or eggs can be eaten daily.
- Drink lots of clean, safe water.
- Use fats sparingly. Choose vegetable oils, rather than hard fats.
- Use sugar and foods and drinks high in sugar sparingly.
- Use salt and food high in salt sparingly.

Figure 2.7: FBDGs (Vorster, Badham and Venter 2013)

2.16.1.1 Enjoy a variety of foods

Having variety in one's diet is recommended for a healthy diet. A variety in the diet means consuming foods from the different food groups (Steyn and Ochse 2013) and ensures a balanced diet with sufficient nutrients.

2.16.1.2 Be Active.

"Be active!" Physical activity is defined as half an hour of medium to intense exercise. Being active promotes health and well-being and is an important factor in reducing the incidence of NCD's as well treatment of NCD's in South Africa (Botha *et al.* 2013).

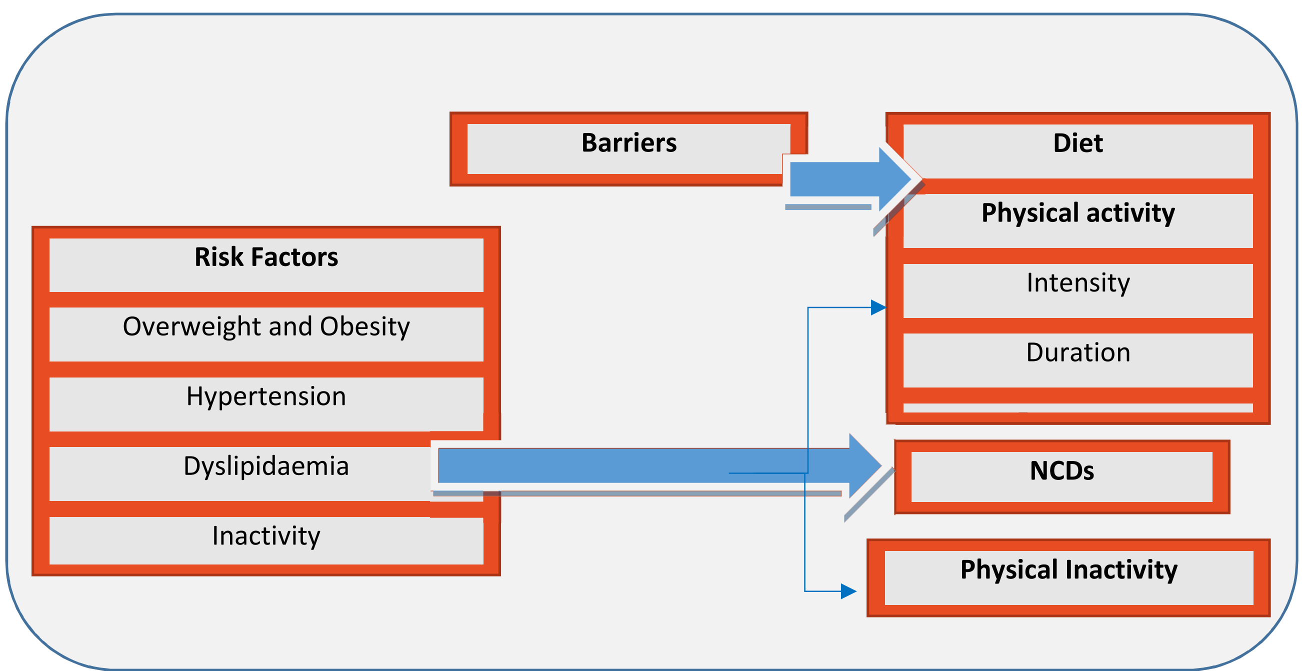


Figure 2.8: Conceptual framework illustrating the role of physical activity and non-communicable diseases adapted from SAJCN (Botha et al. 2013).

As seen in Figure 2.8 diet and physical activity are the main barriers in targeting non communicable diseases. Other risk factors are obesity, high blood pressure, dyslipidaemia, being inactive, smoking and alcohol use (Botha *et al.* 2013).

Being Active can be simple, like using the stairs instead of a lift, parking your car a distance away so that you can get more exercise, or walk instead of using transport for shorter distances, play a sport once a week, household chores can also be counted (HSF 2014).

2.16.1.3 Make starchy foods a most part of the meal

South Africans should eat starchy foods in the form of whole grains (that have little processing), legumes and root vegetables. Starch is known to protect the body against non-communicable diseases such as cardiovascular disease (CVD). Starch is a good source of energy and is often fortified with vitamins and minerals like breakfast cereals (Vorster 2013).

Starch is important in the adult diet but care needs to be taken that intake of starch does not exceed expenditure, so as to avoid NCD's such as CVD, obesity and diabetes (Vorster 2013).

2.16.1.4 Eat a variety of fruit and vegetables every day.

Eating a variety of fruit and vegetables provides the body with valuable minerals and nutrients (Naude 2013a).

Some ways to increase the intake of fruit and vegetables in the diet, is to add fresh, canned or dried fruit to your breakfast cereal. Snacks can be replaced by pieces of fruit or vegetable such as carrots, it satisfies the sweet craving that most people have and may be tempted to have sweet desserts that are high in sugar and fat. Beans and lentils can be added to dishes to increase the fibre content of the food. Salads are good as a side dish provided the dressing is low fat (Naude 2013a).

2.16.1.5 Eat dry beans, split peas and pulses

"Eat dry beans, split peas, lentils and soya regularly". The FBDGs was designed to address both over-nutrition and under-nutrition, by addressing micronutrient deficiencies and aid in the prevention and control of non-communicable diseases in South Africa (Venter *et al.* 2013).

Research has shown that beans are cheap and have a high micronutrient content. Legumes are a good quality protein source and are important for health and protecting the body against non-communicable diseases (Venter *et al.* 2013).

2.16.1.6 Have milk or maas everyday

Milk (and some dairy products) may protect against the development of NCD's. Research has shown that milk is an excellent source of high quality protein Milk can also be used to complement foods like wheat and maize. Adding milk and other dairy products to these foods results in in a meal with all the amino acids, and is beneficial in populations where maize and bread are mainly consumed such as in developing countries like South Africa (Vorster *et al.* 2013).

2.16.1.7 Fish, chicken, lean meat or eggs can be eaten daily.

In appropriate amounts, fish, chicken, lean meat and eggs are important sources of easily digestible and high quality protein, and essential micronutrients such as iron, Vitamin A, Vitamin B12, calcium and zinc (Schonfeld, Pretorius and Hall 2013).

Small amounts of these proteins added to a diet with variety can add to the nutrient values. However overeating , especially foods that are high in saturated fat and cholesterol, leads to being obese, overweight and other NCD's (Schonfeld, Pretorius and Hall 2013).

2.16.1.8 Drink lots of clean and safe water

Water is essential to life. Water is an essential nutrient (Van Graan *et al.* 2013) with roles such as temperature control, lubricant, nutrients, waste, solvent among other functions (Van Graan *et al.* 2013). It is important to keep the body hydrated at all times. The recommended Intake of water is 6-8 glasses per day by the World Health Organisation (Van Graan *et al.* 2013).

2.16.1.9 Use fats sparingly

"Choose vegetable oils, rather than hard fats" is the new FBDG designed for the people of South Africa. Using plant based fats such as polyunsaturated fatty acids (PUFAS) and monounsaturated fatty acids (MUFAS) is recommended for good health (Smuts and Wolmarans 2013).

Having more oily fish to increase omega-3 long-chain PUFAs is important (Steyn and Temple 2008; Smuts and Wolmarans 2013).

2.16.1.10 Use sugar-foods and drinks high in sugar sparingly.

The diet of South Africans has changed over the years. There is an inconsistency in sugar intake among Americans and South Africans because of factors such as age, gender, socio-economic status and the longing to eat a healthier diet (Temple and Steyn 2013).

Research has shown that increased sugar intake was associated with increased weight gain. Furthermore, a diet with reduced sugar intake is recommended to prevent not just obesity, but other related conditions such as diabetes, CVDs and colon and breast cancer (Temple and Steyn 2013). In South Africa tooth decay is common (Temple and Steyn 2013).

2.16.1.11 Use salt sparingly

Having a diet high in sodium leads to hypertension. High blood pressure is an important risk factor for developing diseases such as CVD, CHD and stroke. Research has shown that globally hypertension is the number one risk factor for mortality (Wentzel-Viljoen *et al.* 2013).

Besides hypertension, high salt intake can damage blood vessels and organs increasing the risk of kidney disease, heart disease and stroke (Wentzel-Viljoen *et al.* 2013; BNF 2015).

2.16.1.12 Limit Alcohol Use

In South Africa, the most common substance abuse is alcohol with South Africa having the highest incidence of abuse and risky drinking. Research has shown that chronic alcohol abuse can lead to damage of the liver (Jacobs and Steyn 2013).

2.16.2 Food Guide

The food guide has to be used in conjunction with the Food Based Dietary Guidelines as shown in Figure 2.9 below:-

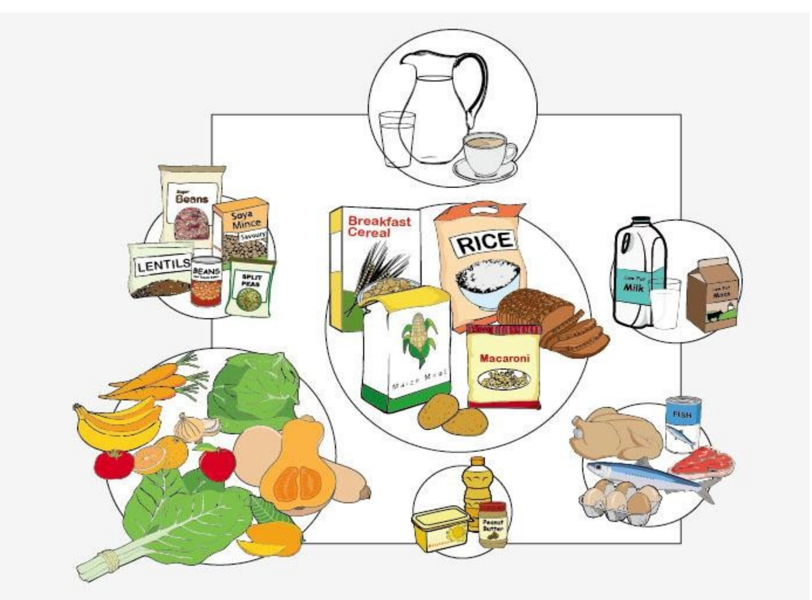


Figure 2.9: The Food Guide (DOH 2012)

The food guide gives suggested amounts for food that is to be eaten daily. The guidelines for the healthy eating food guide (DOH 2012) are:

- Eat a variety of different foods
- Eat a variety from the different food groups
- Eat foods in the correct amounts
- Eat according to one’s needs

The food guide illustrates the groups of foods that are essential for healthy living. The guide focuses on foods of a traditional nature that is affordable, culturally acceptable and is based on the daily habitual intake of poorer South Africans. The size of the circle around each food group shows the amount of food that is to be consumed from each food group (Vorster *et al.* 2013).

2.16.3 Food and Nutrition Labelling

Encouraging consumers to read food labels can be used as a guide together with the FBDGs. This allows for a more informed way for the selection of food and provides information on the composition of food (FAO/WHO 1992). The South African Food Labelling Regulations were developed in 2010 and adapted in 2014 (Van Graan 2014). It has become compulsory for a nutrition information to be present on the label of food items in the form of a table (Kotzenbberg and Christelle 2005). This is important for the consumer to know more about the product and the ingredients as well as the nutrients present. When designing a nutrition programme it is important to educate people to read the label and know what the food item is made up off.

2.16.4 Food Composition Tables

Consumption of nutrients in the correct amounts is important for optimal nutrition. Each food item consumed has a different composition and breakdown of nutrients. The food composition tables can be used as a guide for nutrition-education and nutrition-knowledge on the different nutrients and how that impacts on the food that one eat and health. The value of the nutrient given in the composition database are based on estimates and are not actual bioavailability of the different nutrients (Van Graan 2015).

2.17 Education and communication strategies for different groups and settings

2.17.1 Social Marketing

Behaviour change cannot be brought about just by providing information. There are a number of factors that are involved in the decision making process towards creating a change in behaviour such as practical factors, environmental factors, socio-cultural factors and psychological factors. Social marketing uses marketing strategies to persuade people into social causes (Stuart and Achterberg 1997; Young *et al.* 2004).

2.17.2 Social Mobilisation

Social mobilisation looks at every agent of change and uses them to implement change, this involves using all key players to create the desired change. For the desired result to be successful, all participants in every area need to be active (Unicef 2005).

2.17.3 Knowledge, Attitudes and Practices (KAP)

In most cases women are still very much involved in the purchase and preparation of food in most households. Research needs to be done to find out firstly, who are the primary targets for nutrition education, and thereafter to find out existing knowledge, attitude and practice, so that KAP can be used as an intervention. Nutrition messages can be used to change existing behaviour. Habits, beliefs and preferences with regards to food are usually passed on from one generation to the other and eventually become tradition and custom. However these preferences and beliefs can lead to some unhealthy food choices being made, which in turn leads to poor nutrition (Stuart and Achterberg 1997; Contento 2010).

2.17.4 Setting Communication Objectives

Setting objectives for communication is important. Objectives that are clear and well-designed can be used as a guide developing communication strategies that are appropriate, it helps with choosing the content for materials for communication. The SMART (specific, measureable, attainable, realistic and time-bound) principle is also effective for setting of objectives. Objectives need to be specific to the message, and also assist with measuring the success of the messages, objectives need to be attainable and realistic, objectives must be achievable, lastly it should be time bound- objectives should be achievable in a specific time period (Stuart and Achterberg 1997; CDC 2011a).

2.17.5 Mass Media and Social Communication

Single message strategies are known to be an effective way of communication nutrition knowledge. The development of these messages should involve content that is accurate and supports change in beliefs, the message should be of a high technical quality, the channel of communication should be effective - media choice should make sure that the messages are reached widely and is accessible to all individuals. Lastly the message should be received well by the audience. Media can include pamphlets, brochures, booklets, bulletin boards, posters, television and radio. Well- designed messages however, need to be repeated for effective reach (Stuart and Achterberg 1997; Bandura 2001).

Each learning method in table 2.33 has its own advantages and disadvantages. A combination of learning methods can be more effective and allow for more interaction.

Table 2.33: Advantages and Disadvantages of Different Learning Methods (Stuart and Achterberg 1997; McKimm and Jollie 2007).

Method	Advantage	Disadvantage
Lectures	This method is effective for presenting specific material or for the introduction of a topic.	Feedback is usually one-way. Messages are only delivered at the pace of the presenter.
Demonstration	Easy to understand, it links together theory with practice and is good for keeping individuals attentive.	Mistakes are possible and can go unseen.
Discussion	This method is effective since it allows group interaction and is good for covering essential points.	Difficult to keep track and skills are needed for this. Time consuming.
Case Studies/Role plays	Helps link the gap between practice and theory. Every individual can be involved.	Lots of preparation is needed. Extra time is needed for discussion and debriefing in-between the exercises. High risk.

2.18 CONCLUSION

The literature has indicated a combination of interrelated factors such as the process of nutritional transition and its influences on the impact of non-communicable diseases in South Africa among adults. It is clear that there are many factors that influence diet of South Africans impacting on general wellness and wellness in the workplace. The basis of understanding the literature has created a foundation and support, for the objective goal of developing a nutritional wellness education material as a component of a wellness programme for staff.

CHAPTER 3 - RESEARCH DESIGN

3.1 INTRODUCTION

This chapter will be presented in two sections, the first part will focus on the questionnaires and anthropometric measurements, the second part of the chapter will present the methodology used to develop the nutrition wellness education material.

3.1.1 CONTEXT OF THE STUDY

Mobeni forms part of the greater South Industrial Basin region in Durban. Public facilities, amenities and public transport are provided on South Coast Road. Surrounding areas comprise ‘low-income’ residential accommodation.

The study was conducted in a FET College in Mobeni, were around 170 staff are employed. There are around 1500 students that attend Coastal College. There is a tuck shop on campus that stocks a few snack items. There is no cafeteria on site. There are a few fast food outlets close by. Most staff members consume their meals in the staff room where there are tea and coffee facilities as well as a microwave.

Figure 3.1 Map of the Mobeni Area (Mobeni Weather Forecast 2015)

3.2 ETHICAL CONSIDERATIONS

The campus manager granted permission for the study to be conducted at the college (Annexure A), the researcher also explained to the staff that there would be no remuneration for participation in the study and participation was entirely voluntary. Voluntary participants were given an information letter (Annexure B) and the study was approved by the Durban University of Technology (DUT) Institutional Research Ethics Committee, reference number: REC 7/12 (Annexure H). The campus manager of Coastal College, Swinton Campus was approached and an information letter requesting permission to do research was given and requested that the findings be presented to the college after completion of the study. The staff of Coastal Kwazulu Natal (KZN) FET College were approached after the mornings briefing in the staffroom by the researcher to request participation in the study. The researcher informed the staff about the nature of the research. Staff were also informed on the confidentiality of the research as well as that there was no obligation to participate in the study. It was made clear to the staff that they could withdraw from the study at any time and signed a letter of consent indicating intent in participating in the study. Numbers were allocated to participants and participants were weighed and measured in private to ensure confidentiality and anonymity. One on one interviews were conducted and the same study assistant who conducted the interviews, also conducted the same measurements to ensure consistency.

The researcher followed the SA Medical research Council Guidelines for research on human beings throughout the study.

3.3 DATA ENUMERATORS

The use of well trained and adequate numbers of fieldworkers with effective language and communication skills, to gather the data for this study, is of paramount importance. To this purpose ten 3rd year students from the Department of Food and Nutrition Consumer Sciences of the Durban University of Technology, who could speak Isizulu and translate/interpret English into IsiZulu were trained to record the data required. The training included how respondents should be approached, matters of conduct (code) and the administration of health. Study assistant guidelines were printed in English. A demonstration was given and the student practised a role-play situation on how to obtain correct anthropometric measurements with the use of food models to demonstrate the correct portion sizes and assist the respondents to identify unfamiliar foods. The significance of the research was discussed with the fieldworkers to inform them of the objectives and importance of the research.

3.4 STUDY POPULATION AND SAMPLING

One hundred and seventy staff members were approached and briefed on the nature of the research. One hundred and thirty eight staff members agreed to participate in the study. The sample population consisted of 138. Adults between the ages of 19 and 50 years of age formed 80% of the sample group and the group between 51 and 70 years of age, the remaining 20%.

The inclusion criteria were:

- Staff (adults) 19-50 years old.
- Male and female.
- Geographical area – Swinton campus (Mobeni).

The exclusion criteria were:

- Staff outside Coastal KZN FET College, Swinton Campus.
- Students of Coastal KZN FET College.
- Staff outside recommended ages.

3.4.1 SAMPLING STRATEGY

The sample was calculated using a power calculation and 118 subjects out of a population of 170 adults work at Coastal College in Mobeni were required to obtain statistically significant results.

Sample Size:

$$ss = \frac{Z^2 * (p) * (1-p)}{c^2}$$

Where:

Z = Z value (e.g. 1.96 for 95% confidence level)
p = percentage picking a choice, expressed as decimal (.5 used for sample size needed)
c = confidence interval, expressed as decimal = 0.05 (three units on both sides of the normal).

Figure 3.2: Trained fieldworkers from the Department of Food and Nutrition and Consumer Sciences DUT recording anthropometric measurements and questionnaires

3.5 STUDY DESIGN AND MEASURING INSTRUMENTS

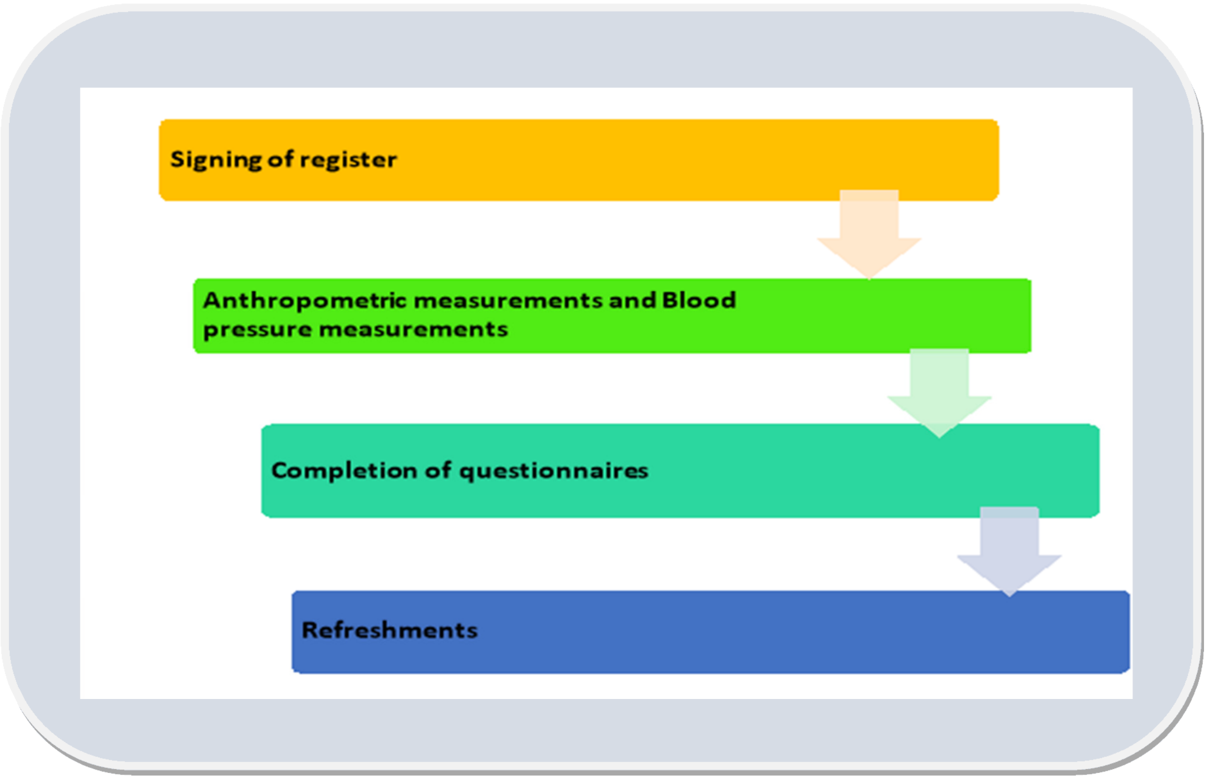


Figure 3.3: Data Collection Process

3.5.1 ANTHROPOMETRIC MEASUREMENTS

In this study anthropometric measurements recorded were weight measurements, height measurements, waist circumference and blood pressure checks. The methodology around these measurements will be further discussed in this section.

3.5.1.1 Body Mass Measurement of Participants

The fieldworkers measured and recorded the body mass of the sample population. All individuals in the sample wore light clothing without shoes. To ensure uniformity of the body mass measurement the participants were asked to stand in the centre of the scale looking straight ahead with their hands to their sides (CDC 2007). The body mass was measured to the nearest 0.1kg using a standardised collaborated scale (Physician scale, scales 2000). To ensure accuracy the scale was placed on a flat surface. All measurements were taken twice

and the average calculated to the nearest 0.01. The scale was switched on and reflected a 0.00 measurement before participants were requested to step on to the scale. The measurement was then recorded and the participant was then asked to step down from the scale. The scale was returned to 0.00, after which the respondent stepped on again for the second measurement.

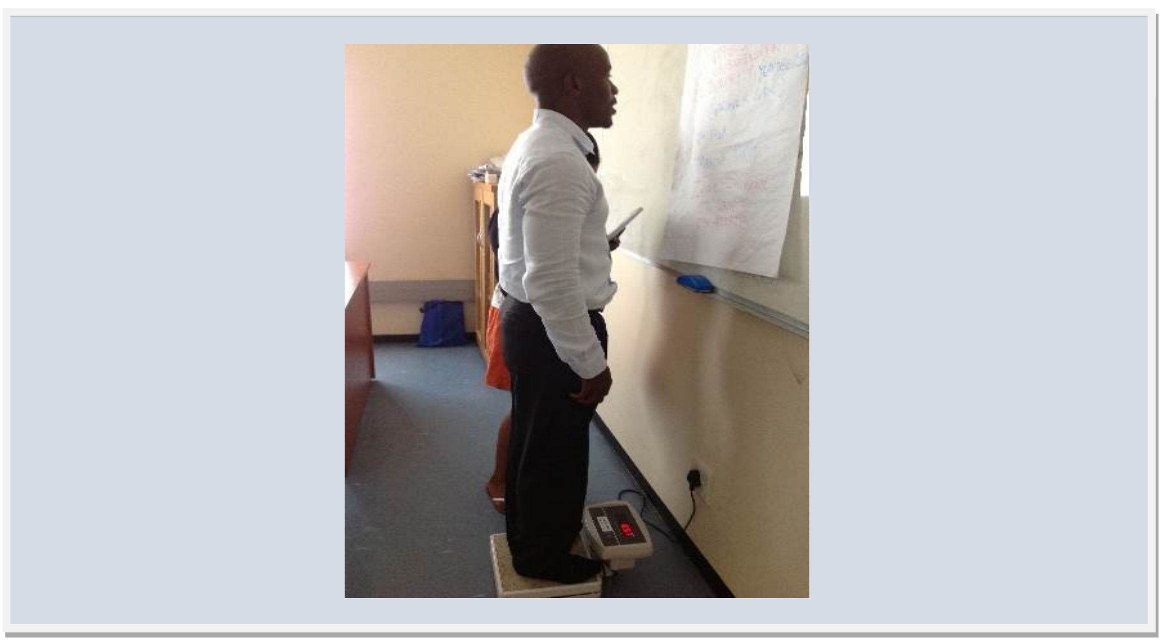


Figure 3.4: Measuring the body mass of a participant.

3.5.1.2 Determining the Height of Participants

A stadiometer was used to measure the height of each respondent. The same study fieldworker measured the height of all participants ensuring validity of the measurements. Guidelines from the National Health and Nutrition Examination Survey Anthropometry Procedures Manual (2009) were used to determine the height of participants:

- Head, shoulders, buttocks and heels were not allowed to touch the back of the stadiometer.
- Participants were asked to stand up straight with hands to the side and shoulders relaxed, arms and legs straight and feet together and flat on the ground.
- Shoes were removed and participants were required to stand on a flat hard surface to ensure correct measurements.
- The stadiometer was lowered so that the head piece rested lightly on the participants head.

- Participants were also asked to keep the head straight and look straight ahead. The height of each participant was measured twice and the average height was recorded.

3.5.1.3 Waist Circumference Measurement of Participants

The waist circumference measurements was measured with a tape measure made from material that cannot stretch. Waist circumference was measured at a level midway between the lower rib margin and iliac crest, with the tape all around the body in a horizontal position. Respondents had to stand up straight and lift their arms slightly and clothing above the waist (CDC 2007). The fieldworker stood on the right side of the participant (CDC 2007). The waist circumference measurement of each participant was measured twice and the average waist circumference measurement was recorded.

3.5.2 Health Assessment

3.5.2.1 Health Questionnaire

Health assessments provide information on the adult's current health status and is therefore used to monitor the respondent's health needs and assist in planning lifestyle changes, through the development of a wellness programme. Health assessment looked at self-reported disease, the amount of alcohol and cigarettes smoked per day.

A valid health questionnaire adapted by the DOH (Annexure F) was used in the study. A marking room was used where there were tables and chairs. Respondents were seated across the table from the fieldworker. The questionnaire was completed in a one on one interview by a trained fieldworker. Health questionnaires were important for detecting suspected self-reported infections or diseases, smoking and drinking patterns, level of physical activity, and the number of deaths in the past year. One hundred and thirty eight questionnaires were completed.

3.5.2.2 Blood Pressure

A sphygmomanometer (Omron model m6) was used to measure blood pressure in all respondents to determine the prevalence of hypertension. The same venue as that for the other health assessments was used. Measurements were done privately with the respondents in a seated position. The left arm was used. Respondents with long-sleeved shirts were asked

to roll up their sleeves. The blood pressure measurement of each participant was measured twice and recorded and the average calculated and used as the final measurement. One hundred and thirty eight blood pressure measurements were conducted.

3.5.3 Socio-demographic Questionnaire

A valid socio-demographic questionnaire was used (Oldewage-Theron and Kruger 2008a) (Annexure C). This is used to gather personal information and demographic data on the respondent such as chronological age, the sex of a person, living conditions and the earnings of an individual. One hundred and thirty eight questionnaires were completed by respondents.

3.5.4 Food Frequency Questionnaire (FFQ)

A valid food frequency questionnaire designed by (FAO 2004) (Annexure E) was used in this study to determine the Food group Diversity Score (FGDS) and Food Variety Score (FVS) of the sample population. The FFQ was used to analyse the food consumed over seven consecutive days which provided an overall picture of the food intake of the respondents. Trained fieldworkers assisted the respondents in completing the questionnaires in a one-on-one interview. One hundred and thirty eight FFQs were completed.

3.5.5 24-Hour recall

Three 24-Hour Recall questionnaires (Annexure D) were used to determine the actual food items that were consumed, including the portion sizes during the previous 24 hours. With this questionnaire the respondents had to list specific foods eaten in the previous 24 hours with the assistance of a fieldworker. Food mock-ups were used to assist participants to determine accurate portion sizes. The 24-Hour Recall questionnaire was completed twice with a week interval on two week days and one weekend recall, to get a clear indication of the mean food consumption of respondents.

3.6 DATA ANALYSIS AND STATISTICS

The researcher checked the collected data on a daily basis to ensure that all questions were answered. If any information was missing it was followed up the next day.

3.6.1 Anthropometric Measurements

Anthropometric assessments provide a simple, non-invasive and a practical way of describing the overall nutritional status of the different population groups. It is useful since the anthropometry's close correlation with the multiple dimensions of individual health and development and their socio-economic and environmental determinants (FAO 2004).

3.6.1.1 Body Mass Index (BMI)

Body mass index (BMI) is a measure of weight adjusted for height. Although BMI is often considered an indicator of body fatness, it is a measure of body fat because it measures excess body weight rather than excess fat (CDC 2014b).

The WHO cut-off points for BMI were used to check the prevalence of obesity in the group, refer to table 3.1. Height and weight were captured on an Excel® spread sheet and calculated as weight in kilograms divided by the square of height in meters (kg/m2). The results were presented for men and women separately in a table.

Table 3.1: BMI cut off Points (WHO 1995)

Cut-off points BMI	
Underweight	<18.50
Normal	18.50 - 24.99
Overweight	≥25.00
Obesity Class I	30.00 - 34-99
Obesity Class II	35.00 - 39.99
Obesity Class III	≥40.00

3.6.1.2 Waist Circumference

Waist circumference is recommended as an index for central fat distribution. Fat around the waist can be a risk for high blood pressure, high cholesterol, type 2 diabetes, heart disease and stroke. A reduction of body weight by 5% can reduce high blood pressure and blood cholesterol levels (HSF 2013). Average waist circumference were captured on an Excel® spread sheet and presented in a table using the WHO cut-off points as indicated in table 3.2. The mean waist circumference for Asian and non-Asian men and women were presented.

Table 3.2: Waist Circumference Cut-off points (WHO 2000)

	Healthy	Central Obesity
Non-Asian Men	<102cm	>102cm
Asian Men	<90cm	> 90cm
Non-Asian Women	<88cm	> 88cm
Asian Women	<80cm	> 80cm

3.6.1.3 Waist-to-height-ratio

The WHtR was calculated using the waist circumference and height data that was captured by the researcher. The WHtR can be used as a risk indicator for metabolic syndrome. The waist circumference in cm is divided by the height in cm to obtain a ratio. A cut-off point of >0.5 places the person at risk of metabolic syndrome.

3.6.2 Health assessment

3.6.2.1 Health Questionnaire

The completed health questionnaire data was sorted and checked for completeness and accuracy by the researcher and 138 were usable. The information was captured on an Excel® spread sheet by the researcher and then analysed by utilizing the SPSS version 20 for Windows program with the assistance of a statistician for descriptive statistics. Tables and graphs were drawn up with percentages of the different variables included in the questionnaire. Data was presented in terms of frequencies and percentages for the various categories.

3.6.2.2 Blood Pressure Measurements

Table 3.3: Blood pressure cut-off points for systolic and diastolic pressure

	Normal BP	Prehypertension	High BP 1	High BP 2
Systolic blood Pressure (SBP)	**SBP**	**SBP**	**SBP**	**SBP**
	<80 mmHg	80-89 mmHg	90-99 mmHg	≥100 mmHg
Diastolic blood Pressure (DBP)	**DBP**	**DBP**	**DBP**	**DBP**
	<120 mmHg	120-139 mmHg	140-159 mmHg	≥160 mmHg

Blood pressure measurement data were captured on and Excel® spread sheet by the researcher and then analysed by utilizing SPSS for Windows version 20 program with the assistance of a statistician to determine the incidence of hypertension. Results were presented for men and women separately and were presented according to the different age groups, 21-30, 31-50 and 51-70. Blood pressure measurements were also analysed according to systolic blood pressure as well as diastolic blood pressure and presented in a table. The data analysed, identified respondents with the prevalence to hypertension according to the World Health Organisation cut-off points (Whitworth 2003). The cut-off points are presented in table 4.1. The mean systolic blood pressure and diastolic blood pressure for the two groups were also calculated and compared to the cut-off points for SBP and DBP as presented in table 3.3 (Whitworth 2003).

3.6.3 Socio Demographic Questionnaire

All the information completed on the socio-demographic questionnaires were sorted and checked for completeness and accuracy by the researcher and 138 were usable. Descriptive statistics were determined using SPSS version 20 with the assistance of a statistician. Tables were drawn up with percentages of the different variables included in the questionnaire. Data was presented in terms of frequencies and percentages for the various categories.

3.6.4 Food frequency Questionnaire

The completed food frequency questionnaire data was sorted and checked by the researcher for accuracy and completeness and 138 were usable. The information was coded and captured on an Excel® spread sheet by the researcher and then analysed by using the SPSS for Windows version 20 software program with the assistance of a statistician for descriptive statistics and presented in frequencies. Food consumed were presented in Food Group Diversity and a Food Variety Score.

3.6.5 24-hour Recall

Three 24-hour recall questionnaires were completed by the respondents with the assistance of trained study assistant. The data was captured and analysed by a nutrition professional using the MRC Food Finder® version 3.0 software, based on the South African Food Composition Tables of South Africa (Wolmarans, Kunneke and Laubscher 2009). Analysed

results of the 24-hour recall questionnaires were compared to the dietary reference intakes (DRIs) for men and women ages 19-70, to identify possible deficiencies.

The top 20 food items consumed was calculated for the group as well as for the fruit and vegetable intake for this group. Data from the nutrient analysis was correlated with the FGDS score to determine dietary diversity. The FFQ nutrient adequacy ratio (NAR) was determined by using the actual intake and DRIs and was presented as a percentage. The nutrient adequacy ratio (NAR) indicates under-consumption of certain nutrients.

3.7 METHODOLOGY: WELLNESS PROGRAMME

3.7.1 Development of the nutrition wellness educational material

The nutritional wellness education material the researcher chose to develop was very similar to a nutrition intervention programme that is based on nutrition education. For this reason the researcher reviewed wellness programmes with a nutrition component as a basis for the nutritional wellness programme at the workplace.

The results from the data collection were used to create the nutrition wellness education material that will form part of a wellness programme.. The material outlines the benefits of the wellness program for both the employer and the employee (WHO 2014). The South African FBDGs designed by the Department of Health (DOH 2012) were used as a tool for the nutrition education. Information on food sources and functions of nutrients, portion sizes and physical activity were also presented. The South African Food Guide designed by the Department of Health (DOH 2012) was used to explain the different food groups. Each of the ten FBDG was explained in detail. The FBDG on salt intake in particular was used to address the problem of salt intake and prehypertension that was noted in this group. The WHO (Naude 2013a) recommendation for fruit and vegetable intake was used as a tool to increase the fruit and vegetable intake amongst members in the group. Cut-off points by the Heart and Stroke Foundation of South Africa were used as a guide for blood pressure (HSF 2013). The nutrition wellness education material showed respondents how to calculate BMI using the (WHO 1995) classification, determine the incidence of obesity. The guide also consisted of information on cut-off points for waist circumference (WHO 2000) to assist respondents in determining central obesity. Lastly, a sample menu (DOH 2012) and healthy tips were included to assist in overall wellness.

3.7.2 To improve nutrition education in the workplace

Nutrition education consisted of two components: presentations of detailed nutrition information as well as group participation with individual nutrition wellness education toolkits containing activities. These sessions will focus on nutrients and food sources, portion control, the food guide, how to use the food based dietary guidelines for South Africa, BMI, waist circumference, menu planning and tips for healthy eating. This will be done using the designed wellness toolkit outlined, as well as posters and a brochure.

3.7.3 Nutrition Education

Detailed nutrition information will be given throughout the duration of the nutrition component of the wellness programme (intervention). This will be done using the following key methods:

3.7.4 Posters, Brochures and toolkit booklets

Posters were developed that can be displayed throughout the workplace and can be used during the presentations as well. The nutrition wellness material can be used during the nutrition education session. Brochures will be issued after presentations.

3.7.5 Recipes

Recipes were included in the booklet to assist in healthy eating and will be given to employees. The first recipe for a chickpea salad, is in-keeping with one of the FBDG which is to "Eat Dry Beans, Split Peas and Pulses". This salad consists of pulses such as chickpeas, cherry tomatoes, celery, cucumber and spices. The second recipe, is in-keeping with another FBDG, which is "Eat a variety of fruit and vegetables everyday". This recipe comprises of a variety of vegetables and fruit such as lettuce, rocket, olives, and cucumber, cherry tomatoes, avocado and sunflower seeds.

3.7.6 Reliability and Validity of the messages and material

The nutritional education support material was tested for content and face validity.

3.7.6.1 Phase 1: Conceptualisation

A valid and reliable needs assessment was carried out to identify health problems and food intake patterns during the research, using questionnaires and anthropometric indices. Results indicated a need for a wellness programme.

3.7.6.2 Phase 2: Formulation

Clear objectives were set out based on the results of the research. Expected results were also envisaged, bearing in mind the objectives that were set out. Nutrition wellness education material was developed using the results of the research. The wellness toolkit was checked for content validity and reliability by three nutrition specialists (Creswell *et al.* 2007). A few corrections were highlighted and the researcher then made the necessary corrections. This study ends at phase two.

3.7.6.3 Phase 3: Implementation

The developed wellness toolkit will be presented to the FET management for implementation and assessment. The nutrition wellness education toolkit, posters and brochure will be printed in A4 size and in colour to ensure that the messages are clear. The toolkit will be used during the wellness programme while posters will be displayed to effectively communicate the messages in the programme. Take home brochures will further emphasise the messages that are in the nutrition component of the wellness programme (not part of this study).

3.7.6.4 Phase 4: Monitoring and Evaluation

Monitoring and evaluation will be done by the researcher and those assisting in the implementation process (not as part of this study).

3.8 CONCLUSION

Chapter four presented the methodology of anthropometric indices: health assessments and dietary intake assessments; methods used for data analysis; as well as the methodology used to develop the nutrition wellness material.

CHAPTER FOUR- RESULTS AND FINDINGS

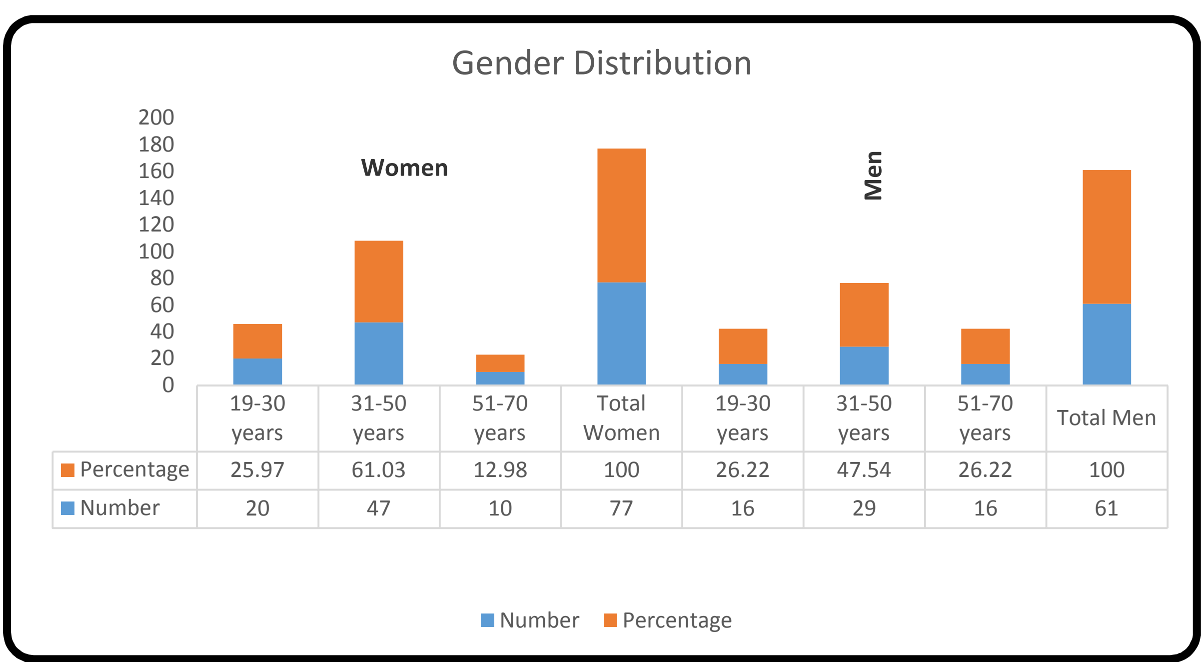
4.1 INTRODUCTION

The purpose of this study was to determine the socio demographic, health status, food choice and dietary intake behaviour of staff at Coastal KZN FET College in Mobeni, in order to develop a nutrition wellness education material as a component of a wellness programme to address the problems identified. This chapter reports on the results of the data that has been processed. The data has been interpreted, evaluated and presented in tables and graphs. The sample techniques resulted in n=138 respondents forming part of the sample population with a total of 100 percent response.

4.2 STUDY RESULTS

4.2.1: Socio-Demographic data

The Socio-demographic questionnaires were completed by the 138 participants, analysed and will be presented in the first section.



	19-30 years	31-50 years	51-70 years	Total Women	19-30 years	31-50 years	51-70 years	Total Men
Percentage	25.97	61.03	12.98	100	26.22	47.54	26.22	100
Number	20	47	10	77	16	29	16	61

Figure 4.1: Gender Distribution

The study consisted of 138 participants of which 44.00% (n=61) were men and 56.00% (n=77) women. Further insight shows that there were 26.22% (n=16) men in the 19-30 age category compared to the 25.97% (n=20) women in the same age category. The majority of the group was made up of 47.54% (n=29) men and 61.03% (n= 47) women from the 31-50

age category. The 51-70 age category was made up of 26.22% (n=16) men and 12.98% (n=10) women.

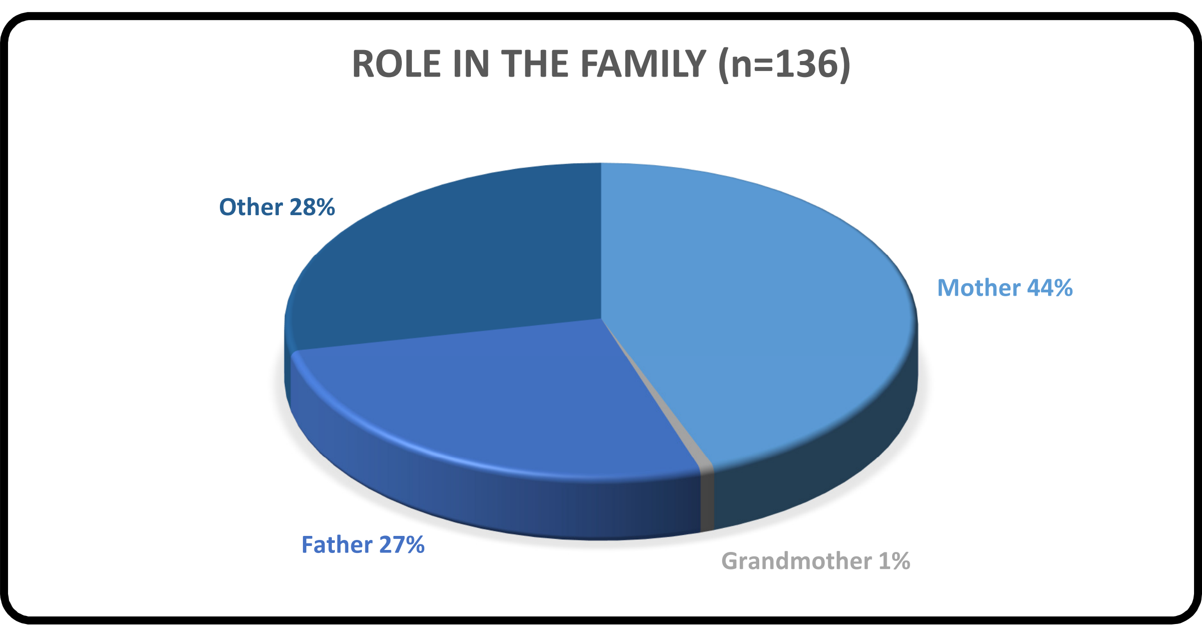


Figure 4.2: Role in the Family

Figure 4.2 indicates that a large number 44.20% (n =61) of respondents were mothers. Twenty seven percent (n=37) of the participants were the father in the household while only one participant was a grandmother.

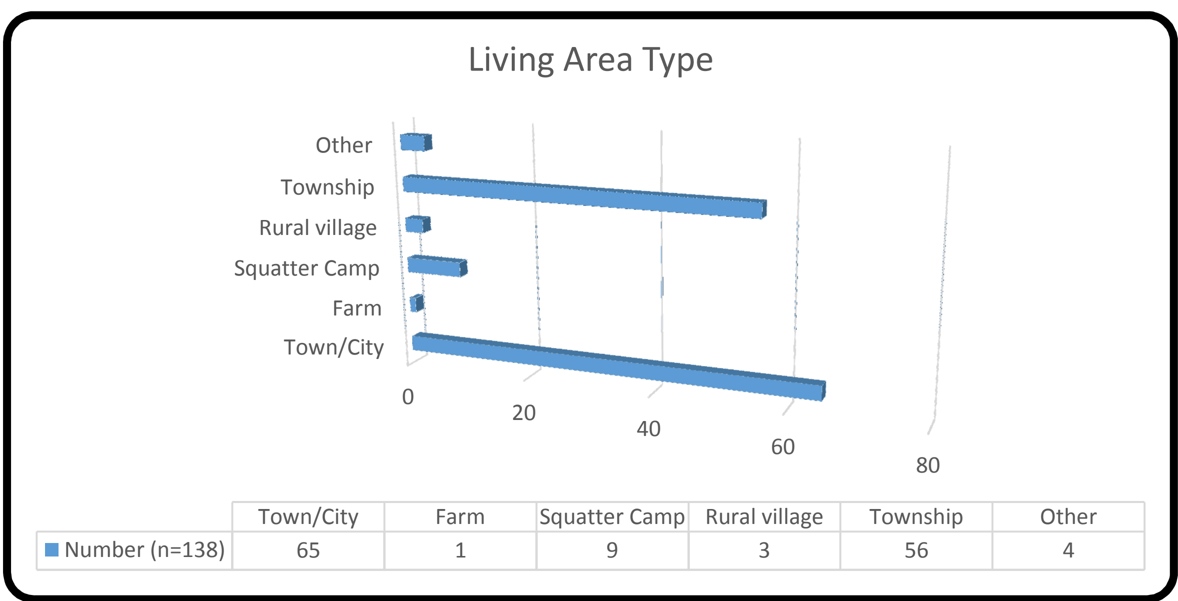


Figure 4.3: Living area type

Figure 4.3 illustrates that 47.10% (n=65) of the participants were living in urban areas while 2.20% (n=3) lived in rural areas. It was noted that even though many lived in urban areas, a large number of respondents lived in townships 41.00% (n=56). Further insight showed that 7.00% (n=9) lived in squatter camps with a small percentage (3.00%, n=4) living in other types of housing.

Table 4.1: Family size, type of house and number of rooms per household

Variables	Number (n=138)	Percentage (%)
Household size		
1 - 4 people	91	65.94
5 – 8 people	38	27.54
9 - 10 +people	9	6.52
Type of House		
Brick	**128**	**92.75**
Clay	5	3.62
Grass	1	0.72
Wood	2	1.45
Zinc/shack	2	1.45
Number of Rooms		
< 2 Rooms	18	13.40
3-4 Rooms	41	29.71
> 4 Rooms	78	56.52
Other	1	0.72
Variables	**Number (n=138)**	**Percentage (%)**
Water Supply		
Tap in House	**122**	**88.40**
Tap outside the yard	16	11.59
Toilet facility		
None	4	2.89
Pit Latrine	5	3.62
Flush/sewage	**129**	**93.47**

According to table 4.1, 65.94% (n=91) of the respondents had a household size of 1-4 people. Table 4.1 also reports that the majority (88.40%, n=122) of the respondents have access to water with taps inside the house. In addition, 93.47% (n=129) had access to flush/ sewage toilets. Moreover, the majority (92.00%, n=128) of the respondents lived in brick houses. The research also showed that 13.40% (n=18) of the respondents had a living space of >2 rooms.

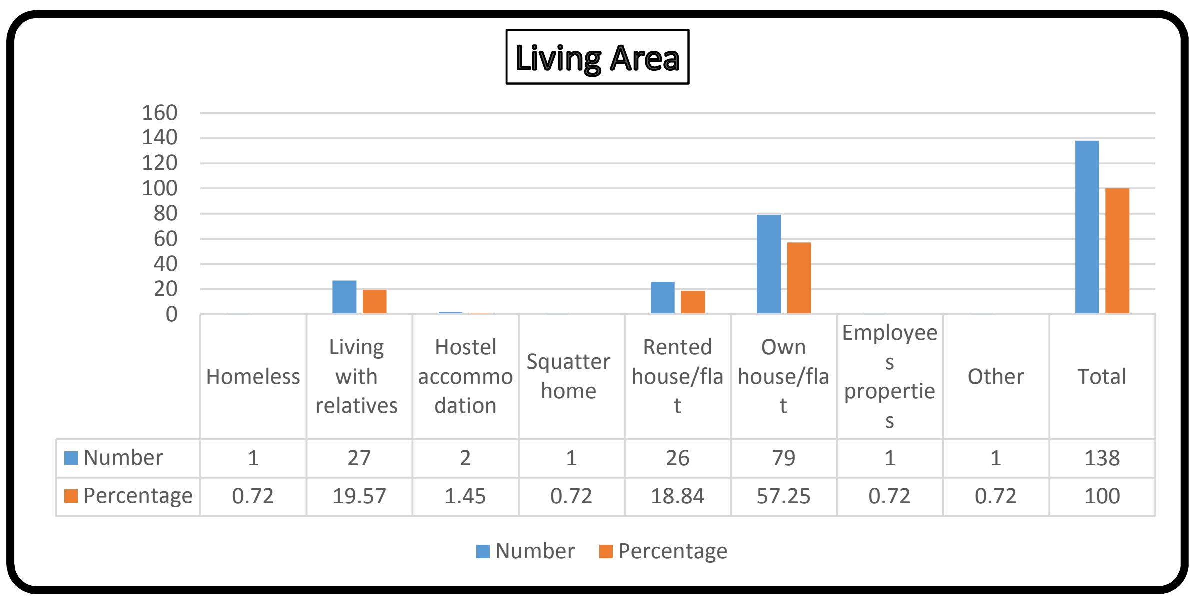


Figure 4.4: Living Status

Figure 4.4 indicated that 57.25% (n=79) of the respondents owned a house/flat. It can be seen that a small number 19.57% (n=27) of respondents were living with a relative, while 18.84% (n=26) lived in a rented house/flat. There were a small number of respondents who reported living in hostel accommodation 1.45% (n=2), squatter homes, employee -property and finally those who were homeless 0.72% (n=1).

Table 4.2: Access to Facilities and Problems with Housing and Pests

Variables	**Number (n=138)**	**Percentage (%)**
Problems with housing		
None	1	0.72
Too small	**27**	**19.57**
Cracking	2	1.45
Repairs	1	0.72
Geyser is leaking	25	18.12
Roof leaking	**79**	**57.25**
Toilet leaking	2	1.45
Damp	1	0.72
Problem with household pests (more than one option could be selected)		
Mice/Rats	62	44.90
Cockroaches	**119**	**86.20**
Ants	**108**	**78.30**
Fleas	**107**	**77.50**
Mosquitoes	21	8.40
Geckos	37	26.8
Snakes	18	13.00

A large number of the respondents indicated that the houses needed maintenance. Table 4.2 reported that a large number of respondents had a problem with a leaking roof 57.25% (n=79) while 19.57% (n=27) indicated that the house was too small. Majority (86.20%, n=119) of the respondents had a problem with pests like cockroaches, ants 78.30% (n=108) and fleas 77.50% (n=107).

4.2.2 Work Status and Education Levels

Table 4.3: Work Status and Income

Variables	**Number (n=138)**	**Percentage (%)**
Current Status		
Employed	137	99.28
Retired	1	0.72
Job Title		
Lecturing staff	104	75.36
Non-lecturing staff	34	24.64
Total Household Income		
R500 – R2500	6	4.35
R2501-R4000	10	7.25
R4501-R6000	18	13.04
>R6001	104	75.36

The results in table 4.3 present the work status and income for the group. Almost all of the respondents were employed (99.28%, n=137) as staff members of Coastal College and the majority of the respondents were lecturing staff 75.36% (n=104). The rest of the staff 24.64% (n=34) were administrative and cleaning staff. The total household income for the majority (75.36%, n=104) was >R6001, while the total monthly income ranged from R500 to R6000 a month for the rest of the respondents.

4.2.3 Education and Language

Table 4.4: Level of education and language

Variables	**Number (n=138)**	**Percentage (%)**
Level of Education		
None	2	1.45
Primary school	2	1.45
Standard 8 (Grade 10)	10	7.25
Standard 10 (Grade 12)	15	10.87

College/FET	39	28.26
Other post school	69	50.00
Other	1	0.72
Language		
IsiZulu	97	70.29
IsiXhosa	3	2.17
English	34	24.64
Afrikaans	2	1.45
Other	2	1.45

The results presented in Table 4.4 indicate that the education levels of 50.00% (n=69) of the staff were post school qualifications, while 28.26% (n=39) had College/FET qualifications. Although the majority indicated having College/FET and other post school qualifications, the level of education for the rest of the staff ranged from no education to Standard 10 (Grade 12). For most 70.29% (n=97) of the respondents the home language was IsiZulu followed by English 24.64% (n=34).

4.2.4 Household Food Security and Assets

Table 4.5: Food Purchases and Expenditure

Variables	Number (n=138)	Percentage (%)
How often do you not have enough money to purchase food		
Always	3	2.17
Often	8	5.80
Sometimes	45	32.69
Seldom	17	12.32
Never	65	47.10
Frequency of purchasing food		
Everyday	4	2.90
Once a week	22	15.94
Once a month	104	75.36
Other	8	5.80
Where food is purchased		
Street vendor	1	0.72
Wholesalers	16	11.59
Supermarket	121	87.68
Amount of money spent of food per month		
R151-R200	1	0.72
R251-R300	24	17.40
>R500	100	72.46

Table 4.5 indicates that the majority of the respondents were food secure with 47.10% (n=65) always having money to purchase food. The results showed that the majority 75.36%

(n=104) purchased food once a month. Furthermore, the food items purchased by 87.68% (n=121) were from supermarkets while the amount of money spent on food per month by the majority 72.46% (n=100) of the respondents was >R500.

Table 4.6: Food preparation

Variables	Number (n=138)	Percentage (%)
Responsible for food preparation in household		
Father	22	15.94
Mother	81	58.70
Sibling	9	6.52
Grandma	2	1.45
Aunt	**3**	2.17
Other	21	15.22
Who decides on food purchase		
Father	29	21.01
Mother	85	61.59
Sibling	6	4.35
Grandma	1	0.72
Aunt	1	0.72
Other	16	11.59
Who decides on the amount of money spent on food		
Father	44	31.88
Mother	71	51.45
Sibling	1	0.72
Grandma	2	1.45
Aunt	2	1.45
Other	18	13.04

Table 4.6, shows that the mother (58.70%, n=81) was mostly responsible for food preparation as well as the purchasing of food (61.59%, n=85). The mother in most households (51.45%, n=71) also decided on how much money was spent on food. It is clear that the mother still has an important role in food purchase and preparation.

Table 4.7: Meals Consumed

Variables	Number (n=138)	Percentage (%)
Number of meals consumed per day		
1 meal	2	1.45
2 meals	26	18.84
3 meals	100	72.46
>3 meals	10	7.25
Where are most meals consumed		

Home	71	51.45
Friends	4	2.90
Work	63	45.65

The majority (72.46%, n=100) of the respondents ate three meals a day and 51.45% (n=71) of these meals were consumed at home. However, 45.65% (n=63) also indicated that most meals were consumed at work. With almost half (45.65%, n=63) of the staff indicating that most of their meals are consumed at work. This makes the workplace ideal for nutrition-education intervention programmes (refer to table 4.7).

Table 4.8: Personal Assets

Variables	**Number (n=138)**	**Percentage (%)**
Electrical stove	131	94.90
Gas stove	65	47.10
Primus or paraffin stove	16	11.60
Microwave	124	89.90
Hot plate	58	42.00
Radio	127	92.00
Television	136	98.60
Refrigerator	134	97.10
Freezer	113	81.90
Mattress only	16	11.60
Lounge suite	120	87.00
Dining room suite	111	80.40
Electrical iron	137	99.30
Electrical, kettle	133	96.40

The results in table 4.8, indicate that the most common household asset were electric stoves owned by 94.90% (n=131) of the households. This was followed by microwaves 89.90%

(n=124), radios 92.00% (n=127), and television sets by 98.60% (n=136). There were a large number (97.10%, n=134) of respondents who indicated owning a fridge, as well as freezers 81.90% (n=113). Other household assets owned were lounge suites in 87.00% (n=120) of the households, dining room suites 80.40% (n=111), electric irons 99.30% (n=137) and electric kettles 96.40% (n=133).

Table 4.9: Fuel and pots used to cook food

Variables	Number (n=138)	Percentage (%)
Type of fuel used for food preparation		
Paraffin	1	0.72
Electricity	131	94.93
Gas	6	4.35
Type of pots used to cook food		
Cast iron	5	3.62
Aluminium	19	13.77
Stainless steel	112	81.16
Clay	2	1.45

Table 4.9 indicates that the majority (94.93%, n=131) of the respondents used electricity in food preparation, this is linked with the results in Table 5.9 where the majority indicated having electric stoves. The most common utensil used for cooking was stainless steel pots by 81.16% (n=112) of the participants.

4.2.4 Anthropometric Indices

All the participants were weighed, measured, with waist circumference measured as well as blood pressure recorded. This section reports on these results.

Table 4.10: BMI categories for Men and Women 19-30 years old (WHO 1995)

Parameter	Men (n=16)	Percentage (%)	Women (n=20)	Percentage (%)
Underweight <18.50	1	6.25	1	5.00
Normal 18.50 - 24.99	9	56.25	6	30.00
Overweight ≥25.00	5	31.25	7	35.00
Obesity Class I 30.00 - 34-99	1	6.25	5	25.00
Obesity Class II 35.00 - 39.99	0	0	0	0
Obesity Class III ≥40.00	0	0	**1**	**5.00**

Table 4.10 indicates that 56.25% (n=9) of men in the 19-30 age category had a normal BMI, This was followed by 31.25% (n=5) in the overweight category. Thirty five percent (n=7) of women were in the overweight category. Even though almost a third 30.00% (n=6) of the women had a normal BMI, 25.00% (n=5) were in the obese class one category. The results showed in this age category that there were more women who were overweight than men.

Table 4.11: BMI categories for Men and Women 31-50 years old (WHO 1995)

Parameter	**Men (n=29)**	**Percentage (%)**	**Women (n=47)**	**Percentage (%)**
Underweight <18.50	0	0	0	0
Normal 18.50 - 24.99	9	31.03	13	27.66
Overweight ≥25.00	12	41.38	10	21.28
Obesity Class I 30.00 - 34-99	3	10.34	8	17.02
Obesity Class II 35.00 - 39.99	4	13.79	9	19.15
Obesity Class III ≥40.00	1	3.45	7	14.89

In the 31- 50 age category 41.38% (n=12) of men were in the overweight category. However, the results also showed that 10.34% (n=3) of men were in the obese class one and 13.79% (n=4) in the obese class two categories. Moreover 27.66% (n=13) of women were in the normal weight category. There were 21.28% (n=10) of the women who were in the overweight category and 17.02% (n=8) in the obese class one and 19.15% (n=9) in the obese class two category, with 14.89% (n=7) in the obese class three category. The results showed that although there were more men than women who were overweight, there were more women who were in the obese class one, two and three categories.

Table 4.12: BMI categories for Men and Women 51-70 years of age (WHO 1995)

Parameter	**Men (n=16)**	**Percentage (%)**	**Women (n=10)**	**Percentage (%)**
Underweight <18.50	0	0	0	0
Normal 18.50 - 24.99	3	18.75	2	20.00
Overweight ≥25.00	6	37.50	1	10.00
Obesity Class I 30.00 - 34-99	6	37.50	3	30.00
Obesity Class II 35.00 - 39.99	1	6.25	3	30.00
Obesity Class III ≥40.00	0	0	1	10.00

Table 4.12 indicates that 37.50% (n=6) of men in the 51-70 age group were in the overweight category. There were also 37.50% (n=6) of men in the obese class one category. Thirty percent (n=3) of the women were in the obese class one and 30.00% (n=3) in the obese class two category. Even in the 51-70 age category, it was evident that there were more obese women than men.

In a *t*-test conducted for BMI for men and women it was found that the difference between the means at a 95% confidence level was statistically significant $p = 0.004$. The BMI of women was higher than that of men.

Table 4.13: Waist Circumference – Women 19-30, 31-50 and 51-70 years according to the WHO (1997) cut-off points

		Categories					
		<75cm	**75-79cm**	**80-88cm**	**89-101 cm**	**102110cm**	**111-120cm**
Recommended cut off point (women) 88cm							
Women – Ages 19-30 (n=20)							
	n	7	3	4	4	1	1
	%	35.00	15.00	20.00	20.00	5.00	5.00
Women- Ages 31-50 (n=47)							
	n	11	7	7	11	8	3
	%	23.40	14.80	14.8	23.40	17.00	6.38
Women- Ages 51-70 (n=10)							
	n	3	1	1	1	1	3
	%	30.00	10.00	10.00	10.00	10.00	30.00
TOTAL (n=77)	**n**	**21**	**11**	**12**	**16**	**10**	**7**
	%	**27.27**	**14.29**	**15.58**	**20.78**	**12.99**	**9.09**

A waist circumference larger than 88cm in women indicates central adiposity (WHO 1995). Table 4.13 indicates that 35.00% (n=7) of women in the 19-30 age category, 23.40% (n=11) in the 31-50 age category and 30.00% (n=3) in the 51-70 age category had a waist circumference of <75cm. In the age category 19-30 years, 20.00% (n=4), 23.00% (n=11) in the 31-50 age category and 10.00% (n=1) in the 51-70 age category had a waist circumference of 89-99cm. In the 51-70 age category 30.00% (n=3) of the women had a waist circumference of 111-120cm.

Table 4.14: Waist Circumference – Men 19-30, 31-50 and 51-70 Years according to the (WHO 1997) cut-off points

		<75cm	**75-79cm**	**80-88cm**	**89-101cm**	**102-110cm**	**111-120>cm**
Cut off point (Male) 102cm							
Men - Ages 19-30 (n=16)							
	n	9	3	2	1	1	0
	%	56.20	18.80	12.50	6.25	6.25	0
Men- Ages 31-50 (n=29)							
	n	7	7	9	3	2	1
	%	24.10	24.10	31.00	10.30	6.89	3.44
Men- Ages 51-70 (n=16)							
	n	3	3	0	4	5	1

	%	18.70	18.70	0	25.00	31.20	6.25
Total (n=61)	n	**19**	**13**	**11**	**8**	**8**	**2**
	%	**31.15**	**21.31**	**18.03**	**13.11**	**13.11**	**3.28**

A waist circumference larger than 102cm in men indicates central adiposity (WHO 1995). Table 4.14 indicates that 56.20% (n=9) of men in the 19-30 age category, 24.10% (n=7) in the 31-50 age category and 18.70% (n=3) in the 51-70 had a waist circumference of <75cm. However, 6.25% (n=1) in the 19-30 age category, 6.89% (n=2) in the 31-50 age category and 31.20% (n=5) in the 51-70 age category respectively had a waist circumference of 102-110cm indicating central adiposity.

In a *t*-test that was conducted for WC it was found that the difference between the means at a 95% confidence level was statistically insignificant p = 0.052. The WC of women was not higher than the WC of men.

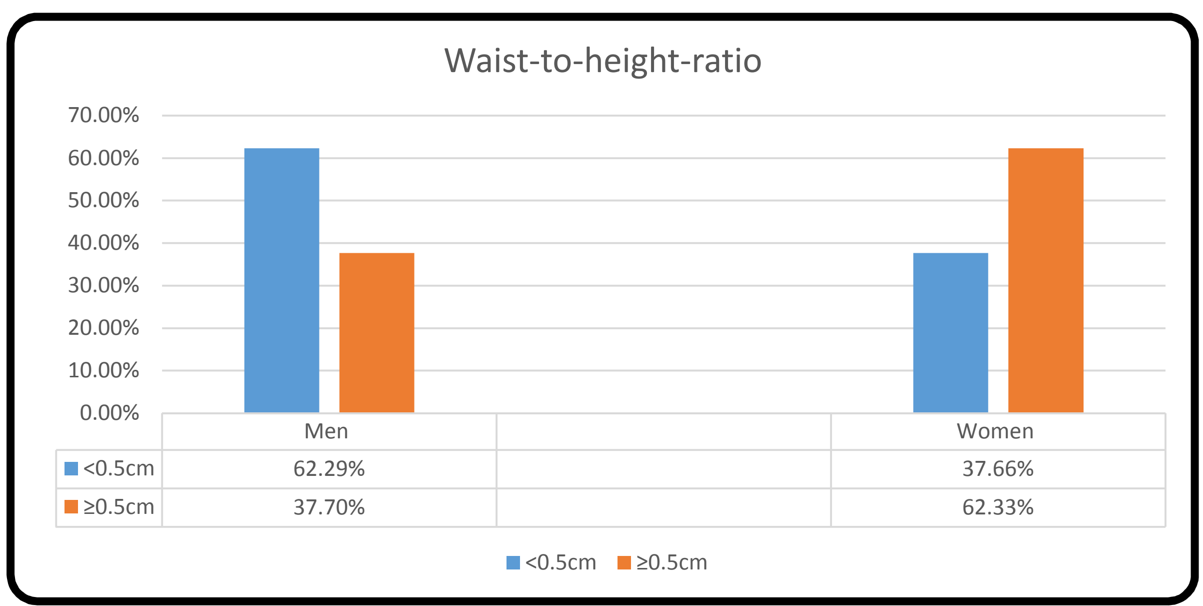


Figure 4.5: Waist-to-height-ratio

In this group there were 62.33% (n=48) women and 37.70% (n=23) men that exceeded the cut-off point of <0.5cm for the waist-to-height ratio.

In a *t*-test that was conducted for the WHtr for men and women in this group it was found that the difference between the means at a 95% confidence level was statistically significant p = 0.004. The WHtr for women was higher than that of men.

4.2.4 Health Assessment

Table 4.15: Women Blood Pressure Categories Systolic and Diastolic according to the WHO cut- off points (2003)

		Normal BP	Prehypertension	Hypertension stage 1	Hypertension stage 2
		SBP/DBP	SBP/DBP	SBP/DBP	SBP/DBP
		<120mmHg/<80 mm	120-139 mmHg/80-89 mmHg	140-159 mmHg/90-99 mmHg	≥160 mmHg/≥100mmHg
Women - Ages 19-30 (n=20)					
	n	16	2	0	2
	%	80	10	0	10.9
Women- Ages 31-50 (n=47)					
	n	31	12	4	0
	%	65.90	25.50	8.50	0
Women- Ages 51-70 (n=10)					
	n	3	6	0	1
	%	30.00	60.00	0	10
TOTAL (n=77)	**n**	**50**	**20**	**4**	**3**
	%	**64.94**	**25.97**	**5.19**	**3.90**

Blood pressure measurements indicated in Table 4.15 reported that 80.00% (n=16) of the women in the 19-30 age category and 65.90% (n=31) in the 31-50 age category had normal blood pressure (>120mmHg/<80mmHg). However 10.00% (n=2), 25.50% (n=12) and 60.00% (n=6) of women in the age category of 19-30, 31-50 and 51-70 respectively were in the pre-hypertension category. A small number of women (n=4) and (n=1) were in the hypertension stage one and two categories.

Table 4.16: Men Blood Pressure Categories Systolic and Diastolic according to the WHO cut- off points (2003)

		Normal BP	Prehypertension	Hypertension stage 1	hypertension stage 2
		SBP/DBP	SBP/DBP	SBP/DBP	SBP/DBP
		<120/mmHg/<80 mmHg	120-139 mmHg/80-89 mmHg	140-159 mmHg/90-99 mmHg	≥160 mmHg/≥100mmHg
Men - Ages 19-30 (n=16)					
	n	8	7	0	1
	%	50.00	43.70	0	6.20
Men- Ages 31-50 (n=29)					
	n	15	11	3	0
	%	51.70	37.90	10.30	0
Men- Ages 51-70 (n=16)					
	n	7	8	0	1
	%	43.70	50.00	0	6.20
TOTAL	**n**	**30**	**26**	**3**	**2**

(n=61)					
	%	**49.18**	**42.62**	**4.92**	**3.28**

The blood pressure measurements for men are presented in table 4.16. Fifty percent (n=8) of men in the 19-50 age group had normal blood pressure, 51.70% (n=15) in the 31-50 age group were also in the normal blood pressure category. However, 43.70% (n=7), 37.90% (n=11) and 50.00% (n=8) of men in the age category of 19-30, 31-50 and 51-70 respectively were in the pre-hypertension category. A small number of men (n=3) and (n=2) were in the hypertensive stage one and two categories.

Table 4.17: Blood Pressure Categories for Men (BP Systolic) and (BP Diastolic) classified by the WHO categories (2003)

		Normal BP	**Prehypertension**	**Hypertension stage 1**	**Hypertension stage 2**
		SBP	**SBP**	**SBP**	**SBP**
		<120mm/Hg/<80 mmHg	**80-89 mmHg**	**90-99 mmHg**	**≥100 mmHg**
Men - Ages 19-30 (n=16)					
	n	8	7	0	1
	%	50.00	43.50	0	6.25
Men - Ages 31-50 (n=29)					
	n	15	11	3	0
	%	51.72	37.93	10.34	0
Men - Ages 51-70 (n=16)					
	n	7	8	0	1
	%	43.75	50	0	6.25
Total (n=61)	**n**	**30**	**26**	**3**	**2**
	%	**49.18**	**42.62**	**4.92**	**3.28**
		Normal BP	**Prehypertension**	**Hypertension stage 1**	**Hypertension stage 2**
		DBP	**DBP**	**DBP**	**DBP**
		<120 mmHg	**120-139 mmHg**	**140-159 mmHg**	**≥160 mmHg**
Men - Ages 19-30 (n=16)					
	n	12	1	2	1
	%	75.00	6.25	12.50	6.25
Men - Ages 31-50 (n=29)					
	n	18	8	2	1
	%	62.10	27.60	6.90	3.40
Men - Ages 51-70 (n=16)					
	n	9	6	1	0
	%	56.25	37.50	6.25	0
Total (n=61)	**n**	**39**	**15**	**5**	**2**

	%	**63.93**	**24.59**	**8.20**	**3.28**

BP – Blood Pressure, SBP – Systolic Blood Pressure, DBP – Diastolic Blood Pressure

Table 4.17 reports that 50.00% (n=8) of men in the 19-30 age group had normal systolic blood pressure while 75.00% (n=12) had normal diastolic blood pressure. In the 31-50 age category, 51.72% (n=15) had normal systolic blood pressure (<120 mmHg) while in the same age category, 62.10% (n=18) had normal diastolic blood pressure (<80 mmHg).

Table 4.18: Blood Pressure Categories for Women (BP Systolic) and (BP Diastolic) according to the WHO classification (Whitworth 2003)

		Normal BP	**Prehypertension**	**Hypertension stage 1**	**Hypertension stage 2**
		SBP	**SBP**	**SBP**	**SBP**
		<120 mm/Hg/<80 mmHg	**80-89 mmHg**	**90-99 mmHg**	**≥100 mmHg**
Women - Ages 19-30 (n=20)					
	n	16	2	0	2
	%	80.00	10.00	0	10.00
Women - Ages 31-50 (n=47)					
	n	31	12	4	0
	%	66.00	25.50	8.50	0
Women - Ages 51-70 (n=10)					
	n	3	6	0	1
	%	30.00	60.00	0	10.00
Total (n=77)	**n**	**50**	**20**	**4**	**3**
	%	**64.94**	**25.97**	**5.19**	**3.90**
		Normal BP	**Prehypertension**	**Hypertension stage 1**	**Hypertension stage 2**
		DBP	**DBP**	**DBP**	**DBP**
		<120 mmHg	**120-139 mmHg**	**140-159 mmHg**	**≥160 mmHg**
Women - Ages 19-30 (n=20)					
	n	16	4	0	0
	%	80.00	20.00	0	0
Women - Ages 31-50 (n=47)					
	n	28	14	2	3
	%	59.70	29.78	4.25	6.38
Women - Ages 51-70 (n=10)					
	n	3	7	0	0
	%	30	10	0	0
Total (n=77)	**n**	**47**	**25**	**2**	**3**

	%	61.04	32.47	2.60	3.90

BP – Blood Pressure, SBP – Systolic Blood Pressure, DBP – Diastolic Blood Pressure

Table 4.18 reports that the majority (80.00%; n=16) of women in the age category 19-30 had normal systolic (>120mmHg) and normal diastolic blood pressure (<80 mmHg). A large number of women (66.00%; n=31) in the 31-50 age category also had normal systolic blood pressure (>120mmHg). More than half of the women (59.70%; n=28) in the 31-50 age group also had normal diastolic blood pressure (<80 mmHg).

In a *t*-test that was conducted for systolic BP, it was found that the difference between the means at a 95% confidence level was statistically significant p = 0.266. The BP Systolic of women and men were similar.

Simarlarly, the *t*-test conducted for diastolic BP revealed that the difference between the means at a 95% confidence level was statistically significant p = 0.579. The BP Diastolic of women and men were also similar.

Table 4.19: History of Disease (Self-reported)

Variables	**Men**		**Women**	
	n= 61		**n= 77**	
Skin disease	6	9.70	9	11.80
Affection of the skeleton and or joints	5	8.10	10	13.20
Affection eyes, ears, nose, teeth	15	24.20	28	36.80
Affection of the heart or circulatory system	4	6.50	7	9.20
Affection of the chest and or respiratory system	4	6.50	3	3.90
Affection of the digestive system	4	6.50	5	6.60
Affection of the urinary system and or genital organs	61	100.00	3	3.90
Nervous affection or mental abnormality	61	100.00	2	2.60
Headaches	18	29.00	21	27.60
Other illness, not specified	9	14.50	7	9.20

Table 4.19 report that 24.20% (n=15) of the men indicated affected eyes, ears, nose and teeth while 100.00% (n=61) indicated urinary system and genital organs and; nervous and

mental abnormality. 36.8% (n=28) of the women also indicated affected eyes, ears, nose and teeth and 27.60% (n=21) suffered from headaches.

Physical Activity

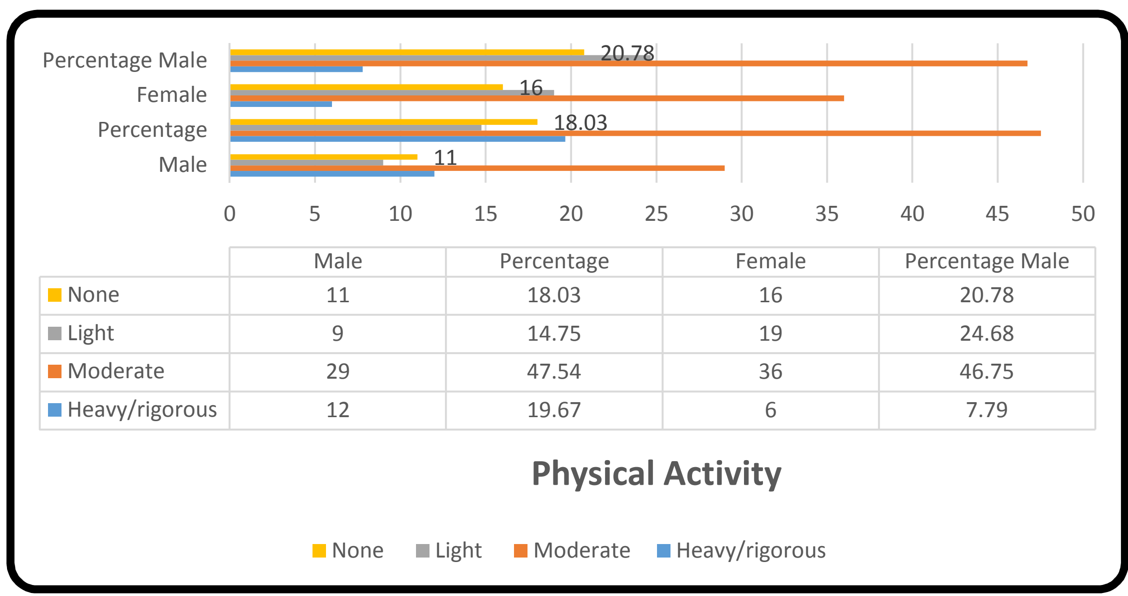


Figure 4.6: Self reported physical activity of men (n=61) and women (n=77)

The perceived physical activity of the participants are reported in figure 4.6 and indicates that 47.54% (n=29) of the men and 46.75% (n=36) of the women engaged in moderate exercise. The results also indicated that 14.75% (n=9) of the men and 24.68% (n=19) of the women indicated engaging in light exercise. No physical activity was reported by 18.03% (n=11) men and 20.78% (n=16) women.

Table 4.20: Substance Usage and Patterns

Variables	Men n=61	Percentage %	Women n=77	Percentage %
Tobacco use				
Yes	13	21.31	10	12.99
No, never smoked	**46**	**75.41**	**65**	**84.42**
No, Stopped	2	3.28	2	2.60
Number of cigarettes per day				
1-15 per day 20-30 per day	10 1	16.00 1.60	7 0	9.10 0
Snuff				
Yes	2	3.28	1	1.30
No, never used snuff	**57**	**93.44**	**74**	**96.10**
No, stopped	2	3.28	2	2.60

Total	61	100.00	77	100.00
Alcohol use				
Yes	27	44.26	17	22.08
No, never used alcohol	30	49.18	51	66.23
No, stopped	4	6.56	9	11.69
Total	61	100.00	77	100.00
Type of alcohol consumed				
Commercial beer/ cider	24	39.30	10	13.00
Home-brewed beer	1	1.60	3	3.90
Strong-liquor	4	6.60	7	9.10
Wine	6	9.80	16	20.80

Table 4.20 reports that 75.41% (n=46) of men and 84.42% (n=65) of women did not smoke. Almost half of the men 49.18% (n=30) indicated that alcohol was not consumed while 44.26% (n=27) indicated that they did consume alcohol. Moreover 66.23% (n=51) of women indicated that alcohol was not consumed. For those that indicated alcohol consumption, commercial beers and ciders were consumed by 39.30% (n=24) men while 20.80% (n=16) of women consumed wine.

4.2.7 Food Variety score, Dietary Diversity Score and Nutrient Adequacy

This following section will report on the dietary intake of the participants

Table 4.21: Food Variety score for the Nine Food Groups (n=136)

Cereal Group n=10	Legumes Group n=5	Flesh Products n=12	Egg Group n=1	Dairy Group n=7	Vegetable Group n=12	Fruit Group n=16	Vitamin A Rich Group n=8	Fat Group n=6	Total Individual Food Items Eaten from all Groups n=77
2=5	1=14	1=1	1=120	1=15	2=2	1=4	1=5	1=3	3-15=3
3=3	2=26	2=1		2=17	3=5	2=3	2=11	2=9	20-29=11
4=5	3=26	3=9		3=21	4=7	3=3	3=12	3=15	30-35=21
5=11	4=10	4=18		5=12	5=13	4=5	4=12	4=23	36-39=6
6=13	5=42	5=17		6=20	6=5	5=11	5=10	5=15	41-45=10
7=21		7=13		7=37	7=5	7=8	6=8	6=69	46-50=6
8=15		8=9			8=11	8=8	7=13		51-54=8
9=22		9=11			9=10	9=3	8=62		57-61=9
10=41		10=7			10=11	10=3			64-67=12
		11=13			11=14	11=5			68-72=14
		12=28			12=52	13=4			73-77=36
						14=7, 15=9			
						16=53			

Low = 0–3 food groups or <30 individual foods.
Medium = 4–5 food groups or 30–60 individual foods.
High = 6–9 food groups or >60 individual foods.

The results in table 4.21 indicate that the fruit group showed the most food variety with 16 types of fruit, followed by the vegetable and flesh group with 12 varieties. The total number of foods consumed by this group was 77 foods.

Within the cereal group two to ten cereal varieties were consumed by the 136 respondents. This was followed by the fat group where one to six varieties were consumed by 134 respondents. In the vitamin A-rich group one to eight foods were consumed by 133 respondents while one to seven dairy products were consumed from the dairy group by 122 respondents. A variety of five legumes were consumed from the legume group by 118 respondents. It was interesting to note that the fruit group had the highest variety with 53 people consuming 16 varieties within the fruit group and 126 people consuming between one to 16 varieties of fruit.

Table 4.22: Summary of the food variety within the nine food groups (n=136)

Food Group	**Mean**	**SD**	**Range of Scores**
Cereals, Roots and Tubers	7.69	±2.245	2 – 10
Vegetables	9.20	±3.073	2– 12
Vitamin A Rich Fruit and Vegetables	5.98	±2.348	1 – 8
Animal Foods meat, poultry, fish	7.74	±3.222	1 – 12
Fats and Oils	4.82	±1.443	1 – 6
Dairy	4.46	±2.142	1 – 7
Fruit	11.24	±5.078	1 – 16
Legumes and Nuts	3.33	±1.451	1 – 5
Eggs	1.00	±0.000	1 – 1
Total Food Items	**55.46**	**±19.088**	**2-77**

Low = 0–3 food groups or <30 individual foods.
Medium = 4–5 food groups or 30–60 individual foods.
High = 6–9 food groups or >60 individual foods

Table 4.22 presents a summary of food variety within the food groups with the Mean (±SD) number of foods consumed by the group. The mean food variety by the group was 55.46±19.0 for all nine food groups within a period of seven days indicating a medium dietary diversity (Medium = 30–60 individual foods).

The group consumed between two to 77 foods. Results also showed that the largest mean variety was in the fruit group where 11.24±5.07 different fruits were consumed followed by vegetables with a mean of 9.20±3.07. The cereal group had a mean variety of 7.69±2.24, and the meat food group a mean variety of 7.74±3.22.

Table 4.23: Mean FGDS of the participants (n=136)

Number of Food Groups Consumed n=9	Frequency	Percentage
3	1	0.73
7	5	3.67
8	27	19.85
9	103	75.70
Total	**136**	**100.0**

Low = 0–3 food groups or <30 individual foods.
Medium = 4–5 food groups or 30–60 individual foods.
High = 6–9 food groups or >60 individual foods

The nine food groups with the number and percentages of participants that consumed from a specific number of food groups is reported in the FGDS summarized in Table 5.24 with 75.70% (n=103) of the participants consuming foods from all nine of the food groups indicating a high food group diversity (High = 6–9 food groups).

4.2.8 Dietary Intake Nutrient Analysis and Top 20 food items

Three 24-hour recall questionnaires, one weekend day and two weekdays were used to calculate the mean food intake and are reported in this section.

Table 4.24: Dietary Intake Nutrient Analysis for men ages 19-30, 31-50 and 51-70, measured using the average of three 24- Hour recall (IoM 2004)

Table 4.24 presents the nutrient analysis for men age categories 19-30, 31-50 and 51-70.

	Mean nutrient intake			Nutrient adequacy			DRIs
Nutrients p/day	**Men 19-30yrs Mean±SD n=16**	**Men 31-50yrs Mean±SD n=29**	**Men >50yrs Mean±SD n=16**	**Men 19-30yrs <100% of DRIs**	**Men 31-50yrs <100% Of DRIs**	**Men >50yrs <100% of DRIs**	**Men 19-50+ yrs**
Energy (kJ) EER	7210.08 ±1403.32	6305.2 ±1751.61	7435.91 ±2257.71	100.00	100.00	93.33	12 881
Total Fat (g)	59.66±10.07	52.61±18.55	60.78±23.42				
Carbohydrate	210.35±53.11	176.68±44.31	220.50±70.31	0.0	6.66	0.0	100

(g) EAR							
Total protein (g) RDA	69.03±20.02	64.22±20.02	67.85±22.73	25.00	36.60	20.00	56
Total dietary fibre (g) AI	14.94±4.56	15.17±9.39	15.64±4.50	100.00	96.60	100.00	19-50– 38 51-70– 30
Calcium (mg) AI	442.70±196.50	406.40±173.91	438.64±192.54	100.00	100.00	100.00	19-50– 1000 51-70– 1200
Iron (mg) EAR	9.56±3.42	8.19±3.14	9.04±3.46	12.50	30.00	20.00	6.0
Magnesium* (mg) EAR	212.49±47.49	209.41±80.87	230.27±65.17	100.00	96.60	93.33	19-30– 330 31-70– 350
Phosphorus (mg) EAR	931.03±234.29	853.36±274.98	935.23±245.00	12.50	16.66	20.00	580
Zinc (mg) EAR	8.90±2.76	8.34±3.99	8.91±3.15	6.25	80.00	73.33	9.4
Selenium (µg)EAR	47.30±26.67	38.48±20.17	36.80±14.11	43.75	76.60	73.33	45
Iodine (µg) EAR	43.27±14.27.	37.01±16.68	38.03±11.01	100.00	96.60	100.00	95
Vitamin A RE (µg/day) EAR	574.25±882.33	358.64±241.77	296.00±175.65	87.50	83.30	93.33	625
Thiamin (mg) EAR	1.00±0.31	0.86±0.29	0.93±0.33	50.00	70.00	66.66	1.0
Riboflavin (mg) EAR	1.35±0.69	1.10±0.55	1.19±0.69	31.25	53.33	60.00	1.1
Niacin (mg NE/Day) EAR	19.68±39.98	15.70±7.52	17.93±6.57	18.75	30.00	20.00	12
Vitamin B6 (mg) EAR	1.32±0.50	1.15±0.51	1.19±0.50	43.75	53.33	73.33	19-50– 1.1 51-70– 1.4
Folate (µg EAR	229.74 ±130.57	181.27 ±99.21	198.94 ±71.57	81.25	96.66	93.33	320
Vitamin B12 (µg) EAR	5.38±6.68	2.86±1.25	3.80±2.15	12.50	20.00	26.66	2.0
Pantothenate (mg) AI	6.36±3.37	5.42±3.70	5.11±2.09	37.50	53.33	53.33	5.0
Biotin (µg) AI	31.15±31.94	22.53±7.42	22.53±5.42	68.75	90.00	86.66	30
Vitamin C (mg) EAR	46.27±35.62	45.73±42.09	31.56±25.23	81.25	80.00	93.33	75
Vitamin D (µg)	2.85±1.22	3.86±4.12	2.70±1.73	100.00	90.00	100.00	19-50– 5.0 51-70- 10
Vitamin E (mg) EAR	6.71±1.58	7.02±2.88	8.48±4.07	100.00	96.66	86.66	12
Vitamin K (µg) AI	26.26±17.92	42.82±45.92	41.92±55.77	100.00	90.00	93.33	120

None of the men in the 19-30 (n=16) age category met the EAR's for energy (7210.08kJ±1403.32), total dietary fibre (14.94g±4.56), calcium (442.70mg±196.50), magnesium (212.49mg±47.49), iodine (43.27µg±14.27), vitamin D (2.85µg±1.22), vitamin E (6.71µg ±1.58) and vitamin K (26.26µg±17.92). The majority of men (80.50%,n=14) of the did not meet the EARs for vitamin A while (81.25%, n=13) did not meet the EARs for folate and vitamin C. The EARs for biotin (68.75%, n=11), zinc (62.50%, n=10), thiamine (50%, n=8), selenium (43.75%, n=7), vitamin B6 (43.75%, n=7), pantothenate (37.5%, n=6), riboflavin (31.25%, n=5), protein (25%, n=4), iron (12.50%, n=2), phosphorus (12.50%, n=2) and vitamin B12 (12.50%, n=2) were also not met.

In the 31-50 age category the EARs were not met for dietary fibre (15.17g±9.39), iodine (37.01µg±16.68), folate (181.27µg±99.21), vitamin E (7.02µg±2.88) (96.66%, n=29), biotin (22.53µg±7.42), vitamin D (3.86µg±4.12), vitamin K (42.82µg±45.92) (90.00%, n=27), vitamin A (358.64µg±241.77) (83.33%, n=25), zinc (8.34mg±3.99), vitamin C (45.73mg±42.09) (80%, n=24), selenium (38.48µg±20.17) (76.66%, n=23), thiamine (70.00%, n=21), riboflavin (53.33%, n=16), pantothenate and vitamin B6 (53.33%, n=16). The EARs were also not met for protein (40%, n=12), iron (30%), niacin (30%, n=9), vitamin B12 (20.00%, n=6), phosphorus (16.66%, n=5) and carbohydrate (0.66%, n=2).

Men in the 51-70 age category did not meet the EARs for calcium (438.64mg±192.54), iodine (38.03µg±11.01), fibre (15.64g±4.50), vitamin D (2.70µg±1.73) (100%, n=15), EER energy (7435.91kJ±2257.71), magnesium (230.27mg±65.17), vitamin A (296.00µg ±175.65), folate (198.94µg±71.57), vitamin C (31.56mg±25.23), vitamin K (41.92µg ±55.77) (93.33%, n=14), vitamin B6 (1.19mg±0.50), selenium (36.80µg±14.11), zinc (8.91mg±3.15) (73.33%, n=11), biotin (22.53µg±5.42), vitamin E (8.48mg±4.07) (86.66%, n=13), thiamine (66.66%, n=10), riboflavin (60.00%, n=9), pantothenate (53.33%, n=8), iron, phosphorus, niacin (20.00%, n=3) and vitamin B12 (26.66%, n=4).

Table 4.25: Dietary Intake Nutrient Analysis and nutrient adequacy for women ages 19-30, 31-50 and 51-70, measured using the average of three 24- Hour recall (IoM 2004)

	Mean nutrient intake			**Nutrient adequacy**			**DRIs**
Nutrients p/day	**Women 19-30yrs Mean±SD n=20**	**Women 31-50yrs Mean±SD n=47**	**Women >50yrs Mean±SD n=10**	**Women 19-30yrs <100% of DRIs**	**Women 31-50yrs <100% Of DRIs**	**Women >50yrs <100% of DRIs**	**Women 19-50+ yrs**
Energy (kJ)	6027.65	5790.44	5989.79	95.23	95.65	100.00	10 093

EER	±1913.01	±2072.44	±986.90				
Total Fat (g)	52.39±21.31	49.80±24.87	47.85±12.73				
Carbohydrate (g) EAR	166.24±60.06	157.64±61.64	185.24±40.03	14.28	15.21	0.0	100
Total protein (g) RDA	61.88±19.96	60.49±19.28	50.19±12.15	23.80	26.08	40.00	46
Total dietary fibre (g) AI	12.33±4.47	13.81±4.85	12.71±4.86	100.00	100.00	100.00	19-50 – 25 51-70 – 21
Calcium (mg) AI	388.71±140.40	400.50±167.76	364.77±161.21	100.00	100.00	100.00	19-50 – 1000 51-70 – 1200
Iron (mg) EAR	7.95±2.77	8.09±3.08	6.44±2.11	57.14	52.17	30.00	19-50 – 8.1 51-70 – 5.0
Magnesium (mg) EAR	178.46±54.06	192.24±63.95	193.64±39.44	90.47	91.30	100.00	19-30 – 255 31-70 – 265
Phosphorus (mg) EAR	821.94±220.02	839.93±233.53	745.35±131.56	19.04	15.21	10.00	580
Zinc (mg) EAR	7.98±2.87	7.63±2.87	6.27±1.71	38.09	47.82	80.00	6.8
Selenium (µg)EAR	42.12±12.55	35.39±26.81	26.91±12.36	61.90	71.73	90.00	45
Iodine (µg) EAR	36.16±12.05	35.06±19.08	40.00±25.45	100.00	97.82	100.00	95
Vitamin A RE (µg/day) EAR	418.28±474.78	631.43±1061.57	223.97±84.79	85.71	65.21	100.00	500
Thiamin (mg) EAR	0.86±0.28	0.80±0.31	0.78±0.20	52.38	60.86	80.00	0.9
Riboflavin (mg) EAR	1.26±0.65	54.08±0.68	1.30±1.17	28.57	39.18	50.00	0.9
Niacin (mg NE/Day) EAR	17.22±6.51	15.88±7.45	13.82±4.66	19.04	30.43	40.00	11
Vitamin B6 (mg) EAR	1.19±0.45	1.07±0.43	0.86±0.33	42.85	60.86	80.00	19-50 – 1.1 51-70 – 1.3
Folate (µg EAR	170.55±55.62	161.53±69.37	127.52±50.31	95.23	97.82	100.00	320
Vitamin B12	3.73±4.21	5.72±11.16	2.58±1.65	19.04	28.26	40.00	2.0

(µg) EAR							
Pantothenate (mg) AI	6.01±2.67	5.39±2.88	5.33±2.20	42.85	107.74	50.00	5.0
Biotin (µg) AI	24.14±7.04	25.56±14.09	20.25±3.94	80.95	78.26	100.00	30
Vitamin C (mg) EAR	44.29±38.98	44.20±35.91	51.42±67.07	71.42	69.56	80.00	60
Vitamin D (µg) AI	2.37±1.23	2.69±1.56	2.25±1.42	95.23	93.47	100.00	19-50 – 5.0 51-70 - 10
Vitamin E (mg) EAR	7.60±4.04	7.46±4.26	7.09±2.54	85.71	86.95	100.00	12
Vitamin K (µg) AI	42.07±47.24	53.03±111.24	34.01±25.29	90.47	91.30	100.00	90

Table 4.25 presents the nutrient analysis for women in the age categories 19-30, 31-50 and 51-70. None of the women in the 19-30 age category met the EARs for dietary fibre (12.33g±4.47), calcium (388.71mg±140.40), zinc (7.98mg±2.87), iodine (36.16µg ±12.05), folate (170.55µg±55.62) and vitamin D (2.37µg±1.23) (100%, n=21). The EARs were also not met for vitamin A (418.28µg±474.78), EER energy (95.23%, n=20), vitamin K (42.07µg ±47.24) (95.23%, n=20), magnesium (178.46mg±54.06) (90.47%, n=19), vitamin E (7.60mg±4.04) (85.71%, n=18), biotin (24.14µg±7.04) (76.19%, n=16), vitamin C (44.29mg±38.98) (71.42%, n=15), selenium (61.90%, n=13) and iron (57.14%, n=12). EARs were also not met for vitamin B6 (42.85%, n=9), pantothenate (42.85%, n=9), zinc (38.09%, n=8), thiamine (52.38%, n=11), protein (23.80%, n=5), carbohydrate (14.28%, n=3), phosphorus, niacin and vitamin B12 (19.04%, n=4).

In the 31-50 age category the EARs were not met for EER energy (5790.44kJ±2072.44), fibre (13.81g±4.85), calcium (400.50mg±167.76) (100%, n=46), iodine (35.06µg±19.08), folate

(161.5µg3±69.37) (97.82%, n=45), magnesium (192.24mg±63.95) (89.13%, n=41), vitamin D (2.69µg±1.56) (93.47%, n=43), vitamin K (53.03µg±111.24) (91.30%, n=42), vitamin E (7.46mg±4.26) (86.95%, n=40), biotin (25.56µg±14.09) (78.26%, n=36), vitamin C (69.56%, n=32), selenium (71.73%, n=33), vitamin B6 (60.86%, n=28). The EARs were also not met for iron (52.71%, n=24), zinc (47.82%, n=22), thiamine (41.30%, n=19), riboflavin (39.18%, n=18), vitamin A (34.78%, n=16), vitamin B12 (28.26%, n=13), protein (26.00%, n=12), carbohydrate and phosphorus (15.21%, n=7).

None of the women in the 51-70 age category met the EARs for energy (5989.79kJ±986.90), fibre (12.71g±4.86), calcium (364.77mg±161.21), vitamin E (7.09mg±2.54), vitamin K

(34.01µg±25.29), folate (127.52µg±50.31), magnesium (193.64mg±39.44), iodine (40.00µg±25.45), vitamin A (223.97µg±84.79), biotin (20.25µg ±3.94) and vitamin D (2.25µg±1.42) (100%, n=10). The EARs were also not met for selenium (26.91µg±12.36) (90.00%, n=9), zinc, thiamine, vitamin B6, vitamin C (80.00%, n=8), pantothenate (50.00%, n=5), riboflavin, niacin, vitamin B12 (40.00%, n=4), protein, iron (30.00%, n=3) and phosphorus (10.00%, n=1).

Table 4.26: Top 20 food items for men 19-30 (n=16) ranked by frequency consumed

No	Food items	Total intake per day (g)	Mean intake per day (g)	Frequency per day	Per capita Intake per day (g)
1	Sugar, White	165.00	10.76	15	10.31
2	Bread/rolls	1335.00	89.00	15	83.44
3	Milk	1700.00	121.43	14	106.25
4	Rice	1231.67	127.41	10	76.98
5	Tea, Brewed	1906.67	260.00	7	119.17
6	Cold Drink, Carbonated	2593.33	370.48	7	162.08
7	Maize Meal	1491,67	213.10	7	93.23
8	Cold Drink	1716.67	257.50	7	107.29
9	Coffee, Instant	1119.67	223.93	5	69.98
10	Apple	860.00	172.00	5	53.75
11	Chicken Curry	843.33	168.67	5	52.71
12	Polony	121.67	26.07	5	7.60
13	Cheese	145.00	33.46	4	9.06
14	Beef Curry	845.00	211.25	4	52.81
15	Potato Chips	451.67	123.18	4	28.23
16	Banana	353.33	96.36	4	22.08
17	Sausage/ Boerewors	266.67	80.00	3	16.67
18	Breakfast Cereal- Corn Flakes	160.00	48.00	3	10.00
19	Chicken, Roasted	486.67	182.50	3	30.42
20	Margarine	35.00	13.13	3	2.19

The top 20 foods consumed by men in the 19-30 age group are presented in table 4.26. The majority of men, ages 19-30 consumed high amounts of carbohydrate food items. Sugar was consumed by 15 individuals and was ranked number one for men ages 19-30. The total intake of sugar for the group was 165.00g and the mean intake was 10.76g, with a per capita intake of 10.31g. Bread rolls (number two) had a mean consumption of 89.00g and a per capita intake of 83.44g while rice was consumed ten times in a one-day period (number four) ,with a mean consumption of 127.41g and a per capita intake of 76.98g. Maize meal (number seven) had a mean intake of 213.10g and was consumed seven times in a one-day period, with a 93.23g per capita intake. The first protein consumed by men (number 11) was

chicken curry, with a mean intake of 168.67g and a per capita intake of 52.71g. The second was polony, with a mean intake of 26.07g and a per capita intake of 7.60g which was consumed five times in a one-day period. The third protein consumed was beef curry (number 14), with a mean intake of 211.25g and a per capita intake of 52.81g. Food items consumed from the fruit and vegetable group were apples (number seven) with a mean intake of 172.00g and a per capita intake of 53.75g which was consumed five times in a one-day period. Bananas (number 16) were consumed 4 times and had a per capita intake of 22.08g and a mean intake of 96.36g.

Table 4.27: Top 20 foods items for women ages 19-30 (n=20) ranked by frequency consumed

No	Food Items	Total intake per day (g)	Mean intake per day per person (g)	Frequency consumed	Per capita intake for 1 day (g)
1	Milk, Full Fat	2402.67	144.16	17	114.41
2	Bread/rolls	1180.00	72.24	16	56.19
3	Sugar, White	212.33	13.00	16	10.11
4	Rice, Brown	1340.00	121.82	11	63.81
5	Tea	1958.33	244.79	8	93.25
6	Maize Meal	1455.00	207.86	7	69.29
7	Chicken Roasted	833.33	119.05	7	39.68
8	Coffee, Instant	1706.67	256.00	7	81.27
9	Banana	516.67	81.58	6	24.60
10	Chicken Stew, Curry	773.00	136.41	6	36.81
11	Cold Drink	1423.33	266.88	5	67.78
12	Apple	740.00	138.75	5	35.24
13	Mixed Vegetables	371.67	69.69	5	17.70
14	Beef Stew, Curry	1031.67	206.33	5	49.13
15	Potato Chips	378.33	103.18	4	18.02
16	Tomato	114.00	31.09	4	5.43
17	Cold Drink	1173.33	352.00	3	55.87
18	Breakfast Cereal-corn Flakes	150.00	50.00	3	7.14
19	Cheese	99.67	33.22	3	4.75
20	Snack, Savoury	90.00	30.00	3	4.29

Table 4.27 indicated the top twenty foods consumed by women in the 19-30 age group. Milk was ranked number one for women ages 19-30. The total intake per day was 2402.67g while the mean intake was 144.16g consumed seventeen times in a one day period, however, the capita intake was 114.41g. Sugar was ranked 3rd and was consumed 16 times in a single

day period by the group, with a mean intake of 13.00g and a per capita intake of 10.11g, while rice with a mean intake of 121.82g and per capita intake of 63.81g. Maize meal (number six) was consumed seven times within a one-day period, with a mean intake of 207.86g and a per capita intake of 69.29g. The top 3 foods consumed from the protein group was chicken (roasted) with a mean intake of 119.05g and a per capita intake of 39.68g. Chicken (stewed/curry) (number 10) was second with a per capita intake of 36.81g and a mean intake of 136.41g. The third most consumed protein (5 times) was beef (stew/curry) with a mean intake of 206.33g and a per capita intake of 49.13g. Foods consumed from the fruit and vegetables group were bananas which were consumed six times (number nine) with a mean intake of 27.19g and a per capita intake of 24.60g. The second most consumed fruit were apples (number 12), consumed four times with a mean intake of 138.75g, while mixed vegetables (frozen/boiled) were the third most consumed in the fruit and vegetable group with a mean intake of 69.69g and a per capita intake of 17.70g.

Table 4.28: Top 20 foods items for men 31-50 (n=29) ranked by frequency consumed.

No	Food Items	Total Intake per day (g)	Mean intake per day (g)	Frequency per day	Per Capita intake for 1 day (g)
1	Bread/rolls	2388.33	80.51	30	79.61
2	Sugar	316.00	11.56	27	10.53
3	Milk	312667	144.31	22	104.22
4	Rice	2365.67	129.04	18	78.86
5	Tea	2926.67	243.89	12	97.56
6	Maize Meal	2275.00	206.82	11	75.83
7	Coffee, Instant	2685.00	259.84	10	89.50
8	Chicken Stew/ Curry	1373.33	152.59	9	45.78
9	Cold Drink	1828.33	249.32	7	60.94
10	Apple	1163.33	166.19	7	38.78
11	Banana	606.67	86.67	7	20.22
12	Beef Stew/ Curry	1328.33	199.25	7	44.28
13	Cold Drink, Carbonated	3000.00	500.00	6	100.00
14	Butter	75.00	13.24	6	2.50
15	Cheese	190.00	35.63	5	6.33
16	Bacon	71.67	13.44	5	2.39
17	Lettuce	58.33	10.94	5	1.94
18	Chicken Roasted	715.00	143.00	5	23.83
19	Egg, Fried	38333	76.67	5	12.78
20	Polony	116.67	25.00	5	3.89

Table 4.28 shows the dietary analysis and top 20 foods for men (n=30) ages 31-50. The food item that was ranked 1st for men, was bread rolls which were from the carbohydrate group, which was consumed 30 times over a one day period, with a mean intake of 80.61g and a per capita intake of 79.61g. The 2nd most consumed (27 times) carbohydrate was sugar with a per capita intake of 10.53g and a mean intake of 11.56 by 27 individuals. Rice was consumed 18 times over a one day period with a mean intake of 129.04g and a per capita intake of 78.86g. The 4th most consumed carbohydrate was maize meal (11 times over a one day period) which was ranked 6th with a mean intake of 206.82g and a per capita intake of 75.83g. The three most consumed foods from the protein group were chicken (stew/ curry) which was consumed nine times, of a one-day period with a mean intake of 152.59g and a per capita intake of 45.78g, followed by beef (stew/curry) which was consumed seven times over a one day period with a per capita intake of 44.28g and a mean intake of 199.24g. Bacon (pan-fried/grilled) was consumed five times over a one-day period and had a mean intake of 13.44g and a per capita intake of 2.39g. Foods consumed from the fruit and vegetable group was apples (seven times in one day) with a mean intake of 86.67g and a per capita intake of 38.78g, bananas (seven times in one day) with a mean intake of 1820g and a per capita intake of 20.22g and lettuce (five times in one day) with a mean intake of 10.95g and a per capita intake of 1.94g.

Table 4.29: Top 20 foods items for women 31-50 (n=47) ranked by frequency consumed.

No	**Food item**	**Total intake per day (g)**	**Mean intake per day (g)**	**Frequency consumed**	**Per capita intake (g)**
1	Milk	4163.33	123.66	34	90.51
2	Sugar	374.83	11.47	33	8.15
3	Bread/rolls	2160.33	68.22	32	46.96
4	Rice	2590.00	119.54	22	56.30
5	Tea	5095.00	246.53	21	110.76
6	Maize Meal	3538.33	221.15	16	76.92
7	Chicken Curry/ Stew	2085.00	142.16	15	45.33
8	Apple	1886.67	145.13	13	41.01
9	Cold Drink, Carbonated	4018.33	317.24	13	87.36
10	Mixed Vegetables	1030.00	83.51	12	22.39
11	Cheese	330.83	33.08	10	7.19
12	Coffee, instant	2144.00	238.22	9	46.61
13	Banana	726.67	83.85	9	15.80
14	Cold Drink (Squash)	2215.00	265.80	8	48.15
15	Chicken Roasted	975.00	121.88	8	21.20

16	Yoghurt	833.33	113.64	7	18.12
17	Margarine	75,83	10.34	7	1.65
18	Beef Curry, Stew	1396.67	199.52	7	30.36
19	Sausage	450.00	67.50	7	9.78
20	Butter	86.00	14.33	6	1.87

The top 20 foods consumed by women in the 31-50 age group is presented in table 4.29. The food item ranked (number one) was milk (consumed thirty four times in one day) with a mean intake of 123.66g and a per capita intake of 90.51g. The majority of women consumed foods from the carbohydrate group with sugar (consumed 33 times over a one day period) being ranked 2nd with a per capita intake of 8.15g and a mean intake of 11.47g. Bread rolls were the second most consumed carbohydrate (32 times in one day) with a mean intake of 68.22g and a per capita intake of 46.96g. The 3rd most consumed carbohydrate was rice (consumed 22 times in one day) with a per capita intake 56.30g and a mean intake of 119.54g. The top three foods consumed from the protein group were chicken (stew/curry) (consumed 15 times in one day) with a mean intake of 142.16g and a per capita intake of 45.33g, roasted chicken (consumed eight times over a one day period) with a per capita intake of 21.20g and a mean intake of 121.88g and beef (stew/ curry) (consumed 7 times over a one day period) with a

mean intake of 199.52g and a per capita intake of 30.36g. The top three foods consumed from the fruit and vegetable group were apples (consumed 13 times over a one-day period) with a mean intake of 145.13g and a per capita intake of 41.01g, mixed vegetables (consumed twelve times over one day) with a per capita intake of 22.39g and a mean intake of 83.51g and bananas (consumed 9 times over one day) with a mean intake of 83.85g and a per capita intake of 15.80g.

Table 4.30: Top 20 foods items for men 51-70 (n=16) ranked by frequency consumed.

No	Food item	Total intake per day (g)	Mean intake per day (g)	Frequency Per day	Per Capita intake (g)
1	Sugar	300.50	13.07	23	20.03
2	Bread/rolls, Brown	1585.00	76.69	21	105.67
3	Tea	3833.33	244.68	16	255.56
4	Milk	1918.33	122.45	16	127.89
5	Rice	1331.67	128.87	10	88.78
6	Cold Drink	1851.67	222.20	8	123.44

7	Coffee, instant	1500.00	250.00	6	100.00
8	Maize Meal	1235.00	217.94	6	82.33
9	Butter	65.00	12.19	5	4.33
10	Beef Curry	898.33	192.50	5	59.89
11	Chicken Curry	836.67	179.29	5	55.78
12	Cold Drink, Carbonated	1443.33	333.08	4	96.22
13	Apple	413.33	137.78	3	27.56
14	Banana, Raw (peeled)	236.67	78,89	3	15.78
15	Polony	76.67	25.56	3	5.11
16	Curry, Mutton	408.33	175.00	2	27.22
17	Beef, Mince Savoury	173.33	74.29	2	11.56
18	Breakfast Cereal- Corn Flakes	120.00	51.43	2	8.00
19	Mixed Vegetables	108.33	46.43	2	7.22
20	Biryani-vegetable	356.67	178.33	2	23.78

Table 4.30 shows the dietary analysis and top 20 foods consumed by men from the 51-70 age group. The majority of men consumed foods from the carbohydrate group with sugar (consumed 23 times in one day) being 1st with a mean intake of 13.07g and a per capita intake of 20.03g, while brown bread rolls (consumed twenty one times over a one-day period) was ranked 2nd with a per capita intake of 105.67g and a mean intake of 76.69g. Rice was ranked 5th (consumed 10 times over a one-day period) with a mean intake of 128.87g and a per capita intake of 88.78g. The top three foods consumed from the protein group were beef (curry) (consumed five times over a one-day period) with a mean intake of 192.50g and a per capita intake of 59.89g, chicken curry (consumed 5 times over one day) with a per capita intake of 55.78g and a mean intake of 179.29g and polony (consumed three times over a one day period) with a mean intake of 25.56g and per capita intake of 5.11g. Milk (consumed 16 times in one day) was ranked 4th with a mean intake of 122.45g and a per capita intake of 127.89g. The top three foods consumed from the fruit and vegetable group were apples (consumed 3 times over a one day period) with a per capita intake of 27.56g and a mean intake of 137.78g, bananas (consumed three times in one day) with a mean intake of 78.89g and a per capita intake of 15.78g and mixed vegetables (consumed 2 times over a one-day period) with a mean intake of 46.43g and per capita intake of 7.22g.

Table 4.31: Top 20 foods items for women 51-70 (n=10) ranked by frequency consumed.

No	Food item	Total intake per day (g)	Mean intake per day (g)	frequency per day	Per capita intake (g)
1	Sugar	155.33	14.12	11	15.53
2	Milk	1265.17	126.52	10	126.52
3	Tea	2266.67	242.86	9	226.67
4	Maize Meal	1650.00	215.22	8	165.00
5	Rice	856.67	142.78	6	85.67
6	Bread/rolls	423.33	70.56	6	42.33
7	Peanut Butter	10.00	2.00	5	1.00
8	Chicken Curry/ Stew	736.67	170.00	4	73.67
9	Coffee, instant	833.33	250.00	3	83.33
10	Apple	513.33	171.11	3	51.33
11	Butter	38.33	14.38	3	3.83
12	Beef Curry/ Stew	386.67	165.71	2	38.67
13	Cold Drink	493.33	246.67	2	49.33
14	Margarine	15.00	7.50	2	1.50
15	Cold Drink, Carbonated	743.33	446.00	2	74.33
16	Fruit Juice	416.67	250.00	2	41.67
17	Breakfast Cereal- Weet-bix	123.33	74.00	2	12.33
18	Cabbage	76.67	46.00	2	7.67
19	Salt, Table	3.33	2.00	2	0.33
20	Chicken Roasted	153.33	115.00	1	15.33

The top 20 foods consumed by women in the 51-70 age group is presented in table 4.31. The majority of foods consumed by women from the age group 51-70 were from the carbohydrate group with sugar (consumed eleven times over a one day period) being ranked number one with a mean intake of 14.12g and a mean intake and per capita intake of 15.53g.Maize meal was ranked 4th (consumed 8 times over one day) with a per capita intake of 165.00g and a mean intake of 215.22g. Rice was ranked 5th (consumed five times in one day) with a mean intake of 142.78g and a per capita intake of 85.67g. Bread rolls (consumed six times in one day) was ranked 6th with a mean intake of 70.56g and a per capita intake of 42.33g. Foods consumed from the protein group were peanut butter (consumed 5 times in one day) which was ranked 7th with a per capita intake of 1.00g and a mean intake of 2.00g and chicken (stew/curry), (consumed four times in one day) with a with a per capita intake of 73.67g and mean intake of 170.00g. Beef (stew/curry) (consumed twice, over a one day period), was ranked 12th with a per capita intake of 38.67g and a mean intake of 165.71g. Foods consumed

from the fruit and vegetable group were apples (consumed three times over a one day period), with a mean intake of 171.11g and a per capita intake of 51.33g and cabbage (boiled) (consumed 2 times in one day) with a per capita intake of 7.67g and mean intake of 46.00g.

Dietary Factor (Nutrient)	**WHO goal**	**Men 19-30 (n=16) Mean % Energy contribution**	**Women 19-30 (n=21) Mean % Energy contribution**
Protein %AMDR	10-15%	16.28	17.45
Total fat %AMDR	15-30%	30.62	32.16
CHO avail. (+ Fibre) %AMDR	55-75%	53.12	50.35
Fruit and vegetables per day (g)	>400	175.69	170.90

% AMDR– Acceptable Macronutrient Distribution Range g- Grams

Figure 4.7: Percentage of energy distribution of the macronutrients and fruit and vegetable intake for Men and Women 19-30 years (WHO 2003).

Figure 4.7 indicates the Acceptable Macronutrient Distribution Range from the 24 hour recalls according to the WHO dietary factor goals (2003) both men (26.22%, n=16) and women (25.97%, n=20) in the age category 19-30 were above the range of 10-15% for protein and 15-30% for fat. However, the carbohydrates and fibre were below the WHO goals for men contributing 53.12% and women contributing 50.35% to the daily energy as compared to the WHO goal of 55-75%. The men consumed 175.69g and women 170.90g fruit and vegetables per day which is <400g per day for fruit and vegetables as recommended by the WHO (2003).

Dietary Factor (Nutrient)	**WHO goal**	**Men 31-50 (n=30) Mean % Energy Distribution**	**Women 31-50 (n=46) Mean % Energy Distribution**
Protein %AMDR	10-15%	17.31	17.76
Total Fat %AMDR	15-30%	30.87	31.82
Carbohydrate avail. (+ Fibre) %AMDR	55-75%	51.72	50.33
Fruit and vegetables per day (g)	>400	153.06	183.30

%AMDR – Acceptable Macronutrient Distribution Range g- Grams

Figure 4.8: Percentage of Acceptable Macronutrient Distribution Range Men and Women 31-50 (WHO 2003)

Figure 4.8 illustrates the energy distribution of the macronutrients in the age category 31-50. The results indicate that men (47.54%, n=29) and women (61.03%, n=47) consumed above the WHO goals for protein (10-15%) and fat (15-30%). The carbohydrate and fibre percentage of energy contribution was lower than the WHO goal at 51.72% for men and 50.33% for women. The fruit and vegetable intake per day for the group was 153.06g for men and 183.30g for women in the 31-50 age category which was <400 WHO recommendation (WHO 2003).

Dietary Factor (Nutrient)	WHO goal	Men 51-70 (n=15) Mean % Energy contribution	Women 51-70 (n=10) Mean % Energy contribution
Protein %AMDR	10-15%	15.47	14.25
Total Fat %AMDR	15-30%	30.17	29.56
Carbohydrate avail. (+ Fibre) %AMDR	55-75%	53.86	56.18
Fruit and vegetables per day (g)	>400	134.44	170.90

%AMDR – Acceptable Macronutrient Distribution Range g- Grams

Figure 4.9: Percentage of Acceptable Macronutrient Distribution Range Men and Women 51-70 years (WHO 2003)

The energy distribution of the macronutrients in the age category 51-70, is presented in figure 4.9. Fat although within the range of between 15-30% is on the higher side of the range at 29.56% for women and; is slightly over the top of the range at 30.17% for the men and the energy distribution for the men from protein was above the cut-off point of 15% at 15.47% and the women 14.25% slightly lower. The percentage energy from carbohydrate and fibre for men (53.86%) was lower than the WHO goal of 55-75% though the women (56.18%) were within the range as compared to the WHO goal of 55-75%. The fruit and vegetable intake was <400g for both men (134.44g) and women (170.90g), per day, respectively in the 51-70 age category.

4.2.9 Mean Nutrient adequacy Ratio (NAR Expressed as %) of energy and nutrients at different levels of dietary diversity score

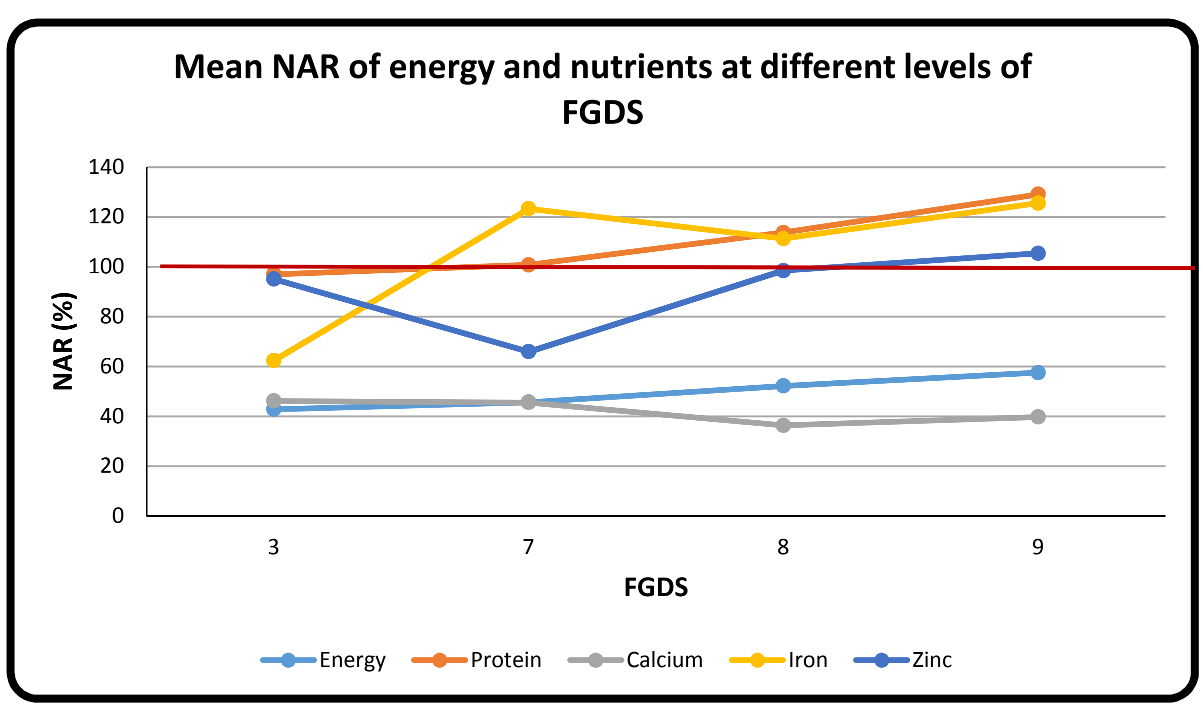


Figure 4.10: Mean Nutrient Adequacy Ratio (NAR Expressed as %) of energy and nutrients at different levels of dietary diversity score.

Figure 4.10 illustrates the relationship between the FGDS and NARs for energy, protein, calcium, iron and zinc. The graphs should be read with caution as only 5 participants consumed from 7 food groups with the rest consuming from eight (n=27) and nine (n=103) food groups (refer to Table 4.2.1). Therefore, the nutrient adequacy ratio increase slightly between seven and eight food groups, will be a better indicator of increased nutrients as dietary diversity increased. Protein and iron reached a NAR of 100% with a dietary diversity score of seven. Although the nutrient adequacy ratio for energy increases with dietary diversity, it did not reach 100%. Iron reached a NAR of 123.31% with a dietary diversity score of 7. Calcium did not reach 100% and showed an upwards trend with increased dietary diversity between eight and nine food groups. Zinc reached a NAR of 105.41% with a dietary diversity score of 9.

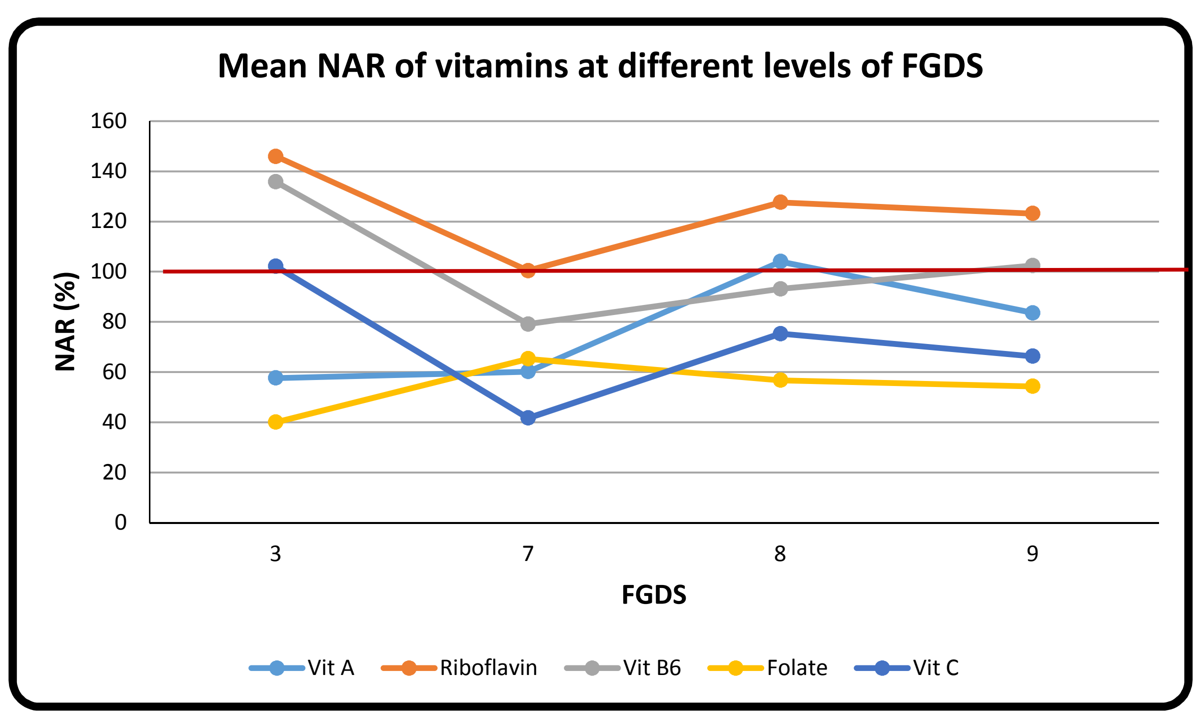


Figure 4.11: Mean Nutrient adequacy Ratio (NAR Expressed as %) of vitamins and nutrients at different levels of dietary diversity score

The relationship between the FGDS and NARS of vitamin A, riboflavin, vitamin B_6, folate and vitamin C are illustrated in figure 4.11. An upward trend was noted only for vitamin B6, between eight and nine food groups reaching a NAR of 135.76%, Vitamin A reached a NAR of 104.04% with a DDS of 8. Folate did not reach a NAR of 100% for this group.

4.3 CORRELATIONS

Correlations were conducted using the Pearson statistical test. The implied scatter plots of two variables are put into coefficient quantitative terms by Pearson's correlation r=0, indicates no association while negative associations are indicated by r= -1 and positive associations are indicated by r= 1 (Gelman 2013).

The *p*-value is the probability of obtaining a test statistic at least as extreme as the one that was actually observed, assuming that the null hypothesis is true. However, the rejection of the null hypothesis occurs when the *p*-value is less than 0.05 or 0.01. When the null hypothesis is rejected, the result is said to be statistically significant (Gelman 2013).

Table 4.32: Relationship between BMI for Age, Waist-to-height ratio, Waist circumference, education, household Income and money spent on food as well as age and other variables (Spearman's rho correlations).

Variable	**Relationship (r value)**	**Significance (p value)**
Waist-to-height ratio (Women) for BMI	0.223	0.050*
Waist-to-height ratio (men) for BMI	0.626	0.000**
Waist circumference for Systolic blood pressure	0.316	0.000**
Waist circumference for diastolic blood pressure	0.177	0.037*
BMI for Education	0.082	0.339
BMI and living area	0.134	0.117
BMI for Age	0.139	0.103
BMI for money spent on food	0.021	0.806
BMI and household income	0.021	0.806
Age and Systolic blood Pressure	0.234	0.005**
Age and Diastolic blood Pressure	0.121	0.157
Age and Blood pressure systolic and diastolic (women)	0.213 Systolic 0.181 Diastolic	0.898 0.786
Age and Blood pressure systolic and diastolic (men)	0.094 Systolic 0.085 Diastolic.	0.469 0.514

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

** Correlation is significant at the 0.01 level (2-tailed).

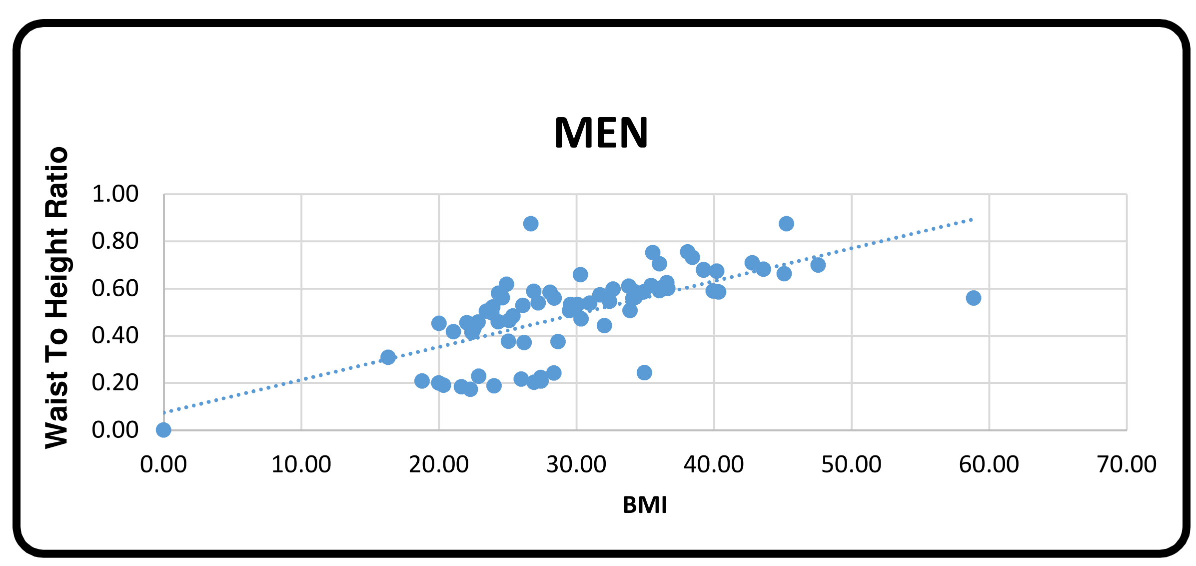


Figure 4.12: BMI for waist to height ratio (Men)

Figure 4.12 represents BMI and waist-to-height-ratio increases among men in the group. This relationship was statistically significant ($p= 0.000$).

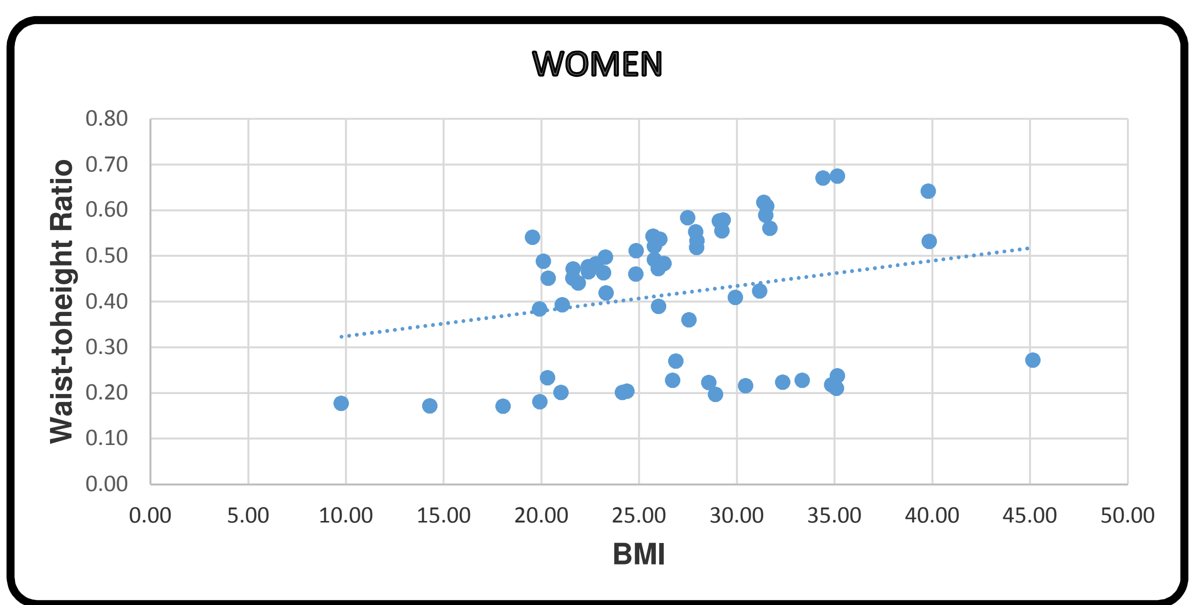


Figure 4.13: BMI for waist to height ratio (Women)

Figure 4.13 represents BMI and waist-to-height-ratio increases among women in the group. This relationship between BMI and waist-to-height ratio was statistically significant ($p= 0.050$).

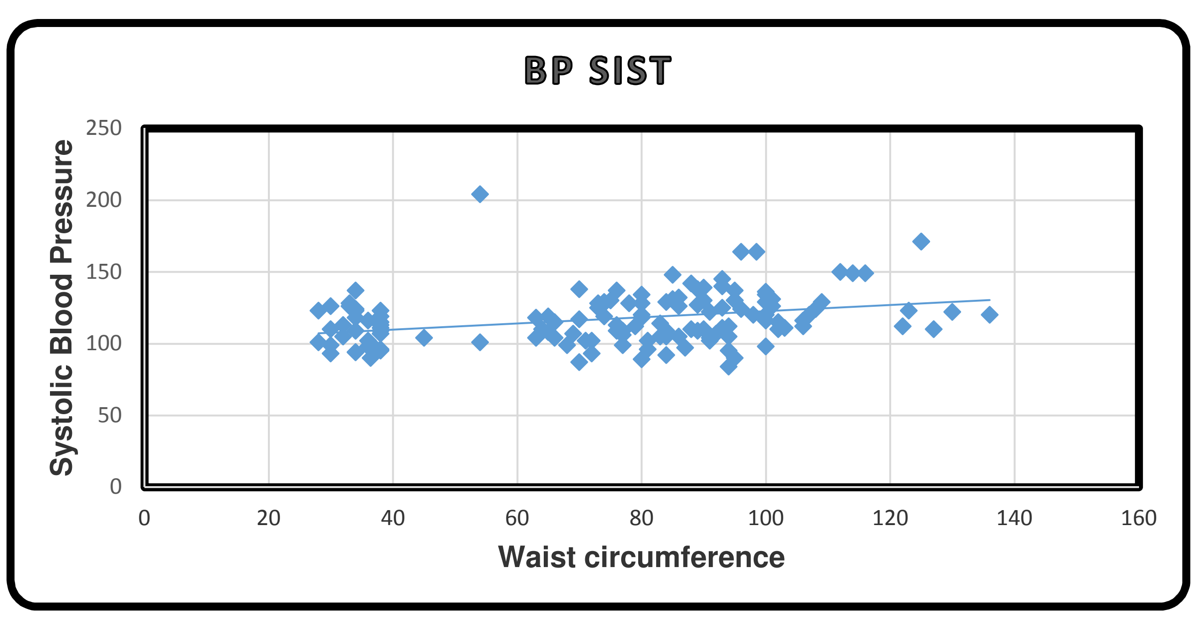


Figure 4.14: Waist circumference for Systolic Blood Pressure

Figure 4.14 presents waist circumferences with systolic blood pressure. Systolic blood pressure increased as waist circumference increased (*p*=0.000). This relationship was statistically significant.

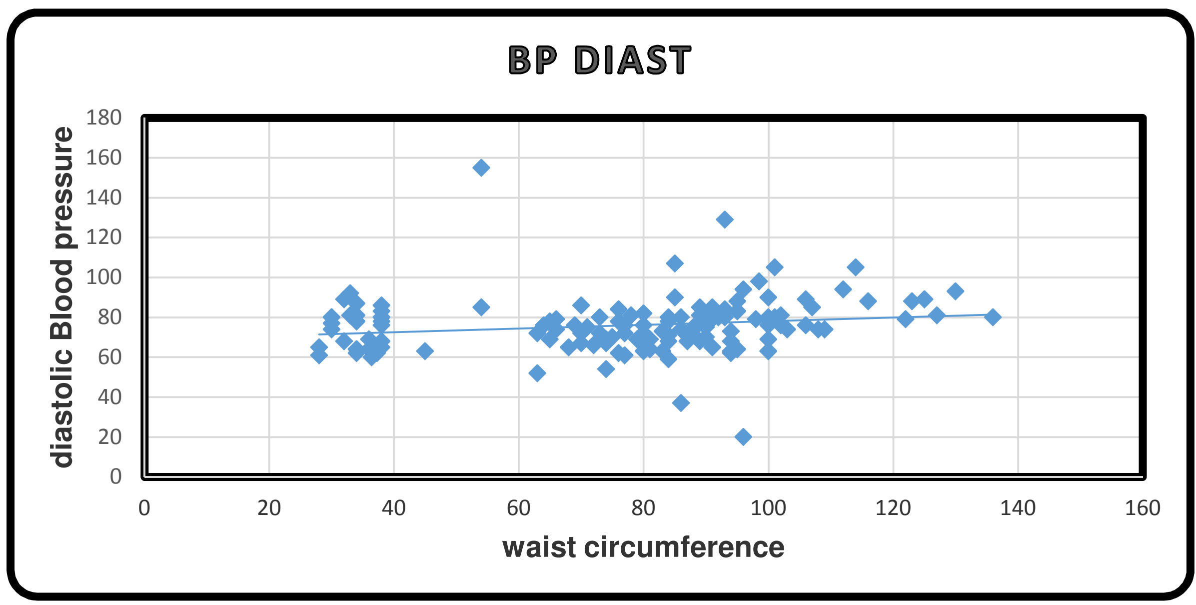


Figure 4.15: Waist Circumference for Diastolic Blood Pressure

Diastolic pressure increased as waist circumference increased as presented in Figure 4.15.

The correlation was not strong, but was statistically significant (*p*= 0.037)

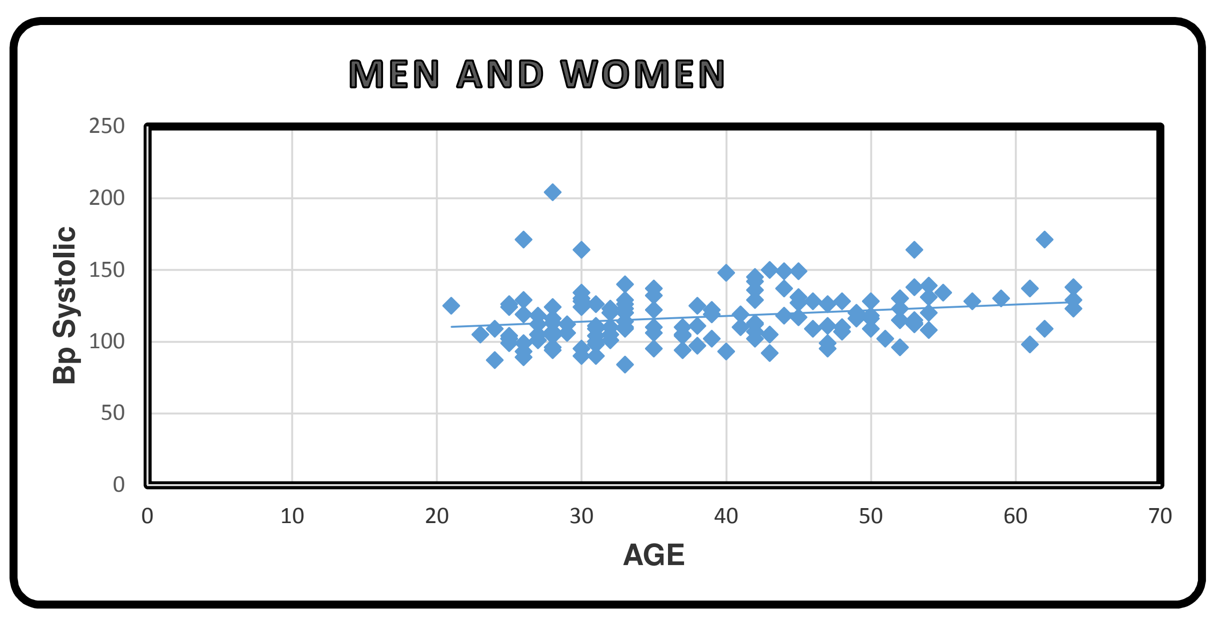


Figure 4.16 presents Age for Systolic Blood Pressure

Systolic blood pressure increased with age. The correlation between age and systolic blood pressure was strong (*p*=0.005). This relationship was statistically significant.

4.4 **DISCUSSION**

In this study there were 138 participants of which 44% (n =61) were men and 56% (n=77) women. Findings showed that the respondents were food secure with 47.1% (n=65) of the staff always having money to purchase food. The majority (75.4%, n=104) of the sample population purchased food once a month. Most of the respondents (87.7%, n=121) purchased food items from supermarkets, while the amount of money spent on food by the majority (89.85%, n=124) of respondents was between R251 and >R500. This is inconsistent with results from a poverty trend report compiled by statistics South Africa between 2006 and 2011 and a living conditions survey done between 2008 and 2009 where it was revealed that poor households spent around 10% of the total expenditure on food (Lehohla 2014). However this was inconsistent since most of the respondents were lecturing staff (75.36%, n=104) and did not fall into the low income category.

The present study indicated that 49.3% (n=68), of the staff had post school qualifications while 28.3% (n=39) had college/FET qualifications. The results in the present study indicated that 63.93% of the men and 71.43% of the women were obese. This is consistent with findings in a South African demographic and health survey conducted in 2002, where 56% of South African women were classified as overweight (Puoane et al 2002). A *t*-test conducted for BMI found that the difference between the means at a 95% confidence level was

statistically significant $p = 0.004$. The BMI of women was higher than that of men. Similar findings were revealed when a *t*-test was conducted for WHtr.

Findings revealed that there were also 16.39% men that exceeded the 102cm cut-off point and 42.86 % women that exceeded the 88cm cut-off point for waist circumference. Moreover in this group there were 62.33% (n=48) men and 37.70% (n=23) women that exceeded the waist-to-height-ratio cut-off point of <0.5cm. Exceeding the cut-off point for waist-to-height-ratio becomes a risk factor for metabolic syndrome and coronary heart disease. Obesity and overweight in this group was more prevalent in women than men. In 2012, the South African National Health and Examination Survey (SANHANES-1) revealed that obesity increased from 27% in 2003 to 39.2% in 2012 amongst adults in urban areas in South Africa (Battersby 2013).

The Heart and Stroke Foundation (HSF 2013) presented that approximately 25% of the South African population are hypertensive. The blood pressure results from the participants in this study indicated that 24.59% (n=15) of men and 25.97% (n=20) of women were pre-hypertensive. The total number of respondents in the group who were hypertensive were 8.20% men and 9.09% women, less than indicated by the HSF.

In this study all the men reported having nervous affection or mental abnormality while 27.60% (n=21) of the women reported having headaches which is higher than was found in a South African stress and health survey (SASH) conducted between 2003 and 2004 where 16.5% of adults experienced mood and anxiety or substance use disorder in the preceding 12 months of the survey (Herman *et al*. 2009).

The findings revealed that 47.5% (n=29) of men and 46.8% (n=36) of women indicated engaging in moderate exercise. Even though almost half of the respondents indicated that they engaged in moderate exercise, the word moderate can have different meanings for different individuals, it could also be that the respondents were engaging in moderate exercise, but it may not have been the correct amount. A sedentary lifestyle among South Africans is another risk factor for the development of non-communicable diseases. This is consistent with findings by Kruger, Puone and Senekal (2005) where increased sedentary lifestyle among South African women were observed.

Less than half of the participants, 44.26% (n=27) of the men and 22.08% (n=17) of the women, consumed alcohol while 21.31% (n=13) of the men and 12.99% (n=10) of the women smoked cigarettes. Similar results were found in the SANHANES-1 survey where 20.8% of the participants smoked cigarettes and 43.0% of the men and 15.3% of the women consumed alcohol (Battersby 2013).

The mean FVS (±SD) for all the foods consumed from all the food groups in a period of seven days was 54.4 (±19.0) indicating a medium variety. The highest consumption was sixteen foods in the fruit group by 37.68% (n=52) of the respondents. The majority of respondents consumed 7-9 of the food groups (99.2%, n=135) indicating a high dietary diversity. However, these results were not consistent with a cross-sectional study done in South African adults in all nine provinces of South Africa in 2009 to access dietary variety, which revealed that KwaZulu Natal had a low dietary diversity of (<4 foods) (Labadarios, Steyn and Nel 2011). The high food variety consumed by this group could be due to the fact that the majority were lecturing staff with an average salary of R6000 that had access to more food variety in the urban areas.

A large percentage of carbohydrates were consumed by both men and women, in the form of sugar, bread rolls, rice and maize meal, and these offered very little fibre and short term energy release. However, the percentage energy distribution for carbohydrates and fibre was slightly lower than the WHO goals of 55-75% for all age categories among men (52.90%) and women (52.28%). Sugar and items from the carbohydrate group, bread rolls in particular, rice, maize meal, as well as milk were among the top twenty food items consumed among the men and women in this group. Similar findings were reported by (Labadarious, Steyn and Nel 2011) in a study conducted on the dietary intake of South African and Kenyan women where tea, sugar, milk, bread, maize porridge and rice were consumed regularly. A food variety and dietary diversity study done in the elderly population in Sharpeville, South Africa by Oldewage-Theron and Kruger (2008b) who showed similar findings where the diet consisted mainly of carbohydrates.

Furthermore, the proteins consumed were mostly beef, chicken, polony and bacon. These results correspond with studies done in a cross sectional descriptive survey investigating food security and academic performance among university students in Kwazulu Natal where chicken, beef and processed meats featured among the top 20 foods consumed (Kassier and Veldman 2013).

Even though the fruit group had the highest consumption the amount consumed was still below the recommended amount. Apples and bananas were the only fruits consumed, while frozen mixed-vegetables, cabbage and lettuce were the only vegetables consumed. All age groups for men and women consumed below the WHO recommendation of >400g per day. These findings were consistent with results from a South African risk assessment study done on adults 15 years and older where it was estimated that 80% of adults did not eat the required 400g of fruit and vegetables per day (Joubert *et al.* 2007). A sufficient intake of fruit

and vegetables is important to prevent micronutrient deficiencies and non-communicable diseases (Naude 2013b).

Though the group had a high dietary diversity, the nutrient adequacy ratio for energy, dietary fibre, vitamin A, calcium, magnesium and iodine were below 100% for both men and women. Contradictory findings were observed by Steyn, Labadarios and Nel (2012) where iron, folate, vitamin B6 and vitamin D were below the 100% NAR in a study done on dietary intake of adult women with the focus on the use of spreads. Foods rich in vitamins and minerals and energy need to be consumed to increase the FGDS and FVS (Naude 2013b).

A high dietary nutrient adequacy ratio was observed for protein, iron, vitamin B6 and riboflavin which was above the recommended 100% NAR. Some of these findings were consistent with the study done by Steyn and Nel (2006) on diet intake of South African adult women where protein was above 100% of the NAR.

Lastly, this study also outlined the relationship between waist circumference and systolic and diastolic blood pressure in relation to central obesity. These findings were consistent with a study done by Warren *et al.* (2012) between 2007 and 2009 in an independent association of waist circumference with hypertension and diabetes study done on African-American adult women. There was also a positive correlation between age and systolic blood pressure.

The summarised findings of the study in table 4.33 were used to develop the nutrition wellness education material and will be discussed in Chapter 5.

Table 4.33: Summarised Research Findings and Results: Determining the Need to Develop and Implement nutrition wellness education material

RESEARCH	GENDER	FINDINGS/RESULTS	METHODS USED TO ADDRESS FINDINGS IN THE NUTRITION WELLNESS EDUCATION MATERIAL
BMI STATUS	Men	• Overweight– 37.70% • Obesity class 1-16.39% • Obesity class 2–8.19% • Obesity class 3-3.27% • Overweight– 22.07%	• Using the food guide as a guide for healthy eating. • The FBDG give specific guidelines for good health. • BMI cut-off points included so that each individual can calculate one owns

	Women	• Obesity class 1- 20.77% • Obesity class 2– 15.58% • Obesity class 3- 11.68%	BMI. • A menu planning guide was included to assist in planning healthier meals. • Healthy eating tips were included. • Portions sizes designed by the department of Health are included as a guideline for portion control.
WAIST CIRCUMFERENCE	• Cut-off points women– 88cm. • Cut-off points men– 102cm	• Women (42.86 %) • Men (16.39%)	• Waist circumference cut-off points included in the booklet. Central obesity can be measured by each individual so that one can be aware of ones waist circumference.
BLOOD PRESSURE LEVELS	**Men** **Women**	• Prehypertension- 42.62% • High Blood Pressure category 1- 4.92% • High Blood Pressure category 2 - 3.28% • Prehypertension - 25.9% • High blood pressure- category 1- 5.19% • High Blood Pressure Category 2 - 3.90%	• A salt guide for South Africans was included so that each individual can use the classification for lower salt consumption. • A guide for blood pressure can be used to access the individual's blood pressure status.
FRUIT AND VEGETABLE INTAKE WHO recommendation of >400g per day	Men **Women**	• 134.44g - 175.69g per day • 124.00g - 183.30 g per day	• The booklet consists of healthy salad recipes that can be used to increase the fruit and vegetable consumption, as well as fibre consumption in the diet. • The FBDG also consist of a guideline for fruit and vegetable intake to assist individuals.
NUTRIENT ANALYSIS	**Nutrient adequacy ratios**	• Energy, dietary fibre, vitamin A, vitamin D. calcium, magnesium and iodine were below the nutrient adequacy ratio of	• Nutrient classification was included in the toolkit to give a guide on the different nutrients

		>100%.	and its functions in the body. • The FBDG on including food variety allows individuals to calculate the food variety in one's diet.
EXERCISE	**Light- no exercise**	• Men- 33% • Women – 45%	• The amount of exercise can be measured with the guide included.
ALCOHOL	**Consumption**	• Men – 44.26% • Women – 22.08 %	• An Alcohol consumption guideline for those that consume alcohol is included in one of the FBDG.

Table 4.33 showed the summarized research results for this group. This will be used to identify the main focus of the wellness program.

4.5 CONCLUSION

The objective of this study was to obtain a health profile for the staff members of a specific FET College. This profile has been attained by: obtaining anthropometric data (height, mass, waist circumference); nutrient intake and food consumption observations, (24hr recall questionnaires, mathematically and statistically calculating parameters and comparing the results with internationally established criteria. The pertinent data: a relatively large Body Mass Index and Waist Circumference in addition to the presence of hypertension, low fruit and vegetable consumption and a low nutrient adequacy ratio for the staff members, indicates the need for an improved diet with levels of nutrient intake closer to that recommended internationally. From the results observed it is clear that it would be most desirable to develop a Wellness Programme and implement it at the FET College. Such an intervention will needs be have a strong nutrition education component. Correcting the debilitating effects of these diseases will improve the overall wellness of the staff members. The improvement of the wellness status can or will, we trust, lead to improvements in the work environment and the accompanying personal satisfaction of being able to perform more effectively.

CHAPTER FIVE – CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

Bearing in mind the objectives of the study, this chapter discusses the results presented in Chapter Four with reference to the literature reviewed in Chapter Two. Thereafter, the objectives for the development of nutrition wellness education material were examined. It is thought that this material will improve nutrition knowledge and dietary intake behaviour: help personnel make more informed food choices so as to improve their nutrition wellness, and at the same time reduce the impact of NCD's and absenteeism in the workplace.

Since there is a growing concern for diet related NCD's in South African workers, families, companies and the economy, recommendations for further research are presented. As urbanisation and globalisation becomes more prevalent in the word, so also does the presence of non-communicable disease.

An adequate diet that has variety is important for nutrient adequacy. However, overconsumption of nutrients results in overweight and obesity which is also a growing problem in South Africa. Over nutrition coupled with inactivity becomes a serious health concern and needs to be addressed.

The findings of this study will assist in formulating practical recommendations for a sustainable work-intervention programme to improve the nutrition knowledge and dietary intake behaviour.

5.2 LIMITATIONS OF THE STUDY

The limitations of the study are the following

The 24 hour recall questionnaires were completed on two separate days, a week apart. On the one day, the weekend intake and on the other occasion the two weekdays was recorded. The participants found it difficult to recall what they consumed 48 hours previously; this could have resulted in some over or under reporting. When assessing the results from the questionnaires, the assumption is that all questions are answered truthfully. With a small sample, generalisations can be made.

5.3 MAIN FINDINGS

The literature shows that non communicable diseases such as diabetes, heart disease, hypertension, obesity and cancer among other illnesses are related to the quality of the food and type of diet consumed by the majority of the population, especially adults. South Africa, like many other countries around the world, is confronted with both over nutrition and under

nutrition. This is mainly due to factors such as urbanisation, globalisation, physical inactivity and the consumption of unhealthy foods.

Almost half of the respondents were food secure indicating that 50% had money to purchase food. This can be attributed to the fact that the staff ranged from lecturers, to administrators to cleaning staff; and means that the money earned came from low to middle income groups. Furthermore, there were different levels of education present in the sample; ranging from no formal education to post school qualifications. Education and nutrition education is important for optimal health and wellness. In most households the mother was responsible for food preparation, the choice of food purchased and the amount of money spent on food. The majority of the respondents purchased food once a month from supermarkets.

There was a lack of nutrition knowledge which could have resulted in the poor-nutrient intake among the respondents. Carbohydrate rich foods were prominent in the top 20 foods consumed. Many of the respondents indicated that they ate three meals per day; most of the meals being consumed at work. This behaviour makes it possible to implement a workplace intervention.

The health survey indicated that there is a greater risk for woman to have obesity and hypertension than their male counterparts. These two diseases are of major health concern for they are risk factors for other non-communicable diseases such as heart disease, diabetes and cancer. Poor health statuses have an impact on daily living and job performance. Stress is also a factor in poor performance. In this case, self-reported mental affection by the men is also a concern. Diet and exercise play an important role in combating stress.

Even though the majority of respondents indicated moderate exercise, the word moderate can mean different things for different individuals. It is possible that the respondents are engaging in "moderate" exercise, however, the amount of exercise maybe outside the limits described for moderate exercise. This correlates with the observations where obesity is prevalent in this group. This supports the implementation of a nutrition intervention and education wellness so that individuals can understand the key to good health.

A small percentage of the respondents reported smoking cigarettes while almost half of the men and a small number of women consumed alcohol. Substance abuse can also contribute to the onset of non-communicable diseases such as cancer and hypertension.

The group consumed a wide variety of foods within the nine food groups. However, even though the group had a high dietary diversity, the nutrient adequacy ratio for dietary fibre, vitamin A, calcium, magnesium and iodine was below 100%. In the top 20 foods, fish, which has a high iodine content, does not feature. Milk is the only dairy product consumed. The

amount of milk consumed did not provide enough calcium an adult requires on a daily basis. Another reason for vitamins and minerals being inadequate was the low fruit and vegetable intake.

Carbohydrates consumed by this group were above the 100g per day. Sugar, bread rolls, rice and maize meal were highly ranked on the top twenty foods list. These foods offer very little fibre and offer only a short term energy release. The energy obtained from macronutrients such as carbohydrates and fibre were below the WHO recommendation. The DRIs for the group, the low fibre intake could have been the cause for this outcome. However, the high carbohydrate consumption and the lack of good quality carbohydrates can be linked to the BMI of this group; ranging from overweight to obesity class two.

The group consumed mostly beef, chicken, polony and bacon (protein food items). Bacon and polony feature on the top 20 foods list. These processed foods have a poor protein quality, have a high fat content, and increased levels of salt, artificial colourants and other non-food ingredients. Increased salt intake can be linked to the pre-hypertension that is prevalent in this group. The fat content in these processed foods is also elevated. The fat intake can also contribute to the high BMIs prevalent in this group and the prevalence of obesity.

The findings also indicate that there is an insufficient intake of fruit and vegetables. All age groups for men and women consumed below the WHO recommendation of >400g per day. This is concurrent with the observation from the Top Twenty Foods List that only apples, bananas, cabbage and mixed vegetables, were the fruits and vegetables consumed. However, the FGDS reveals that the group consumes a mean of 11 types of fruit while the Top Twenty Foods List shows only three fruits were consumed by the group. This may be due to the fact that the 24-hour recall questionnaires reveal an intake for three days, while for the FFQ a period of seven days. The intake of fruit and vegetables among other foods are a key to preventing and controlling non-communicable diseases.

5.4 DEVELOPMENT OF THE NUTRITIONAL WELLNESS EDUCATION MATERIAL

Section 5.3 clearly indicates the need for an intermediate intervention. The DRIs and Top Twenty Food List reveal inadequate mineral and vitamin intake. The prevalence of hypertension and obesity are a concern that should focus in the nutrition wellness education material as a component in a wellness programme. The nutrition wellness education material as a component in the wellness programme may improve nutrition-knowledge among staff

and may lead to more informed food choices. Improved nutrient intake will also improve an individual's health status, may reduce stress levels and also improve work performance.

5.5 CONCLUSION

It was found that obesity and prehypertension as well as a deficiency in nutrients and minerals were present in this group. There is a link between diet, physical activity and non-communicable diseases. Poor food choices among staff could be due to a lack of nutrition education. Nutrition education is therefore a key factor in changing behaviour of the staff so that better food choices can be made. Such changes would improve nutritional status and assist in the control and prevention of non-communicable diseases and, further, improve performance at work and overall well-being.

The developed wellness nutrition wellness education material (booklet, posters and brochure) will be included as part of the implementation process that will form part of the Doctoral studies, upon completion of the Masters in applied science in food and nutrition dissertation.

The FBDG, food guide, salt guide, portion control and menu planning were included to create awareness and make people conscious of food choices and the individual's health. The designed nutrition wellness education material intends to improve overall nutrition wellness and status so that individuals can be more productive at work and reduce the number of sick leave days. These lifestyle changes can improve diet, health and overall wellness. Targeting the individual at the workplace may also decrease absenteeism and may save the South African economy millions of rand. The results clearly indicate that there is a need for nutrition interventions in the workplace to improve nutrition education in order for individuals to make informed, meaningful food choices.

5.6 RECOMMENDATIONS

- **Recommendation 1: Policy Makers**

- **Government Initiatives**

The Department of Health has devised a set of Food Based Dietary Guidelines for the Republic of South Africa. These guidelines have been developed with many nutrition goals in mind. These guidelines, however, have not been publicised sufficiently. Individuals have not been educated on the interpretation of these guidelines. These guidelines need to be included in nutrition-education programmes and nutrition-intervention programmes, so that nutrition knowledge can increase dietary diversity and food intake behaviour so that healthier food choices can be made.

- **Recommendation 2: Nutrition Education- Chefs/Food Handlers/Management**

- **Nutrition Education of food preparation staff in the workplace**

Education of the workplace canteen staff on how to prepare meals with the desired nutrient content without compromising flavour, taste, aroma, and appearance is necessary. Food catering staff must also be trained to cut down on salt and other high sodium products during food preparation. A greater quantity and a good variety of fresh vegetables and fruit need to be introduced into the diet at lunchtime. Workers must be educated on nutrition and how to make healthier food choices in the workplace (canteens and vending machines) and outside the workplace. Individuals must be taught portion control and how to prepare one's own meals at home so that salt usage can be reduced, unhealthy fats and sugars and other energy dense nutrients can be eliminated.

- **Workplace Programmes**

Workplace programmes must be designed to improve the wellness status of workers. Most programmes do not have a strong nutrition component, essential for the control and prevention of diet-related, non-communicable diseases. A section of the wellness programme should consist of nutrition awareness.

- **Exercise Programmes**

The importance of Exercise Programmes must be explained to staff as part of the wellness programme in the workplace. The majority of people today travel in cars or public transport and lead a sedentary lifestyle which contributes to obesity, diabetes and heart complications. Individuals also must be educated on the different types of exercises, how much exercise is required so that it can become part of his/her routine and lifestyle.

5.7 RECOMMENDATIONS FOR FUTURE RESEARCH

This study emphasises the need for further research. The types of research required are listed below:

- Testing the developed wellness programme in an intervention study
- Correlation between diet and the prevalence of disease.
- Dietary diversity and its influence on health.
- Does nutrition education improve dietary intake behaviour?
- Nutrition education on cooking techniques for canteen staff.
- Providing meal choices that are not just healthier and tasty but are also reasonably priced.
- Traditional diets versus modern diets and their implications.
- Consuming more energy than is expended.

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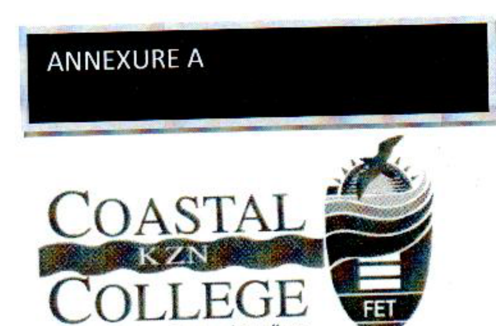
ANNEXURE A



14 March 2011

Ms S Devar

Permission for Masters Research

Your letter dated 08 March 2011 has reference.

This serves to certify that permission is granted with respect to Masters Research undertaking.

It will be appreciated if the findings of this research are shared, for the benefit of staff within the campus.

Best wishes on your current studies.

IT MSIMANG
CAMPUS MANAGER

Swinton Campus - P.O. Box 32050, Mobeni, 4065
Tel: (031) 462 2333 • Fax: (031) 462 3230 • e-mail: swinton@coastalkzn.co.za

ANNEXURE B

Department of Food and Nutrition,
Tel. (031) 373-2326, Fax (031) 373-2795,
P.O. Box 1334, Durban 4000

Dear Member of Staff

Welcome and thank you for taking the time to read through this document. My name is Siveshnee Vardan and I am a researcher from the Durban University of Technology.

I am a registered student and will have students and members from the Department of Food and Nutrition at DUT who will be assisting me in collecting the information that is needed.

WHAT IS THIS PROJECT?

It is a research study on nutritional wellness at Coastal KZN FET college. This study will be done at the Swinton campus in Mobeni.

WHY IS THIS PROJECT IMPORTANT?

The main aim of this study is to develop a nutritional wellness programme to improve the nutritional knowledge and dietary intake behaviour of staff at Coastal Further Education Training College, Swinton Campus in the Mobeni area in order to make informed food choices thereby improving overall wellness in the workplace.

The South African Chamber of Commerce (SACOB) also estimates absence due to illness costs South Africans 12 billion rand per year (Van Eeden and Jordan 2008). A study conducted at a sugar mill in South Africa put the cost of loss of productivity and worker replacement due to sick leave at that time as R9500-00 per worker per annum (Morris, Burge and Cheevers 2000).

In South Africa the burden of non communicable disease risk factors is high – approximately six million people have hypertension, four million have diabetes, seven million smoke and four million have high cholesterol. About 56% of the population has at least one of these risk factors and about 20% are at a high level of risk for non communicable diseases. These poorly treated risk factors require lifestyle changes and medical care to reduce the projected burden of these diseases (Bradshaw and Buthelezi 1996).

Research on chronic diseases of lifestyle has shown that there is a tremendous need to develop and evaluate health promotion programs in the workplace (Steyn 1994). Since most people spend one third of their waking hours at work, having health related programmes at work is stated to be the key to reducing the risk of diseases as well as reducing the health care costs of a nation.

PROCEDURE

- The project will take place over a period of several sessions during 2012.
- You will be requested to talk to us in a facility agreed to between us.
- We will make an appointment with you.
- There are no health risks with any of these measurements and no invasive techniques will be used.
- All the information that we collect will be confidential and private, you will be allocated a number and no names will appear on any of the questionnaires.

WHAT WILL BE MEASURED IN THE PROJECT?

- Eating and drinking habits will be measured and used to establish nutritional intake through questionnaires.
- Weight and height and waist circumference will be measured to establish anthropometric status.
- Socio-demographic and health information will be collected by means of a questionnaire to compare socio-demographic indicators with your nutritional status to identify social variables that may impact on your food intake habits.
- Blood pressure will be checked.

WHO MAY PARTICIPATE?

All staff of Coastal KZN between the ages of 19 and 50 years of age.

WHO MAY NOT PARTICPATE?

Staff outside the recommended ages and staff outside Coastal KZN FET college.

WHAT ARE THE BENEFITS TO YOU?

A wellness programme will be developed for the staff at the institution that may benefit you in the long run.

WHAT DO WE EXPECT OF YOU

- You will be requested to sign a consent form.
- Then you will receive a **reference number** for the project.
- You will be weighed and measured and waist circumference determined.
- You will be questioned in detail about their eating habits, health profile and socio-demographic profile.
- **Please keep in mind that you do not have to take part in this study it is strictly on a voluntary basis.**
- **You are also allowed to withdraw from the project at any time without penalty or loss of benefits.**
- **There will be no monetary compensation for participating in the study.**

If you have any questions about the project, please do not hesitate to ask me or any one of the field workers at any time.

Thank you for your participation.

Siveshnee Vardan
Researcher
0730534709
siveshnee@yahoo.com

Prof. Carin Napier
Supervisor
031 3732326
carinn@dut.ac.za

ANNEXURE C

Food and Nutrition Consumer Sciences

SOCIO-DEMOGRAPHIC QUESTIONNAIRE

This questionnaire covers certain aspects of your life, including work and personal details, health and illness, lifestyle and social life that is relevant to health. The answers to these questions will be kept strictly confidential and the information will not be identifiable from any reports or publications.

1. GENERAL INFORMATION

Subject number:…………… Date: ………………………………

Fieldworker name: ………………………………………

Please answer all questions by marking the correct answer with **X**, except where otherwise indicated.

Where do you live?

……………………………………………………………………

2. PERSONAL INFORMATION

2.1 Your role in the family

Mother	Grandmother	Father	Grandfather	Other, specify……………………

2.2 When were you born? Year: Month: Day:

2.3 How old are you? ____________ years

2.4 Gender:

Male	Female

3. ACCOMMODATION AND FAMILY COMPOSITION

3.1 Do you live in?

Town/City	Farm	Squatter camp	Rural village	Hostel	Township	Other, specify……….….

3.2 Do other people live in your house?

Yes
No

3.3 How many people are living in your house?

1	2	3	4	5	6	7	8	9	10	10+

3.4. Please **complete** the table below on all members of the household

Name of household member	Age (yrs)	Gender M / F	Family relationship	Level of schooling	Does this person eat and sleep in this house at least 4 days a week?

3.5 Are all members' permanent residents in this house?

Yes	No

3.6 If yes, how long have you been staying permanent in this house?

< 1 year	1-5 years	>5 years

3.7 Has any children in your household died in the past?

Yes	No

Reason: ………………………..

3.8 In what type of house are you staying?

Brick	Clay	Grass	Wood	Zinc/shack

3.9 How many rooms does your house have?

< 2 rooms	3-4 rooms	> 4 rooms

3.10 Are there other houses/shacks within the same yard of the main house?

Yes	No

3.11 How are you currently living?

Homeless	
Living with relatives	
Living with friends	
Hostel accommodation	
Squatter home	
Rented house/flat	
Own house/flat	
Employees Properties	
Other, specify………………………	

3.12 Do you have the following facilities at home?

3.12.1 Water

Tap in the house	
Tap outside the house (in yard)	
Borehole	
Spring / river / dam water	
Fetch water from elsewhere	

3.12.2 Toilet facilities

None	
Pit latrine	
Flush / sewage	
Bucket system	
Other, specify………………………	

3.12.3	Waste removal	Yes	No	
3.12.4	Tarred road in front of house		Yes	No
3.12.5	Gravel road in front of house		Yes	No

3.13 To what extent do you have problems with the state of your house (e.g. too small, repairs, damp, etc.)?

....

....

3.14 Do you have problems with the following?

Mice/ Rats	
Cockroaches	
Ants	
Flees	
Mosquitoes	
Geckos	
Frogs	
Snakes	
Bed Bugs	

3.15. What is the floor inside your house made of?

Cement	
Tiles	
Carpet	
Dirt	
Sand/mud	
Dung	
Other, please state	

4. WORK STATUS AND INCOME

4.1. Are you currently employed?

Yes	No

If YES, go to Question 4.5.

4.2. If NO, how would you describe your current status (tick one box only)?

Unemployed	Retired	Housewife	Student	Other, specify....................

4.3. Are you actively looking for paid employment at the moment?

Yes	No

4.4. How long have you been unemployed?

< 6 months	6-12 months	1-3 years	> 3 years

4.5. If YES (question 4.1) is your current job a:

Permanent position	Temporary position	Fixed term contract	Other, specify......................

4.6. Are you doing part time jobs on weekends and school vacations?

Yes	No

4.7 What is the exact title of your current job?
(Including self-employed)

4.8. What is the total income in the household per month?

< R500	R501-R1000	R1001-R1500	R1501-R2000	R2001-R2500	R2501-R3000
R3001-R3500	R3501-R4000	R4501-R5000	R5501-R6000	>R6001	

4.9. Please specify the monthly income in the household (if willing)......................

4.10. How often does it happen that you do not have enough money to buy food? for you and your family?

Always	Often	Sometimes	Seldom	Never

4.11. How many people e.g. partner, relatives & others (including yourself) contributed to your household income from any source, (including wages/salary from paid employment, money from second or odd jobs income from savings investments, pension, rent or property, benefits and or maintenance etc.) in the last 12 months?

People	0	1	2	3	4	5	6	7	8	9

4.12. How often do you buy food?

Every day	Once a week	Once a month	Other, specify....................

4.13. Where do you buy food?

Tuck shop	Street vendor	Wholesalers	Supermarket	Other, specify....................

4.14. What type of transport do you use to get around?

Taxi	
Bus	
Train	
Own vehicle	
Other Specify	

4.15. How much money is spent on food PER MONTH? (Tick only one box)

R 0 – R 50	R 51 – R 100	R 101 – R 150	R 151 – R 200	R 201 – R 250	R 251 – R 300	> R 500	I do not know

5 EDUCATION AND LANGUAGE

5.1. What is your highest education level?

None	Primary School	Standard 8	Standard 10	College/FET	Other post school

5.2 What language is spoken mostly in the house?

Zulu	Xhosa	English	Afrikaans	Other, specify................................

5.3 How many children (in the household) have birth certificates?

None	1	2	3	4	5	6	7	8	All

5.4 How many children have completed their immunisation schedule?

None	1	2	3	4	5	6	7	8	All

5.5 Number of children attending school

None	1	2	3	4	5	6	7	8	All

5.6 How do the children get to school?

Walk	Bus	Taxi	Lift	Other, specify................................

Tick one block for every question:	Father	Mother	Sibling	Grandma	Grandpa	Aunt	Uncle	Cousin	Friend	Other
5.7 Who is mainly responsible for food preparation in the house?										
5.8 Who decides on what type of food is bought for the household?										
5.9 Who is mainly responsible for feeding/serving the child?										
5.10 Who is the head of this household?										
5.11 Who decides how much is spent on food?										

5.12 How many meals do you eat per day?

0	1	2	3	> 3

5.13 Where do you eat most of your meals?

Home	Friends	Work	School	Other, specify........................

5.14 Where do your children eat most of their meals?

Home	Friends	School	Other, specify........................

6. ASSETS

6.1 Does your home have the following items and how many?

	Yes	No	Quantity
Electrical stove			
Gas stove			
Telephone / Cell phone			
Primus or paraffin stove			
Microwave			
Hot plate			
Radio			
Television			
Refrigerator			
Freezer			
Bed with mattress			
Mattress only			
Lounge suite			
Dining room suite			
Electrical iron			
Electrical, kettle			
Car			
Bicycle / Motorbike			

6.2 What type of fuel do you usually use for food preparation?

Wood fire	Paraffin	Electricity	Gas	Coal/Charcoal	Other, specify...............

6.3 What type/s of material are your pots made off (tick all relevant options)?

Cast iron	Aluminium	Stainless steel	Clay	Other, specify..............

Thank you very much for your co-operation. We appreciate the time.

24 – HOUR RECALL

ANNEXURE D

Interviewer: ___________________

Subject Number_____________________ Date: ______/ _______/ _____

Tick what the day was yesterday:

Monday	Tuesday	Wednesday	Thursday	Friday

Would you describe the food that you ate yesterday as typical of your habitual food intake?

Yes	1	No	2

If not, why? ____

I want to find out about everything you ate or drank yesterday, including food you pick from the veld. Please tell me everything you ate from the time you woke up to the time you went to sleep. I will also ask you where you ate the food and how much you ate.

Time (approximately)	Place (Home, school, etc)	Description of food and preparation method.	Amount	Amount in g (office use Only)	Code (office use only)
From waking up to going to work, or starting day's activities					
During the morning at work or at home					

Time (approximately	Place (Home, school, etc)	Description of food and preparation method.	Amount	Amount in g (office use Only)	Code (office use only)
After dinner, before going to sleep					

* Do you take any vitamins (tablets or syrup)	Yes	1	No	2
Give the brand name and dose of the vitamin/tonic:				
* Do you receive a mealie meal mix (PVM) at the clinic?	Yes	1	No	2
How often do you eat this?		Daily	Weekly	Monthly
How much do you eat at a time?				
* Do you receive PVM drink mix at the clinic?	Yes	1	No	2
How often do you eat this?		Daily	Weekly	Monthly
How much do you eat at a time?				

ANNEXURE E

FOOD AND NUTRITION CONSUMER SCIENCES

FFQ LIST OF FOODS AND FOOD GROUPS DIVERSITY

Subject number: ______________ **Interviewer:** ____________________

Date: ______________

PLEASE INDICATE THE FOOD YOU ATE DURING THE PAST SEVEN (7) DAYS BY AN (X)

GROUP 1: Flesh Foods (Meat, Poultry, Fish) Diversity	Y	N
Meat (Chicken)		
Meat (Beef)		
Meat (Mutton)		
Meat (Pork)		
Meat (Goat)		
Dried Meat (Biltong)		
All Mince		
All Tribe/Offals/Runners and Heads		
Fish (fresh / whole)		
Tinned Fish (Pilchards/Tuna)		
Processed Meats (Viennas / Polony, Russians, Boerewors Sausage)		
Seafood (Prawns, Mussel's, Calamari, Crab, Shrimp, Crayfish)		
GROUP 2: Eggs Diversity	**Y**	**N**
Eggs		
GROUP 3: Dairy Products Diversity	**Y**	**N**
All Milk		
Evaporated milk (Unsweetened)		
Condensed milk		
Maas/ Inkomasi		
All Cheese		
Custard		
Ice Cream		
GROUP 4: Cereals, Roots and Tubers Diversity	**Y**	**N**
All Rice		
Maize (Pap, Mealie Rice, Mealie Meal, Samp, Porridge, Corn on the cob, Popcorn, Sweet Corn)		
Macaroni/Pasta/Spaghetti		

All Bread (White/ Brown/ Whole Wheat)		
Dumpling/Steamed Bread/Fat Koek		
Scones/Biscuits		
Mageu		
Breakfast Cereals (Corn Flakes, Oats, Weet Bix, Matabela)	Y	N
All Tubers/Roots (Amadumbe, Sweet Potato)		
Potatoes		
GROUP 5: Legumes and Nuts	**Y**	**N**
All Beans Dried		
Dried Peas		
Lentils		
Peanuts and Nuts		
Soya		
GROUP 6: Vitamin A Rich Fruits and Vegetables Diversity	**Y**	**N**
Pumpkin		
Carrots		
Wild Leafy Vegetables Fresh and Dried		
Spinach		
Butternut		
Apricots (Appelkoos)		
Peach (yellow cling)		
Mango		
GROUP 7: Other Fruits (and juices) Diversity	**Y**	**N**
Deciduous Fruits		
Apple		
Peaches		
Pear		
Grapes (black/green)		
Plum		
Sub – Tropical Fruit	**Y**	**N**
Lemon		
Orange		
Naartjie		
Banana		
Pineapple		
Avocado		
Kiwi fruit		
Watermelon		
Guava		
Paw- Paw		
Juices	**Y**	**N**
Juice (100% pure juice e.g. Ceres/Liquifruit)		

GROUP 8: Other Vegetables Diversity	Y	N
Onions		
Cabbage		
Beetroot		
Tomatoes	Y	N
Green beans (fresh)		
Peas (fresh)		
Cauliflower		
Chili (red/green)		
Lettuce		
Green\ Yellow\ Red Pepper		
Frozen Vegetables (Mixed)		
Ginger & Garlic (Fresh)		
GROUP 9: Oils and Fats Diversity	**Y**	**N**
Butter		
Sunflower oil		
Margarine		
Lard		
Salad dressing/oil		
Potato Crisps		
Coffee Creamer (Cremora, Ellis Brown)		

ANNEXURE F

HEALTH, AND BEHAVIOURAL QUESTIONNAIRE

HEALTH QUESTIONNAIRE:

1.

ARE YOU SUFFERING OR HAVE YOU SUFFERED FROM	YES	NO	IF ANY ANSWER IS YES, GIVE DETAILS OF THE NATURE, SEVERITY AND DURATION OF ILLNESS
1. Any skin disease?			
2. Any affection of the skeleton and/or joints?			
3. Any affection of the eyes, ears, nose or teeth?			
4. Any affection of the heart or circulatory system?			
5. Any affection of the chest or respiratory system?			
6. Any affection of the digestive system?			
7. Any affection of the urinary system and/or genital organs?			
8. Any nervous affection or mental abnormality?			
9. Any headaches			
10. Any other illness?			

2.	YES	NO
Have you lost weight during the past month?		
Have you had a recent change in appetite?		
Do you have problems with the following:		
* chewing?		
* swallowing?		
* nausea?		
* diarrhoea?		
* vomiting?		
* constipation?		
Do you follow a special diet?		
If yes, specify…….		
Are you allergic to any foods?		
If yes, specify		

ould you say your usual level of physical activity is:	Tick the correct block
Heavy/ rigorous (running, playing tennis, swimming, doing :avy gardening, etc., at least three times per week)	
Moderate (Taking rigorous exercise once or twice a week, or eady walking, or other moderate activities at least three times :r week)	
Light (playing golf, taking a stroll, or doing none rigorous :tivities occasionally)	
None (No exercise whatsoever)	

ow often do you get tired?	Always	Sometimes	Never

:	YES	NO
. Do you suffer from any defect of hearing, speech or sight?		
. Are you physically disabled and do you use artificial limbs?		
;IVE DETAILS OF THE NATURE AND SEVERITY OF 'HE DISABILITY		

;. Do you smoke at this moment?	Tick the correct block
. Yes	
2. No (Never smoked	
3. No (Stopped)	

7. If yes in question 5, answer question 6.

What do you smoke and how many per day?	YES	NO	NUMBER per DAY
Cigarettes, home made			
Cigarettes, bought			
Cigarettes, bought, light			
Cigars			
Pipe			
Other, specify			

8. Does your spouse or partner smoke at this moment?	Tick the correct
1. Yes	
2. No	
3. Not applicable	

9.

Do you make use of snuff at this moment?	**Tick the correct block**
1. Yes	
2. No (Never used)	
3. No (Stopped)	

10.

Do you use alcohol on a regular basis ?	**Tick the correct block**
1. Yes	
2. No	
3. Not applicable	

11.

If you use alcohol, How often?	**Tick the correct block**
1. Every day	
2. Once a week	
3. Occasionally	

12.

What type of alcoholic drinks do you drink?	**Tick the correct block**
1. Commercial beer / cider	
2. Home brewed beer	
3. Strong liquor ex. Whiskey, brandy, Vodka etc.	
4. Wine	

13.

	YES	**NO**
Have you undergone any operations?		
GIVE DETAILS OF THE NATURE AND DATE OF THE OPERATION/S		

I declare that the above-mentioned information is true and correct and that I have not withheld any information.
Signature...Date..

Thank you very much for your co-operation.

ANNEXURE G

Department of Food and Nutrition Consumer Sciences

Service Learning
Fieldworker guide
2012

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5.1 BEHAVIOUR 7

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1. INTRODUCTION

Welcome to Fieldwork, this is a stimulating opportunity to work with the Department of Food and Nutrition researchers and their communities around Durban. Research fieldwork in communities cannot be conducted without the assistance of fieldworkers.

Fieldworkers are the key to the success of community studies. They act as interviewers, collect physical measurements or observe features in the participants. Often in community studies fieldworkers can also enter people's homes and interview them there. Data collection in the community is often hard work; if people are not available repeat visits need to be made. Fieldworkers should be well trained in the survey methods being used in a specific study, to ensure reliable data. As part of Work Integrated Learning all 3rd year Food and Nutrition Consumer Sciences students must take part in data gathering of one or more research project in the department.

What is a Field Worker?

The field worker is an extremely important person in this project. In fact, this research would not be possible without the field workers. The field workers are the people who must interview the subjects (the people chosen to take part in the research) and get correct and accurate information from them. The subjects must feel at ease with the field worker so that they will not feel threatened or intimidated and will willingly answer the questions to the best of his or her ability.

2. ENQUIRIES

The following staff members are concerned with field work:

Senior Lecturer/Researcher	:	Prof C. Napier S9 Level 3, Room 312
Tel. No.	:	031 373 2326
E-mail	:	carinn@dut.ac.za
Service Learning lecturer/Researcher	:	Miss H Grobbelaar S9 Level 3, Room 308
Tel. No.	:	031 373 2328
E-mail	:	heleeng@dut.ac.za
Research Assistant	:	Miss S. Memela S9 Level 3, Room 314
Tel. No.	:	031 373 2961
E-mail	:	researchFN@dut.ac.za

3. FIELDWORK REQUIREMENTS

- All 3rd year students will be expected to attend a fieldworker training course separately or as part of Nutrition 3.
- Each student must complete at least 20 hours of Service Learning of which include fieldwork in one or more of the current research projects in the department of Food and Nutrition Consumer Sciences, a time sheet will be signed by the researcher in charge of the project to control the hours worked.
- Fieldworkers will **not** be remunerated for the 20 hours of Service Learning completed, any fieldwork completed by a fieldworker over and above the 20 hours will be paid at a rate per hour.
- The researcher in charge of the project will complete an assessment sheet for mark allocation for this part of the Work Integrated Learning (WIL) Module.

- Service Learning marks add up to approximately 20% of the final mark for WIL.
- Students can be expected to do any of the following tasks as part of their 20 hours:
  - Fieldwork in a community
  - Data capturing
  - Participating in a community upliftment project
  - Assisting with other research activities, e.g. Departmental Research Day

Details regarding the logistics will be discussed at the training session and each researcher will inform participating students of dates, times and venues.

4. ASSESMENT CRITERIA

DEPARTMENT OF FOOD AND NUTRITION CONSUMER SCIENCES

SUBJECT: Work-integrated Learning

LECTURER/RESEARCHER ASSESSMENT: Academic Service Learning component

Student name: ______________________________

Student number: ______________________________

ASSESSMENT CRITERIA	Very good 10 - 9	Good 8 - 6	OK 5	Poor 4 - 3	Unacceptable 2 - 0	Your mark
Arrived timeously						
Professional appearance						
Approached task in an organised manner						
Worked effectively as a team member						
Patience and respect shown towards subjects						
Anthropometrical measurements were correctly applied (if applicable)						
Accurate and detailed recording of information						
All details included in completion of forms						
Followed the task through to the end						

Number of hours completed: __________

General comments: ______________________________

____

____

Researcher Signature: ______________________________

Date: __________

Print name: ______________________________

5. FIELDWORKER CODE OF CONDUCT

5.1 BEHAVIOUR

In order to be a successful interviewer, a field worker must have (or develop) the following characteristics:

1. Friendliness: the field worker must be able to make each subject feel relaxed and not threatened in any way. The subject must feel that the field worker sees him or her as a person, not just another number that must be dealt with.

2. Respect: the subject must be treated with respect at all times. For example, he must be greeted politely, thanked for his time and co-operation; he must not be forced to answer a question that he is not willing to answer. The field worker must never show if she disagrees with something the subject has said.

3. Patience: each subject has to be asked the same questions in the same way. This means that the field worker must ask the same questions over and over, which can be very tiring and irritating. However, the field worker may never show that she is impatient or irritated even when the subjects are slow to answer or when they do not understand the questions. She must be able to control her own feelings and hide them when necessary.

4. Reliability: the field worker must be reliable, she must pay attention to detail, record all answers accurately, not skip over questions or make up answers herself.

5. Enthusiastic and Motivated: the field worker must be enthusiastic about the research. She should be doing it because she really wants to and not just because it's just a job.

6. Flexible: a good field worker is able to adapt to circumstances. She is aware that things do not always work out as planned and sometimes she will have to work under difficult and uncomfortable conditions.

7. Neat Appearance: the field worker must always look neat and well groomed, but never overdressed. The following guidelines for dress should be followed:
   - wear neat, simple and comfortable clothes
   - do not wear badges or emblems of organisations, churches, etc. as these may influence the way subjects answer.
   - dress so that the subject will concentrate on the interview and not on the way you are dressed.

5.2 CONDUCTING THE INTERVIEW

If the subjects in a project are children, the parents and/or caregivers will need to be involved in the interview process to verify information that is needed for the questionnaires. If the subjects are adolescents they can usually remember what they ate and can answer their own questions. If the questions need to be translated the interviewers must be careful not to change the focus of the question.

1. How do I begin?

- Greet the subject politely and introduce yourself.
- Ask what language the subject would prefer to speak.
- Explain what the interview is about. Let the subject ask questions about the research. Reassure the subject that the answers are confidential and that neither the subject nor his or her address will be identified.
- Put the subject at ease. Be flexible and sensitive to the subject. Some subjects may be tense or apprehensive. In such cases, talking about something general, e.g. the weather may put the subject at ease.

2. How do I conduct the interview?

- During the interview direct the questions to the subject, but if it is a child and he or she cannot answer, ask the parent/caregiver for the information needed.
- Ask the questions exactly as they are written on the questionnaire. Try even to keep your tone of voice the same for each subject so as not to lead the subject or to give him an idea of how you want him to answer. You may have to explain a question or use different wording if the subject cannot understand it.
- Ask the questions in the order that they appear on the questionnaire. If the subject refuses to answer the question, record the lack of response and go on to the next question.
- Follow the instructions on the questionnaire. Sometimes it may seem that a subject has already answered a question when he answered a previous one, but the interviewer must still answer the question. For example, the questions about polony and atchaar. Start the question: "We have already mentioned this, but…".
- Do not lead the respondents. Do not try to influence the way the subject answers. Keep your facial expression friendly, but neutral. Never show surprise or shock or approval to the subject's answers. Try to avoid unconscious reactions such as nodding the head, frowning, raising the eyebrows. Never give your own opinions.
- Keep the tone of the interview conversational. Be friendly and courteous. Do not make the subject feel as if he or she is taking an examination or is on trial be familiar with the questionnaire so that you can ask questions conversationally rather than reading them stiffly. The questionnaire is designed to keep the amount of writing to a minimum. However, if a subject gives a long response to an 'other' question, say, 'excuse me while I write that down'. Don't make the subject feel as though you have forgotten he is there.
- Keep control of the interview. Do not let the subject go off into irrelevant conversation. If he or she does, bring him or her gently back to the interview.

- Allow the subject time to think; do not hurry him to answer. However, if he is silent for too long, repeat the question, or 'prompt' him. For example, say 'you have told me how you cook cabbage; now please tell me how you cook pumpkin.
- Follow the instructions on the questionnaire for recording the responses. Record all responses, including negative responses or refusals to answer.
- **Make sure that you have written in the subject's number.**

3. **How do I end the interview?**

   Tell the subject that you have finished the interview.
   Reassure him that everything he has told you is confidential.
   Thank him for his time and cooperation. Direct him to the next stage. Greet him.

6. INTERVIEW EXAMPLE

24-HOUR FOOD RECALL QUESTIONNAIRE

The 24-hour recall is a questionnaire on what the subject has eaten the day before over a 24 hour period. Often the 24-hour recall is used to establish whether the QFFQ is valid or not. It is important to think of the 24-hour recall questionnaire as being a totally separate questionnaire and not a cross-reference to the QFFQ. Therefore, the answers to the questionnaire need to be very detailed. You will need to ask what is eaten and drunk, what type of food or drink is consumed, the brand name, the preparation method and the quantity consumed. Remember to include spreads, sugar and milk to tea / coffee, snacks, sweets, juices, sauces, salts and other condiments.

Example: The subject is asked what she has in the morning on waking up.

I: What do you have in the morning when you wake up?
S: I drink tea and then have porridge.
I: How do you take your tea?
S: With 2 sugars and a little milk.
I: How big is the spoon and is it level or heaped? (*Showing the teaspoon*).
S: It is like that spoon and I also have it heaped.
I: What type of porridge did you eat and how much did you have? (*Showing a bowl or cup*).
S: I had soft mealie meal porridge and I had about 2 of those cups to the fill in a bowl.
I: Do you put anything else in the porridge?
S: Yes, 2 spoons of sugar, like my tea, and a little margarine about 1 spoon.
I: At about what time was this meal?
S: At 6 am.
I: Where did you have this meal?
S: At home.

Time (approximately)	Place (Home, school, etc)	Description of food and preparation method.	Amount	Amount in g (office use Only)	Code (office use only)
From waking up to going to work, or starting day's activities					
6 am	**Home**	**Tea, rooibos**	**1 cup/mug**		
		With milk, full cream	**little milk – 2 tablespoons**		
		And sugar, white	**2 heaped tsp**		
		Soft mealie meal porridge	**2 cups**		
		With sugar, white	**2 heaped tsp**		
		And margarine, hard brick	**1 tsp**		

7. Portion sizes

FOOD	**Smaller than smallest**	**Between small and medium**	**Between medium and large**	**Between large and very large**	**Larger than large/very large**
Stiff porridge	125 g	275 g	425 g	600 g	800 g
Soft porridge	125 g	275 g	425 g		575 g
Samp and beans	100 g	200 g	375 g	600 g	800 g
Rice	70 g	105 g	190 g		310 g
French fries	30 g	90 g	185 g		340 g
Fried beef	15 g	45 g	80 g		120 g
Beef with bone	45 g	75 g	120 g		180 g
Meat stew	55 g	165 g	275 g		385 g
Sausage/ Wors	20 g	50 g	90 g		135 g

FOOD	Smaller than smallest	Between small and medium	Between medium and large	Between large and very large	Larger than large/very large
Offal	20 g	60 g	100 g		140 g
Pilchards	15 g	45 g	90 g		150 g
Mashed pilchards	15 g	45 g	90 g		240 g
Fried fish	50 g	70 g	105 g		155 g
Cabbage, potato and onion	15 g	45 g	75 g		105 g
Spinach, potato	15 g	45 g	75 g		105 g
Tomato and onion gravy	10 g	30 g	60 g		100 g
Pumpkin	15 g	35 g	60 g		80 g
Carrots, potato	45 g	65 g	80 g		95 g
Green mealie	50 g	110 g	180 g		260 g
Beetroot salad	10 g	30 g	65 g		85 g
Fat cake	20 g	50 g	70 g		90 g
Bread	15 g	45 g	80 g		120 g
Margarine	2,5 g	7,5 g	12,5 g		17,5 g
Dumpling	20 g	70 g	125 g		175 g
Apple	70 g	130 g	195 g		265 g
Banana	40 g	60 g	95 g		130 g
Canned peaches	30 + 10 g	70 + 15 g	110 + 25 g		150 +35 g
Custard	5 g	20 g	35 g		65 g
Atjar	10 g	45 g	80 g		120 g

FOOD	Smaller than smallest	Between small and medium	Between medium and large	Between large and very large	Larger than large/very large
Polony	5 g	15 g	30 g		45 g
Peanuts	5 g	20 g	60 g		105 g
Cheese curls	6 g	18 g	38 g		62 g

Other questionnaires

The researcher may also use any of the following questionnaires:

Food Frequency Questionnaire

Socio-demographic questionnaire

Nutrition knowledge questionnaires

Health questionnaires

Coping strategy index questionnaire

Smaller questionnaires drawn up by each individual researcher e.g. lunch box content of school children.

ANNEXURE H

INSTITUTIONAL RESEARCH ETHICS COMMITTEE (IREC)

20 June 2012

IREC Reference Number: **REC 7/12**

Ms S Vardan
19 Jacana Road
Escombe
4093

Dear Ms Vardan

Development of a nutritional wellness programme for staff at a FET college

I am pleased to inform you that Full Approval has been granted to your proposal REC 7/12.

The Proposal has been allocated the following Ethical Clearance number IREC **018/12**. Please use this number in all communication with this office.

Approval has been granted for a period of one year, before the expiry of which you are required to apply for safety monitoring and annual recertification. Please use the Safety Monitoring and Annual Recertification Report form which can be found in the Standard Operating Procedures [SOP's] of the IREC. This form must be submitted to the IREC at least 3 months before the ethics approval for the study expires.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the IREC according to the IREC SOP's. In addition, you will be responsible to ensure gatekeeper permission.

Please note that any deviations from the approved proposal require the approval of the IREC as outlined in the IREC SOP's.

Note that final approval is subject to IREC review of the final data collection tools (post expert group & pilot); in the interim questionnaire validation can take place.

Please note that research on the proposed project may not proceed until you receive Final Approval from the IREC.

Yours Sincerely

Dr D. F. Naude
Chairperson: IREC

ANNEXURE I

Revd. Dr Graham Alston

PO Box 16116

1200 Nelspruit

alstong@telkomsa.net

22 August 2015

TO WHOM IT MAY CONCERN

I wish to advise you that the work done by Ms Siveshnee Vardan has been examined by me with regard to its language quality and conformity academic style.

I certify that the work is substantially of language quality that can submitted for examination.

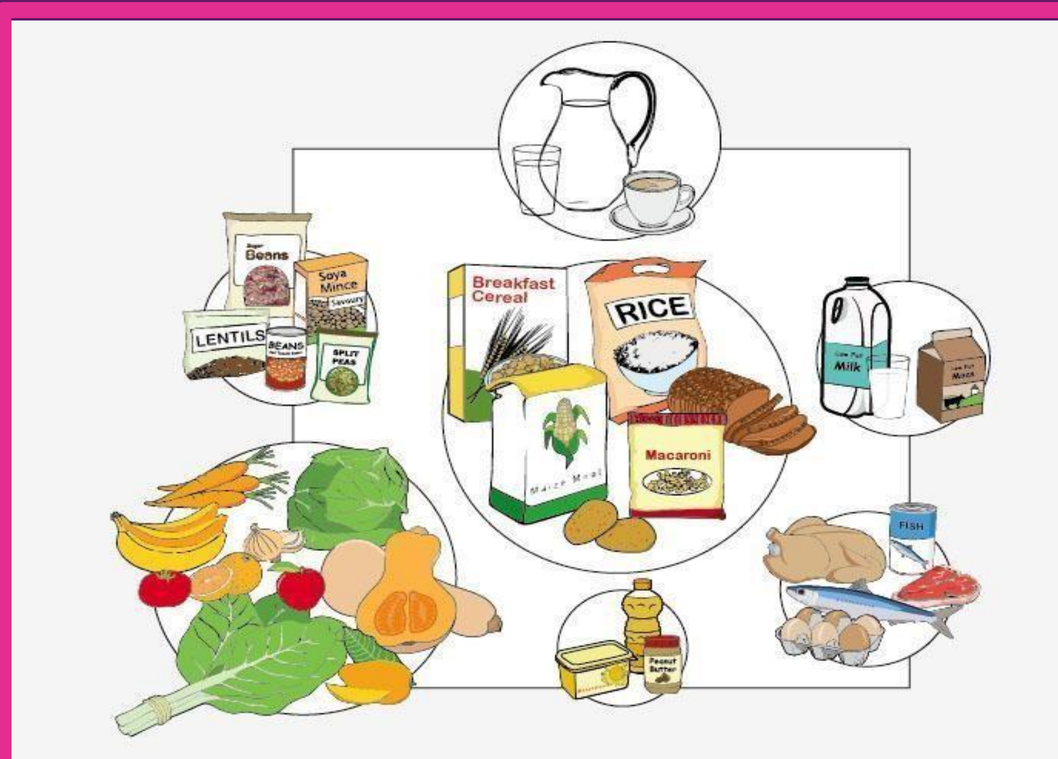
Yours faithfully

Graham Alston

BA; DipTheol; HED; MA(tesol); PhD

NUTRITION WELLNESS EDUCATION

ANNEXURE J



NUTRITION WELLNESS

2015

Nutrition Education for Better Health in South Africa

Nutrition wellness education booklet

1.	Introduction	Page 3
2.	Objectives, expected results, activities and educational materials	Page 4
3.	Benefits of a wellness program	Page 5
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9.	Make use of the food based dietary guidelines for South Africa	Page 14
•	Enjoy a variety of foods	Page 15
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•	Make starchy foods a part of most meals	Page 19
•	Eat dry beans, split peas, lentils and soya regularly	Page 21
•	Eat a plenty of fruit and vegetables everyday	Page 23
•	Have milk, maas or yoghurt everyday	Page 26
•	Fish, chicken, lean meat or eggs can be eaten daily	Page 27
•	Drink lots of clean, safe water	Page 30
•	Use fats sparingly	Page 31
•	Use sugar foods and drinks high in sugar sparingly	Page 32
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Nutrition wellness education booklet

INTRODUCTION

Wellness is defined as "a healthy state of wellbeing free from disease" (Burton 201. The major concern for South Africans is that obesity is an important risk factor for developing hypertension, diabetes and cardiovascular disease. The main function of this workplace wellness program is to improve the nutrition knowledge thereby increasing the well-being and health of staff. This can be done by good portion control, eating a balanced diet, maintaining a healthy body weight, increasing one's knowledge of nutrition and making use of the South African Food Based Dietary Guidelines and the Food guide for South Africa.

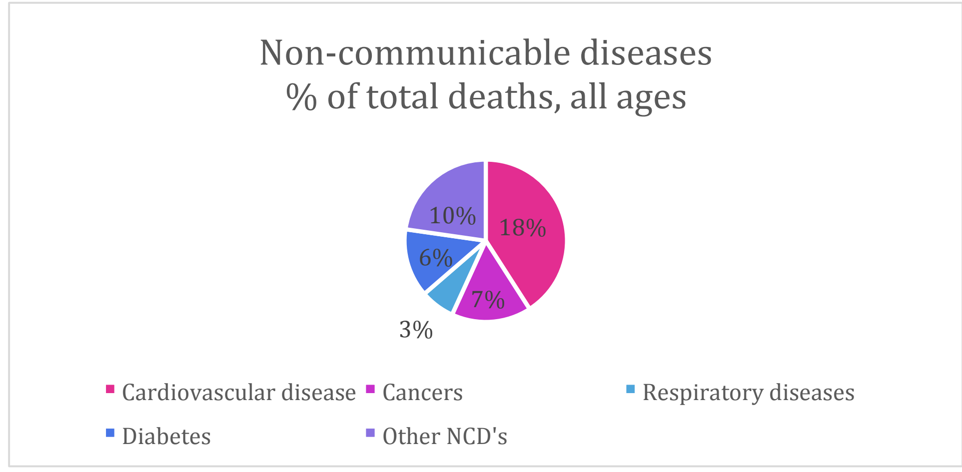

Figure 1: Percentage deaths due to Non-Communicable Diseases in South Africa (WHO 2014)

Figure 1 shows the percentage deaths by non-communicable diseases in South Africa. A total percentage of 43% is attributed to NCDs. The World Health Organisation (WHO) estimates that the probability of dying from NCDs between the ages of 30 and 70 years is 27%.

Nutrition wellness education booklet

Goals of this Programme

- **Improved nutrition knowledge.**
- **Adoption of healthy lifestyle habits**.

Objectives of this Programme

- **Improved diet and physical activity through increased awareness and improved behaviours.**
- **Reduction in obesity**
- **Decreased prevalence of malnutrition (obesity/overnutrition)**
- **Improved knowledge of nutrition and new recipes/food preparation.**

Activities

The main activities of the program will include:

- Classes and workshops
- Interactive talks
- Group discussions
- Media promotion

Education Materials

- Nutrition toolkit booklet
- Brochure
- Posters
- Recipes
- Tips for healthy lunches and eating

BENEFITS OF A WELLNESS PROGRAM

Table 1: Benefits of Wellness Programmes (WHO 2014)

To the organization	To the employee
A health and safety program that is well managed	A healthy and safe environment to work in
The image is one of caring and being positive	Self-esteem is improved
Morale of the staff is improved	Stress is reduced
Staff turnover is decreased	Morale is improved
Absenteeism is decreased	Job satisfaction is increased
Productivity is increased	Health protection skills are improved
Health care/insurance costs are reduced	Health is improved
Risk of fines and litigation are reduced	Sense of well-being is improved

Nutrition wellness education booklet

What is nutrition and why is it important to us?

Nutrition is the food we eat in relation to what the body's dietary needs are. Good nutrition is where there is a balanced diet in combination with regular exercise. Poor nutrition on the other hand can lead to deficiencies, disease and unproductivity when all the nutrient requirements are not being met (NHS 2013).

FOOD SOURCES AND FUNCTIONS OF NUTRIENTS

Below is a table with Macronutrients and Micronutrients showing the Nutrient, the Sources and the function it has in the body. This will assist you in healthier food choices since you can see the function that each nutrient has in the body (DOH 2012).

Table 2: Macronutrients (DOH 2012)

MACRONUTRIENTS		
NAME	**FOOD SOURCES**	**FUNCTION IN THE BODY**
Carbohydrates **Starches, Fibre, Sugars**	Maize, bread, rice, potatoes, dry beans. Dry beans, vegetables and fruit, unrefined starches. Vegetables and fruit, added sugar, honey	Sugars and starches supply energy to the body. When you eat more carbohydrates than necessary, the body converts them into fat. Sugars improve the taste of some foods. It should be limited in the diet. Fibre slows absorption of sugar from the blood and thus prevents high blood sugar levels. It provides food for beneficial bacteria in the small intestine, which promotes digestion and improves immunity to some infections.

		Fibre makes faeces soft and bulky, which helps the body to pass the waste that makes up faeces. It helps prevent constipation.
Protein	Chicken, fish, milk, eggs, meat, dry beans, peas, lentils, soya, peanut butter (also found in starchy foods in small amounts)	For building or replacing worn out cells, tissues, hormones, and building the immune system and helping them to function. Extra protein not used for these functions is used as an energy source.
Fat	Oils, margarine, fats, foods cooked in oil and foods rich in fat (e.g. meat, butter, cream, milk and cheese)	Fat supplies energy to the body. It also helps with the absorption of some vitamins. Fats improve the taste of meals and supply building blocks for some hormones and body parts like the brain and nervous system. Extra fat in the diet is stored as fat in the body. Saturated fat and foods high in cholesterol should be limited in the diet.
Water	Water, vegetables and fruit, soup, drinks made with water like tea	All living tissues contain water. It is needed for digestion, temperature control, body processes and lubrication. It is also needed to keep the body hydrated at all times.

Table 3: Micronutrients (DOH 2012)

MICRONUTRIENTS

There are many different vitamins and each one has a specific use in the body. Most vitamins help body functions, and help to promote and maintain health. Vitamins help the body to use the, protein, carbohydrates and fat contained in foods. They also help to protect the body against infections.

Minerals form part of the structure of body tissues, such as bone, nails and teeth, blood, nerves and muscles. They are essential for physical and mental development.

NAME	FOOD SOURCES	FUNCTION IN THE BODY
Vitamin A (retinol and beta carotene)	Liver, kidney, egg yolk, breastmilk (especially colostrum), milk fat. Carrot, pumpkin, butternut, spinach, *imifino*, yellow sweet potato, enriched margarine, fortified maize and bread.	Keeps mucous membranes, skin and immune system healthy. Supports eye health and night vision, and normal growth and development. Helps the body to use iron when it's needed.
B-group vitamins	From various foods and fortified and enriched foods	Promotes energy production and help to build and repair tissues.
Vitamin C	Fresh vegetables and fruit, oranges, green leaves, tomato, breast milk	Helps the body to use calcium and iron. Makes blood vessels stronger and promotes the healing of wounds.
Vitamin D	Sunlight on skin Liver, milk fat, egg yolk	Helps minerals to be deposited in bones and teeth. Helps several organs to function, including the immune system.
Iron	Liver, kidneys, meat, chicken, fish, breastmilk, spinach, enriched or fortified foods	Helps to carry oxygen in red blood cells and muscles. Helps with the brain and immune system functioning.

Calcium	Milk, yoghurt, maas, fish if eaten with bones	Helps to build bones and teeth. Important for normal heart and muscle functions, blood clotting and immune system defences.
Iodine	Iodated salt	Makes thyroid hormones, and needed for early development of brain, energy and temperature control, and growth of children.
Fluoride	Some ground water, fluoridated toothpaste	Good for bones and teeth. Helps to repair damaged teeth.

The South African Food Guide

The food guide shows the foods from the different food groups that should be eaten regularly. They were developed in line with the new revised set of Food Based Dietary Guidelines for South Africa.

The food guide illustrates the groups of foods that are essential for healthy living. The guide focuses on foods of a traditional nature that is affordable, culturally acceptable and is based on the daily habitual intake of poorer South Africans. The size of the circle around each food group shows the amount of food that is to be consumed from each food group (DOH 2012).

Nutrition wellness education booklet

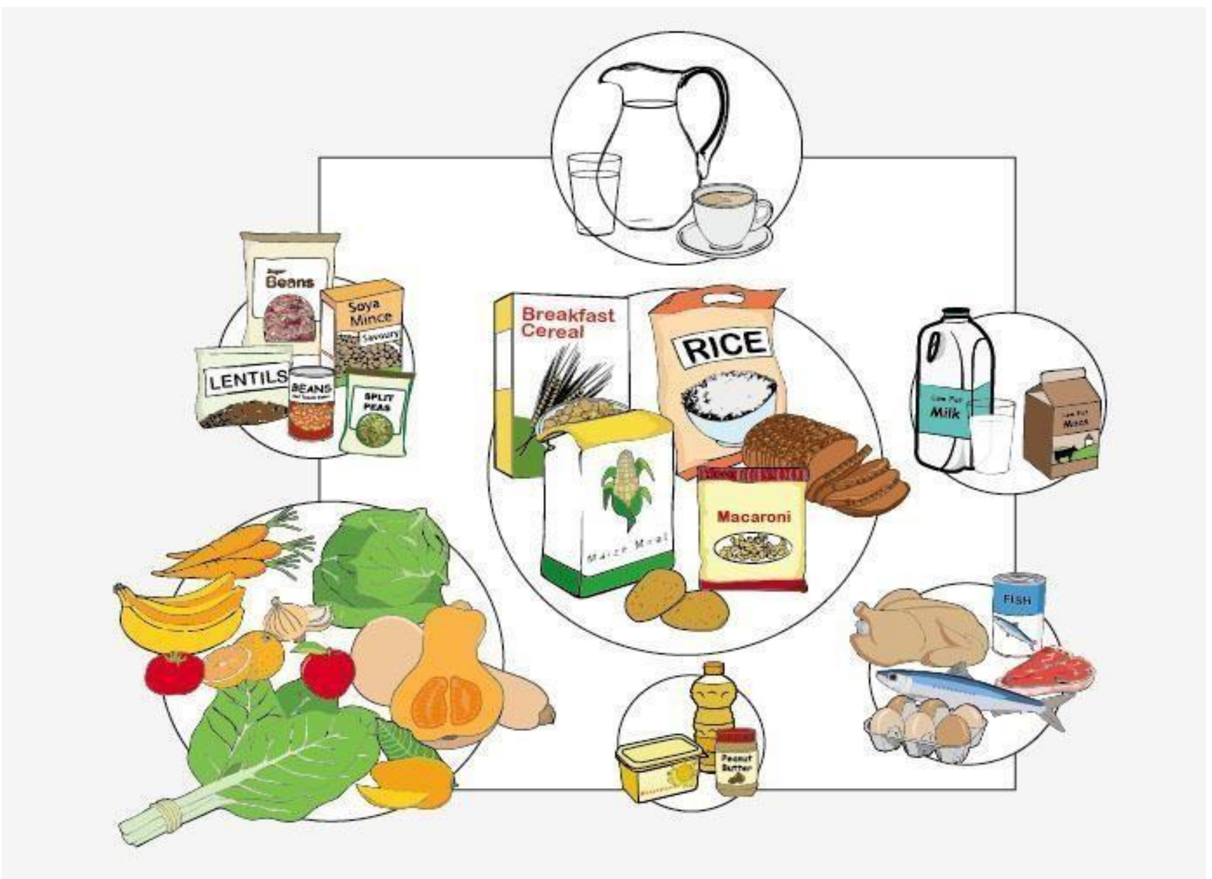

Figure 2: The Food Guide for South Africans (DOH 2012)

Activity 1:

What did I eat today?

List all the foods you have eaten and write down the nutrients by using the table above on macronutrients and micronutrients see if you can tell which nutrient you are missing. This will help with increasing the intake of those foods and those nutrients.

FOOD ITEM	NUTRIENT
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.
7.	7.
8.	8.

Activity 2:

WATCH YOUR PORTION SIZES!

Make use of the food guide unit serves from the Department of Health below to eat the correct portions for the correct amount of nutrients needed by the body. These are to be used together with the recommended intake for each Food Based Dietary Guideline.

Unit / food guide unit

The food guide includes information on the number of units of food from each group needed each day; and it includes information on the size of each food group unit. A typical portion of some foods

will be made of 1 unit of that food (e.g. one unit of fruit is one apple), while for others people typically eat many units at one time (DOH 2012).

This guide is to be used with the recommended daily intake for each Food Based Dietary Guideline in mind. For example the recommended intake for milk and maas is 400-500ml (low fat) per day. This means I can have 1 cup of milk (200ml), and one cup of maas (200ml) and 1 tub of yogurt (100ml) to reach the recommended intake.

Table 5: Food guide unit serves from the South African Food Based Dietary Guidelines (FBDG) (DOH 2012)

FOOD GROUP	FOODS	UNIT	WEIGHT
STARCHY FOODS			
	Bread, brown / white	1 slice	35g
	Porridge, soft,	½ cup	125g
	Maize meal, dry	3 heaped tbsp.	25g
	Potato	1 medium	100g
	Rice, cooked	½ cup	65g
	Pasta, cooked	½ cup	75g
	Samp, cooked	½ cup	75g
	Breakfast cereal	Varies	30g
	Cut corn, mealies	½ cup	75g
	Whole grains, cooked	½ cup	75g

FRUIT AND VEGETABLES	All fresh / frozen vegetables	½ cup cooked	75g
	Raw leafy green vegetables	1 cup raw	75g
	All fresh fruit	1 piece medium sized fruit e.g. apple, banana. 2 pieces of small fruit e.g. apricots, plums. ½ piece large fruit e.g. grapefruit. ½ cup chopped fruit ½ cup fruit juice Tbsp. raisins	150g
DRIED BEANS, PEAS, LENTILS AND SOYA	Dry beans, cooked	½ cup	75g
	Lentils, split peas	½ cup	75g
	Soya mince, dry	30g	

CHICKEN, FISH, MEAT AND EGGS	Fish, white	1 large piece		150g
	Fish, high fat flesh	1 small piece		75g
	Chicken, no skin	1 medium breast		100g
	Meat, lean	Size palm, thick		10mm
	Eggs, hens	2	p/day	80g
	Cheese, yellow	$30mm^3$ Match box size		100g

MILK, MAAS AND YOGHURT	Milk, low fat or skim	1 cup		200ml
	Maas, low fat	1 cup		200ml
	Yoghurt, low fat or fat free	1 tub		100ml
FAT/ OIL	Oil; sunflower, canola, olive or other plant oil	1 tsp		5ml
	Tub margarine	1 tsp		5ml
	Peanut butter	1 heaped tsp	10g	5g
SUGAR	Sugar, brown or white	1 tsp		6g
	Jam	1 heaped tsp.		10g

MAKE USE OF THE FOOD BASED DIETARY GUIDELINES FOR SOUTH AFRICA!

The Food Based Dietary Guidelines are a set of messages that are science based and have been designed to change the dietary intake behaviour of the South African population to meet energy and nutrient requirements as well as protect against the development of non-communicable diseases (Vorster, Badham and Venter 2013).

The Guidelines are:

Figure 3: Food Based Dietary Guidelines for South Africa (DOH 2012)

1. ENJOY A VARIETY OF FOODS

A diet that contains adequate macronutrients, micronutrients and water is a healthy one. Having variety in one's diet is recommended for a healthy diet. A variety in the diet means eating foods from the different food groups and ensures a balanced diet with sufficient nutrients. There is no single food item that contains all the nutrients required by the body for optimum health, therefore we need to eat and enjoy a variety of food in the diet. On the other hand a diet that has a low food

variety can lead to a deficiency in certain nutrients and can lead to an individual becoming food insecure and can also be the cause of malnutrition (Steyn and Ochse 2013).

Recommended Intake

Activity 3:

It is recommended that you have variety in your diet. Are you consuming foods from the nine food groups? Score yourself below.

Table 6: Calculate your food variety score

Food Groups	5 points Eat everyday	3 points Eat 3-4 times a week	2 points Eat 2-3 times a week
Cereals, Roots and Tubers			
Other Vegetables			
Vitamin A Rich Fruit and Vegetables			
Flesh Foods meat, poultry, fish			
Fats and Oils			
Dairy			
Other Fruit			
Legumes and Nuts			
Eggs			
Total			

High food variety 36-45 points
Medium food variety 27-35 points
Low food variety score 18-26 points

2. BE ACTIVE.

Research has shown that there is a link between physical activity and the risk of mortality and morbidity. **Physical activity is defined as at least 30 minutes of moderate-intensity physical activity per day for adults.** Being active promotes health and well-being and is an important factor in reducing the incidence of NCD's as well treatment of NCD's and death that is premature in South Africa (Botha *et al.* 2013).

Being Active can be simple, like using the stairs instead of a lift, parking your car a distance away so that you can get more exercise, or walk instead of using transport for shorter distances, play a sport once a week, household chores can also be counted.

Physical Activity and Overweight

Overweight and obesity in South Africa is one of high prevalence and increasing daily due to a lifestyle behaviour that is destructive. Obesity and overweight is the result of energy consumption that outweighs output and expenditure, in other words, too much food is eaten and little exercise is done (Botha *et al.* 2013).

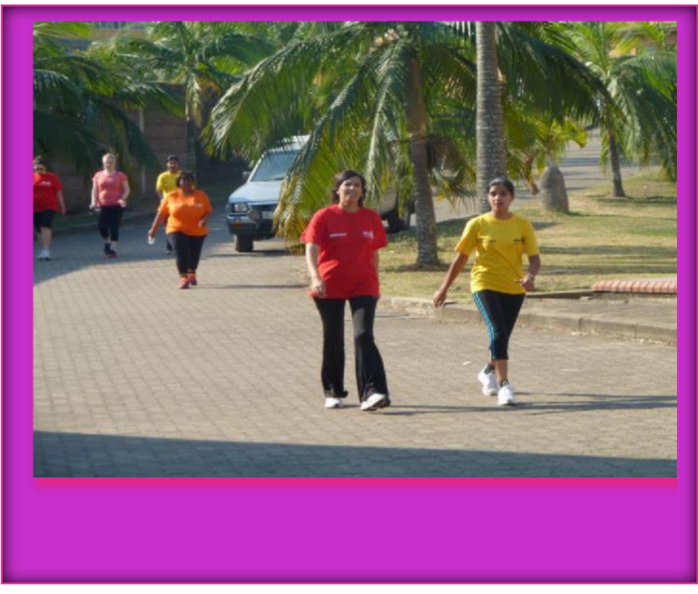

Figure 4: Staff at Coastal College doing their 30 minutes a day

Recommended exercise for Adults: 30 minutes a day

Activity 4:

How active am I?

Let's calculate how much exercise I do for the week!

Monday ___________min/hour

Tuesday ___________min/hour

Wednesday ___________min/hour

Thursday ____________min/hour

Friday ____________min/hour

Saturday ____________min/hour

Sunday ____________min/hour **Total** ____________min/hour

3. MAKE STARCHY FOODS A PART OF MOST MEALS

South Africans should eat starchy foods in the form of whole grains that have little processing, legumes and root vegetables. **Starch is known to protect the body against non-communicable diseases such as CVD. Starch is a good source of energy and is often fortified with vitamins and minerals like breakfast cereals.** Starch is important in the adult diet but care needs to be taken that intake of starch does not exceed expenditure, so as to avoid NCD's such as CVD, obesity and diabetes (Vorster 2013).

Figure 5: Starch (DOH 2012)

Whole Grains

It is the original whole kernel that has not undergone any processing. It contains all macronutrients (carbohydrates, protein, dietary fibre and fats) and micronutrients (Minerals and vitamins) and trace elements. Whole grain products are important for dietary intake to protect against non-communicable diseases (Vorster 2013).

Recommended Intake:

- 10 unit guides daily (1 slice of bread (35-40g) = 1 unit).
- Eat starchy foods in its unrefined form (eat more wholegrain).

Tips on eating starch based foods

Pizza

- Choose a thin crust instead of a deep dish or thick base, this means that the kilojoule content will be lower.
- Choose healthier toppings such as olives, feta cheese, tomatoes, peppers, pineapple.
- Ask for sauce on the side rather than on the pizza, this gives you control over how much you eat. Most sauces are high in salt and Monosodium glutamate (which is added to food to enhance the flavour and taste) and sugar.
- Avoid extra cheese and adding extra table salt on your pizza.

Sandwiches

- Choose a sandwich option that has brown or whole wheat low GI bread. These contain fibre and give sustained energy throughout the day.
- Have low fat margarine, mayonnaise or yoghurt as a spread.
- Avoid processed meats as a filling, rather have for example a chicken breast that has been steamed and seasoned lightly.
- Sandwiches can also have a salad filling such as lettuce, avocado, and tomato.

4. EAT DRY BEANS, SPLIT PEAS, LENTILS AND SOYA REGULARLY

Seed pods that are split into two halves are called legumes. Legumes are the same as “pulses”, while soy beans are classified as “oilseeds”. The FBDG was originally designed to address both overnutrition and undernutrition, by addressing micronutrient deficiencies as well as aid in the prevention and control of non-communicable diseases in South Africa (Venter *et al.* 2013).

Figure 6: Beans (DOH 2012)

Research has shown that beans are cheap and have a high micronutrient content. Legumes are rich and are a good quality protein source. They are important for health and protecting the body against non-communicable diseases (Venter *et al.* 2013).

Recommended Intake

1 cup of cooked dry beans (Venter *et al.* 2013).

Why not try this sumptuous chickpea salad recipe below

Figure 7: Chickpea Salad Recipe

5. EAT PLENTY OF FRUIT AND VEGETABLES EVERY DAY.

Eating fruits and vegetables of different colours gives your body a wide range of valuable nutrients such as vitamins, potassium, folate and fibre. Research has shown that an increased fruit and vegetable intake reduces the risk of diseases such as cancer, cardiovascular disease, and cerebrovascular incidents in adults.

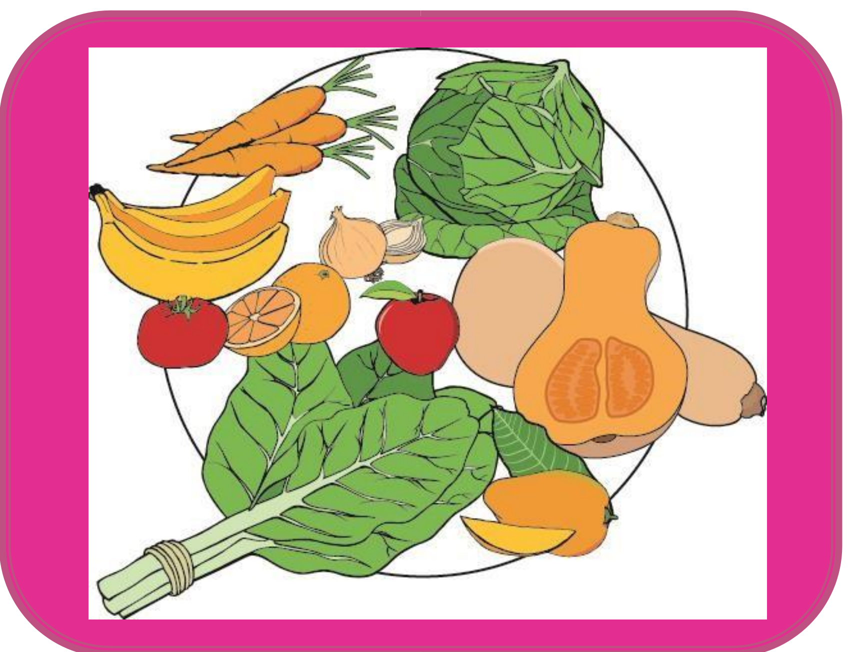

Figure 8: Vegetables (DOH 2012)

A few ways to increase the intake of fruit and vegetables in the diet is to add fresh, canned or dried fruit to your breakfast cereal. Snacks can be replaced by pieces of fruit or vegetable such as carrots, it satisfies the sweet craving that most people have and may be tempted to have sweet desserts that are high in sugar and fat. Beans and lentils can be added to dishes to increase the fibre content of the food. Salads are good as a side dish provided the dressing is low fat (Naude 2013).

Recommended Intake

The World Health Organisation (WHO) recommends adults to consume more than 400g of fruit and vegetables daily which is equivalent to five servings of 80g (Naude 2013).

Salads

- Salads that have fresh vegetables are good options, salad ingredients such as cherry tomatoes, feta cheese, olives, cucumber, onion, cabbage, carrots are healthy (Naude 2013).
- Have low fat and low salt salad dressings such as a low fat yoghurt dressing or olive oil with balsamic vinegar.

TRY THIS HEALTHY SALAD OPTION BELOW

Abby's salad

Ingredients

½ cup lettuce

A handful of rocket

¼ cup olives

¼ cup feta

½ cup Cucumber

½ cup cherry tomatoes halved

¼ cup sunflower seeds

½ butter avocado, chopped roughly

Salad dressing – low fat

Method

1. Mix all the ingredients together. Chill
2. Serve with a salad dressing on the side.

Tip

Any fresh salad ingredients will do, make it your own, by adding your favourite salad ingredient!

Figure 9: Abby Salad recipe

6. HAVE MILK OR MAAS EVERYDAY

Milk (and some dairy products) may protect against the development of NCD's including obesity. **Milk is an excellent source of high quality protein.** Milk can also be used to complement foods such as maize and wheat. Adding milk and other dairy products to these foods results in in a meal with all the amino acids, and is beneficial in populations where maize and bread are staples such as in developing countries like South Africa. Milk and milk products also contain calcium which can help to prevent osteoporosis later in life (Vorster *et al.* 2013).

Figure 10: Milk (DOH 2012)

Recommended Intake

400-500ml low-fat milk per day for adults. This provides:

- 480-610mg calcium
- 608-760mg potassium (Vorster *et al.* 2013).

7. FISH, CHICKEN, LEAN MEAT OR EGGS CAN BE EATEN DAILY.

In appropriate amounts, fish, chicken, lean meat and eggs are important sources of easily digestible and high quality protein, and essential micronutrients such as iron, Vitamin A, Vitamin B12, calcium and zinc (Schonfeld, Pretorius and Hall 2013)

Animal-sourced food is a particularly rich source of these nutrients. Small amounts of these proteins added to a mixed diet, make a substantial contribution to nutrient sufficiency. However overconsumption of food, specifically those which is high in saturated fat and cholesterol, is linked to obesity and overweight and other NCD's (Schonfeld, Pretorius and Hall 2013).

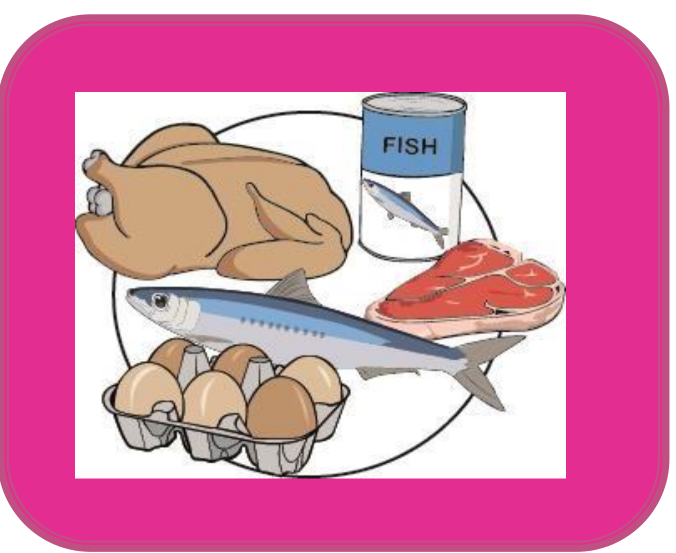

Figure 11: Meat (DOH 2012)

Recommended Intake

- (80-90g per portion) of two-three portions of fish (preferably oily fish such as sardines, pilchards, tuna, anchovies, mackerel, snoek and salmon) per week.
- 2 eggs.
- Lean meat not more than (80-90g portion per day) (Schonfeld, Pretorius and Hall 2013).

Nutrition wellness education booklet

Tips for eating fish, chicken, lean meat and eggs

Chicken

- Choose grilled as opposed to deep fried, grilled chicken is healthier since the chicken is usually cooked without adding additional fat. Deep fried chicken has a higher calorie count and is higher in saturated fat as well as salt.
- Choose a salad as a side option. Choose a green salad option for example. Ask for the salad dressing on the side. Salad dressings should also be low fat. If it isn't take care not to have too much, they can be high in fat and salt. They can also be culprits of hidden fats and dense energy.

Seafood

- Choose fish as an option and ask for the fish to be grilled and lightly seasoned. Grilling is a healthier option and seasoning the fish lightly ensures a lower salt content.
- Choose a salad as a side option (see salad choice under chicken outlet).
- Avoid seafood dishes that have sauces. Sauces can have a high fat and salt content.

Try this fabulous Schwarma recipe, the chicken can be substituted for a soya chicken schnitzel for a vegetarian option!

Chicken Schwarmas
Serves 2

Ingredients

1 Chicken breast/ soya chicken schnitzel

2 Tbs oil (vegetable/olive)

4 Schwarmas (pita breads) (wholewheat or plain)

½ cup Cherry tomatoes

½ cup Avocado chopped

½ cup Olives

Lettuce leaves

A handful of Rocket

½ cup Feta cheese cubed

½ cup mayonnaise (egg free for vegetarian option)

1tbs honey

1 tsp Mustard seeds (crushed)

Method

1. Chicken breast cut into strips. Marinate with crushed garlic and soy sauce for at least half an hour. Stir-fry with a little oil (vegetable/olive oil) until chicken is cooked- 7-8 minutes. Cool chicken strips.
2. Toast pitas lightly on a griddle pan. Cool slightly.
3. Mix half a cup of mayonnaise with 1 tsp crushed mustard seeds (better to grind your own as it gives immense flavour), and add a tablespoon of honey to create your own sauce.
4. Fill Schwarma pockets with chicken salad ingredients and sauce.
5. Alternatively the sauce, the pita and chicken with the salad can be packed separately to avoid it becoming soggy.

Figure 12: Chicken Schwarma Recipe

8. DRINK LOTS OF CLEAN, SAFE WATER

Water is essential to life. Water is an important nutrient with functions such as temperature control, lubricant, nutrients, waste, and solvent among other functions. Water is also important to keep the body hydrated and to prevent dehydration. Beverages such as tea, coffee, fruit juice, foods that contain water all contribute to the liquid intake in the body (Van Graan *et al.* 2013).

Figure 13: Water (DOH 2012)

Recommended Intake: 6-8 glasses per day recommended by the World Health Organisation (Van Graan *et al.* 2013).

Beverages

- Water is a healthier beverage option.
- 100 % fruit or vegetable juice that is unsweetened is a healthy option instead of artificially sweetened drinks.
- Teas and coffees add to the liquid content in the body. Care must be taken not too have too much as the tannin content of tea and caffeine in coffee can be harmful.
- Low fat or skim milk for tea and coffee is healthier.
- Avoid fizzy drinks, these have a high sugar content and have no nutrients.

9. USE FATS SPARINGLY

“Choose vegetable oils, rather than hard fats” is the new FBDG formulated for the fat intake of South Africans. Replacing animal and plant sources of saturated fatty acids with polyunsaturated fatty acids (PUFAs) and monounsaturated fatty acids (MUFAs) is a recommendation. For long term health and well-being. The regular intake of oily fish to increase omega-3 long-chain PUFAs is important. Energy balance remains important (Smuts and Wolmarans 2013).

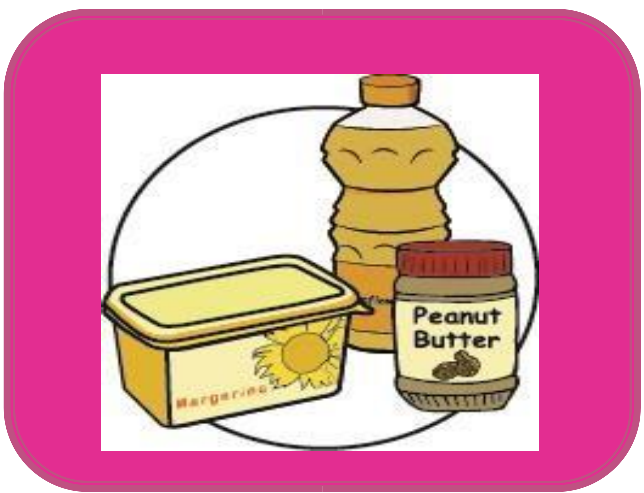

Figure 14: Oils (DOH 2012)

Recommended Intake

- Consume fats and oils that are beneficial to health such as polyunsaturated fatty acids and Monounsaturated fatty acids and reduce the intake of foods that are high in saturated fat.
- Do not eat processed foods often, these are high in SFAs.
- Eat lean meat and chicken with the skin removed.
- Vegetable oils that are good sources of PUFAs and MUFAs such as canola oil and sunflower oil should be consumed.
- Include recommended types of fish often (Smuts and Wolmarans 2013).

10. USE SUGAR FOODS AND DRINKS HIGH IN SUGAR SPARINGLY.

Research has shown that increased sugar intake is associated with increased weight gain. Furthermore a diet with reduced sugar intake is recommended to prevent not just obesity, but other related conditions such as diabetes, cardiovascular disease and colon and breast cancer. Tooth decay is also a widespread problem in South Africa (Temple and Steyn 2013).

Recommended Intake

- **↓ 50g per day (Temple and Steyn 2013)**.

11. USE SALT SPARINGLY

Increased salt intake leads to increase in blood pressure. High blood pressure is an important risk factor for developing diseases such as CVD, CHD and stroke. Research has shown that globally hypertension is the number one risk factor for mortality (Wentzel-Viljoen *et al.* 2013).

Besides hypertension, high salt intake can damage blood vessels and organs increasing the risk of kidney disease, heart disease and stroke (Wentzel-Viljoen *et al.* 2013).

Recommended Intake

- <5g per day

WATCH YOUR SALT INTAKE

Below is a guide to choosing healthier options of salt-containing foods. They have been put into a table and colour coded, green means these can be eaten often, amber mean these foods can be eaten sometimes and red means these food must be eaten less (Wentzel-Viljoen *et al.* 2013).

Table 7: Salt Guide for South Africans Adapted from (DOH 2012) and HSF (2013)

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FOOD GROUP	LOWER SALT FOODS Eat these more often	MODERATE SALT FOODS Eat Sometimes	HIGHER SALT FOODS Eat Less
Starchy foods	Some breakfast cereals Some savoury crackers Dry maize, rice, pasta. Plain popcorn.	Some Breakfast cereals. Bread and bread products.	Some breakfast cereals Some savoury crackers Maize, rice, pasta cooked with a lot of salt Some types of bread Instant noodles. Takeaway's such as pizza. Pies and pastries, take away burgers.
Vegetables and fruit	All fresh vegetables and fruit Frozen vegetables with no seasoning or sauce		Canned vegetables Vegetables with sauces/ seasoning Some vegetable juice
Dry beans, split peas, lentils, soya	All dry beans, split peas, lentils. Unsalted nuts. Plain soya mince.	Baked beans Salted nuts Peanut butter	Canned beans. Some flavoured soya mince.
Fish, chicken, lean meat, eggs	Fresh meat, chicken or fish and eggs.	Tinned fish.	Processed meat (ham, bacon, polony, sausages, biltong) Frozen chicken that has brine added. Canned fish in brine (undrained). All smoked or cured meat, chicken and fish. Processed tinned meat, viennas. Take-away chicken, meat and fish, burgers.

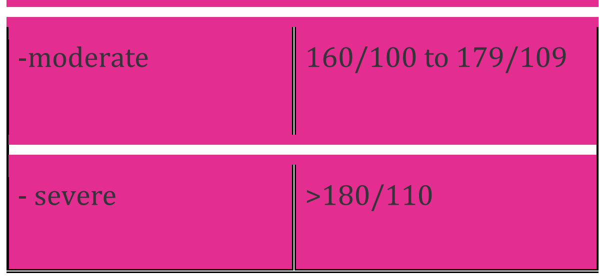
Milk	Milk, maas, yoghurt-plain. Plain cottage cheese. Unsalted butter.	Some cheese. Soft tub margarine.	Some cheese. Haloumi cheese.
Sauces, seasonings and dressings.	Vinegar, spices-plain and fresh and dried herbs.	Table sauces-tomato and mustard	Worcetshire Sauce. Barbecue sauce. Marmite or Bovril. Soy Sauce Stock cubes, seasonings salts, gravy powders and soup powders.

The total daily intake of salt should be less than 5g of table salt (sodium chloride); this equates to a recommended maximum intake of 2500mg of sodium. Some of the salt in the eating plan comes from salt added during cooking and at the table, but most comes from salt added when processed foods are produced and when salt based seasonings and sauces are used in home food preparation (Wentzel-Viljoen *et al.* 2013).

Activity 5:

How much salt do I add to my food? ________________________________

A guide of blood pressure levels:	
Normal	< 120/80 to 129/84
High Normal	130/85 to 139/89
Hypertension:	
- mild	140/90 to 159/99



-moderate	160/100 to 179/109
- severe	>180/110

Table 8: Salt and Blood Pressure (HSF, 2013)

Which category of blood pressure do I fit in?

My blood pressure is ______________

12. ALCOHOL USE

Alcohol abuse is the leading substance abuse disorder in South Africa. Alcohol consumers in South Africa are estimated to drink 16.6 l per annum, with a per capita consumption of South Africa has one of the highest rates of deaths attributable to crime, violence, traffic accidents and HIV/AIDS in the world. These rates relate to the high incidence of alcohol abuse and risky drinking patterns. Research has shown that chronic alcohol abuse can lead to damage of the liver (Jacobs and Steyn 2013).

Recommended Intake (for those that drink)

- **Men – 2 drinks per day**
- **Women – 1 drink per day**

- **One drink is equal to:** **1 glass of wine**
  1 dumpie of beer or
  1 tot of spirits

BMI

Body mass index (BMI) is a measure of weight adjusted for height, calculated as weight in kilograms divided by the square of height in meters (kg/m2). Although BMI is often considered an indicator of body fatness, it is a measure of body fat because it measures excess body weight rather than excess fat (CDC 2014).

BMI is calculated by dividing the square of the height in metres (kg/m^2) by the weight in kilograms.

Table 9: The International Classification of adult underweight, overweight and obesity according to BMI

Classification	BMI(kg/m^2)	
	Principal cut-off points	**Additional cut-off points**
Underweight	**<18.50**	**<18.50**
Severe thinness	<16.00	<16.00
Moderate thinness	16.00 - 16.99	16.00 - 16.99
Mild thinness	17.00 - 18.49	17.00 - 18.49
Normal range	**18.50 - 24.99**	**18.50 - 22.99**
		23.00 - 24.99
Overweight	**≥25.00**	**≥25.00**
Pre-obese	25.00 - 29.99	25.00 - 27.49
		27.50 - 29.99
Obese	**≥30.00**	**≥30.00**
Obese class I	30.00 - 34.99	30.00 - 32.49
		32.50 - 34.99
Obese class II	35.00 - 39.99	35.00 - 37.49
		37.50 - 39.99
Obese class III	≥40.00	≥40.00

Table 10: Asian BMI classification, WHO Expert Consultation (2004a).

Classification	BMI (kg/m) Principal cut-off points	Risk of Co-morbidities
Underweight	<18.5	Low
Ideal BMI	18.5-22.9	Average
Overweight	>23	Increased
Obese I	>25	Moderate
Obese II	>30	Severe

Activity 6:

Let's calculate our BMI

My height is _________ m

My weight is _________kg

Weight __________kg ÷ (height ___________m x height __________m) =

Which BMI category do I fit in? ______________

Waist Circumference

What is my waist circumference?

Waist circumference is recommended as an index for central fat distribution. That's because fat around your middle can put you at an increased risk for high blood pressure, high cholesterol, type 2 diabetes, heart disease and stroke. However, even a reduction of body weight by 5% can reduce your high blood pressure and blood cholesterol levels (HSF 2014).

Table 11: Reference Values for waist circumference (cm), World Health Organisation (2000b)

	Healthy	Central Obesity
Non- Asian Men	<102cm	>102 cm
Asian Men	< 90cm	> 90cm
Non- Asian Women	<88cm	> 88cm
Asian Women	< 80cm	> 80cm

Activity 7:

My waist circumference is ________________cm

Which category do I fit into? ________________

CREATING AN EATING PLAN

Planning one's meals is an effective way to control the quantities and type of food that is being eaten.

MENU PLANNING

Table 12: Sample Menu Adapted from DOH 2012

Menu			
Breakfast	High fibre cereal Milk, low fat Sugar Fresh fruit chopped	Oats porridge Milk, low fat Sugar Apple puree	Maize meal Milk, low fat Peanut butter
Mid- morning snack	Savoury crackers Low-fat Cottage cheese ,spring onions	Banana - medium	Apple slices -1 medium apple
Lunch	**Barley salad** Barley Vegetables Olive oil Herbs and spices	**Sandwich** Brown bread Low-fat margarine chicken breast, no skin, steamed Chopped onion, lettuce	**Salad** Cut corn Vegetables (peppers, carrots) Nuts Sprouted lentils Vinegar, Olive oil
Supper	**Chicken stew** Chicken Oil Chick peas Onion Carrot Spinach Rice Tomato and cucumber salad	**Homemade fish pie** Hake Pilchards Onion Tomato Potato Mixed vegetables Green peas	**Pasta** Pasta Onion Peppers Tomatoes Mushrooms Eggplant Zucchini Olive oil Garlic Herbs Feta cheese and olives

Nutrition wellness education booklet

Daily	Fresh fruit Milk Water	Fresh Fruit Milk Water	Fresh fruit Milk Water

Healthy Eating Tips

Tips for Breakfast

Breakfast is the most important meal of the day.

Healthy Breakfast Options

- Fresh fruit is a healthy option.
- Low fat yoghurt is good provided it is not sweetened.
- Toast made with wholewheat or brown bread is a good option. Have a low fat margarine spread and honey and jams or preserves that are made from fruit and have a low sugar content.
- Oats is healthy with low fat milk and a little sugar.
- Avoid Breakfast cereals that are high in sugar.
- Eggs that are boiled can be eaten, eggs are a good source of protein.
- Fried eggs can be eaten occasionally.
- Bacon must be eaten once in a while because of the high salt and fat content.
- Muesli for breakfast is a healthy option. Care must be taken to choose the ones with a low sugar content.

Other lunch options

- Stir fried vegetables with a protein such as chicken breast strips is a good option, the variety of vegetables is a healthy option. Avoid too much salt and any sauces. Use olive oil or a good vegetable oil.
- Soups can be healthy if they are home made with fresh vegetables and lean meat such as chicken breast. Avoid too much salt and fatty cuts of meat. If cream is to be used, use sparingly and a low fat option.

Snacks and Junk Food

- Cakes and sweet pastries have a high fat and sugar content, have these once in a while.
- Have French fries once in a while, they are usually deep fried and laced with salt or other seasonings and are also topped with sauces that are high in salt, fat and sometimes sugar as well.
- Vetkoek can be eaten once in a while as they are energy dense, and are high in fat and starch, eating too much of these can be highly unhealthy and can make you lethargic at work.
- Pies are very popular during lunch breaks, they are extremely high in fat and salt as well as msg, these can be eaten once in a while.
- Chocolate bars are high in sugar and fat and should be eaten once in a while.
- Snacks like raisins are healthier options. Raisins are healthy and satisfy the sweet craving.
- Nuts are healthy snacks provided you don't add salt.
- Fresh fruit is healthy and packed with nutrients and can be eaten as is.
- Vegetables can also be eaten as a snack at work, pieces of carrots and celery pieces can be eaten with a low fat yoghurt dip or hummus (chickpea dip).
- Popcorn is a healthy snack without any seasoning such as salt and other monosodium glutamate based seasonings.

Beverage Tips

- Water is a healthier beverage option.
- 100 % fruit or vegetable juice that is unsweetened is a healthy option instead of artificially sweetened drinks. Fruit juices can be diluted with water.
- Low fat or skim milk for tea and coffee is healthier since the fat content is lower.

Cooking Methods for Meals

- Grilling is a healthier option since it uses the minimum amount of fat.

- Baking is a good method for dishes such as roast chicken, avoid too much salt and use a minimum amount of fat or no fat since chicken does have its own fat.
- Boiling and steaming are other good options, care must be taken not too add too much salt.
- Steaming is a good option for vegetables but care must be taken not to overcook them as important nutrients can be lost during the cooking process.
- Pan frying can also be a good option if a minimum amount of fat is used. Olive oil is a good option.

Tips for Eating at Work

1. Make use of the South African Food Based Dietary Guidelines.
2. Pack you own lunch.
3. Plan your lunch meals ahead and shop accordingly to avoid unhealthy eating.
4. Pack healthy snacks to eat when you are hungry between meals.
5. Keep your body hydrated with water and other healthy beverages.
6. Fresh fruit is always a good option at work.
7. Whole-wheat and brown instead of bread rolls are good options for bread.
8. Low fat dairy products can be consumed often.
9. Cook your meals with fresh ingredients.
10. Reduce large servings of starch.
11. Increase your fruit and vegetable intake.

Conclusion

Nutrition education is an important component in wellness programs at the workplace. South Africans need to be taught about the different macronutrients and micronutrients. They need to be taught about portion sizes so that they can exercise portion control. Many South Africans are also not aware or do not understand fully the South African food based dietary guidelines in order for them to implement them in their daily lives. These guidelines have been well designed by the South African Department of Health and need to be marketed thoroughly. The average South African spends eight hours or more at work for 5-6 days a week. This makes the workplace the ideal place to implement a wellness program with a nutrition education component.

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ANNEXURE K

Wellness Program

Wellness is defined as (a healthy state of wellbeing free from disease). The major concern for South Africans is that obesity is an important risk factor for developing hypertension, diabetes and cardiovascular disease. The main function of this workplace wellness program is to improve the nutrition knowledge thereby increasing the well-being and health of all South African's. This can be done by good portion control, eating a balanced diet, maintaining a healthy body weight, increasing one's knowledge of nutrition and making use of the South African Based Dietary Guidelines and the Food guide for South Africa.

BENEFITS OF IMPLEMENTING A WELLNESS PROGRAM

For Employers:

Lower health care and disability costs

Enhanced employee productivity

Reduced employee absenteeism

Decreased rates of illness and injuries

Enhanced corporate image

Improved employee morale

Improved employee recruitment and retention

Increased organizational commitment and creation of a culture of health

For Employees:

Increased well-being, self-image, and self-esteem

Improved coping skills with stress or other factors affecting health

Improved health status

Lower costs for acute health issues

Lower out-of-pocket costs for health care services (e.g., reduced premiums; deductibles; co-payments)

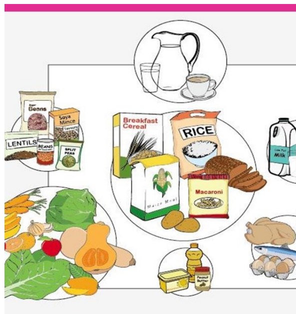
Increased access to health promotion resources and social support

Improved job satisfaction

Safer and more supportive work environment

workplace wellness

2014

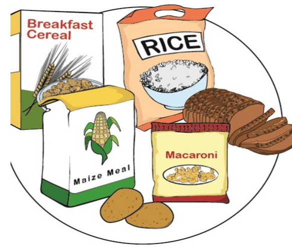


Nutrition Education for Better Health in South Africa

Breakfast is the most important meal of the day.

Healthy Breakfast Options

- Fresh fruit is a healthy option.
- Low fat yoghurt is good provided it is not sweetened.
- Toast made with whole-wheat or brown bread is a good option.



- Have a low fat margarine spread and honey and jams or preserves that are made from fruit and have a low sugar content.
- Oats is healthy with low fat milk and a little sugar.
- Avoid Breakfast cereals that are high in sugar.
- Eggs that are boiled can be eaten, eggs are a good source of protein.
- Fried eggs can be eaten occasionally.
- Bacon must be eaten once in a while because of the high salt and fat content.

FOOD BASED DIETARY GUIDELINES FOR SOUTH AFRICA

1. ENJOY A VARIETY OF FOODS
2. BE ACTIVE.
3. MAKE STARCHY FOODS A MOST PART OF THE MEAL
4. EAT DRY BEANS, SPLIT PEAS AND PULSES
5. EAT A VARIETY OF FRUIT AND VEGETABLES EVERY DAY.
6. HAVE MILK OR MAAS EVERYDAY
7. FISH, CHICKEN, LEAN MEAT OR EGGS CAN BE EATEN DAILY.
8. DRINK LOTS OF CLEAN AND SAFE WATER
9. USE FATS SPARINGLY
10. USE SUGAR FOODS AND DRINKS HIGH IN SUGAR SPARINGLY.
11. USE SALT SPARINGLY
12. "IF YOU DRINK ALCOHOL, DRINK SENSIBLY"

Tips for Eating at Work

- Make use of the South African Food Based Dietary Guidelines.
- Pack you own lunch.
- Plan your lunch meals ahead and shop accordingly to avoid unhealthy eating.
- Pack healthy snacks to eat when you are hungry between meals.
- Keep your body hydrated with water and other healthy beverages.
- Fresh fruit is always a good option at work.
- Whole-wheat and brown instead of bread rolls are good options for bread .
- Low fat dairy products can be consumed often.
- Cook your meals with fresh ingredients.
- Reduce large servings of starch.
- Increase your fruit and vegetable intake.

Workplace Wellness

2015

ANNEXURE L

BENEFITS OF IMPLEMENTING A WELLNESS PROGRAM

For Employees:

- Increased well-being, self-image, and self-esteem
- Improved coping skills with stress or other factors affecting health
- Improved health status
- Lower costs for acute health issues
- Lower out-of-pocket costs for health care services (e.g., reduced premiums; deductibles; co-payments)
- Increased access to health promotion resources and social support
- Improved job satisfaction
- Safer and more supportive work environment

Workplace Wellness

2015

FOOD BASED DIETARY GUIDELINES FOR SOUTH AFRICA

1. ENJOY A VARIETY OF FOODS

2. BE ACTIVE.

3. MAKE STARCHY FOODS A MOST PART OF THE MEAL

4. EAT DRY BEANS, SPLIT PEAS AND PULSES

5. EAT A VARIETY OF FRUIT AND VEGETABLES EVERY DAY.

6. HAVE MILK OR MAAS EVERYDAY

7. FISH, CHICKEN, LEAN MEAT OR EGGS CAN BE EATEN DAILY.

8. DRINK LOTS OF CLEAN AND SAFE WATER

9. USE FATS SPARINGLY

10. USE SUGAR FOODS AND DRINKS HIGH IN SUGAR SPARINGLY.

11. USE SALT SPARINGLY

12. "IF YOU DRINK ALCOHOL, DRINK SENSIBLY"

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2015

Tips for Eating at Work

- Make use of the South African Food Based Dietary Guidelines.

- Pack you own lunch.

- Plan your lunch meals ahead and shop accordingly to avoid unhealthy eating.

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- Keep your body hydrated with water and other healthy beverages.

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- Increase your fruit and vegetable intake.

Workplace Wellness

2015

Breakfast is the most important meal of the day.

Healthy Breakfast Options

- Fresh fruit is a healthy option.
- Low fat yoghurt is good provided it is not sweetened.
- Toast made with whole-wheat or brown bread is a good option.
- Have a low fat margarine spread and honey and jams or preserves that are made from fruit and have a low sugar content.
- Oats is healthy with low fat milk and a little sugar.
- Avoid Breakfast cereals that are high in sugar.
- Eggs that are boiled can be eaten, eggs are a good source of protein.
- Fried eggs can be eaten occasionally.
- Bacon must be eaten once in a while because of the high salt and fat content.
- Muesli for breakfast is a healthy option. Care must be taken to choose the ones with a low sugar content.

Workplace Wellness

2015

WARNING!!!!

The **major concern** for **South Africa** is that **Obesity** is an important **risk factor** for developing **hypertension, diabetes** and **cardiovascular disease**.