Workplace wellness, nutritional status and disease

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Abstract

The objective of this study was to obtain a health profile for the staff members of a specific FET College. The study consisted of 138 adults of which there were 77 women and 61 men. 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.

Keywords: Workplace, wellness, nutrition, disease.

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 A it can be seen that NCDS have one or more of these risk factors (DOH, 2013; WHO, 2014).

In South Africa 40% of total deaths is attributed to NCDs. Figure 1 presents the percentage deaths by the four main non-communicable diseases in South Africa.

| Factor	Cardiovascular diseases	Diabetes	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 1: Common Risk Factors for Non-Communicable diseases (DOH, 2013)

Malnutrition 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, 2005a) 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 .
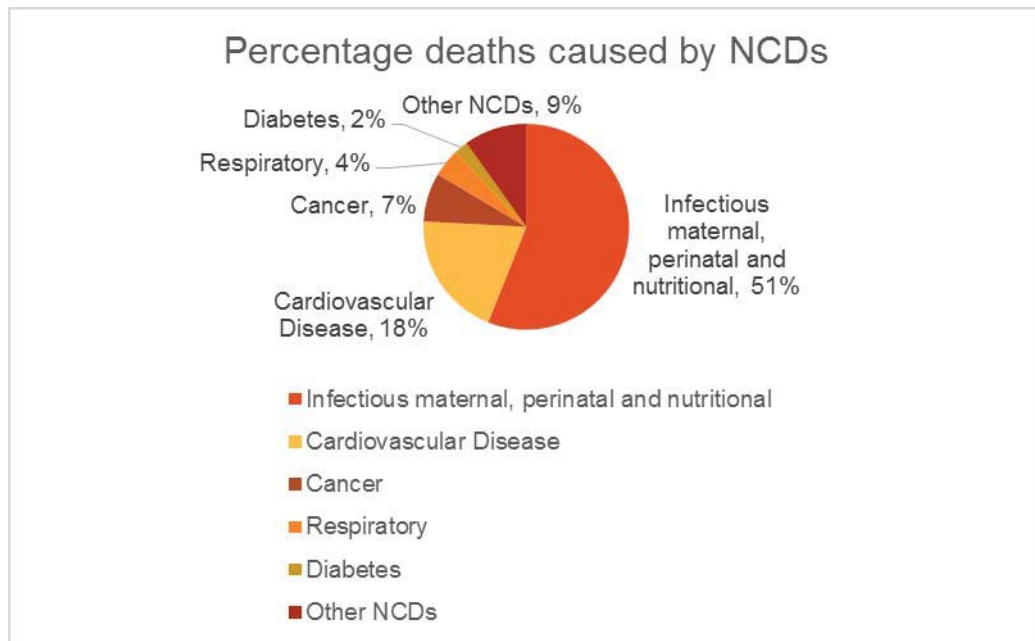
Figure 2: Percentage deaths caused by NCDs (DOH, 2013)

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, 2012b).

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).

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, & Batt, 2013).

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, 2005a).

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, 2011).

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, 2005b). 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).

Obesity

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 & Damasceno, 2006)

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).
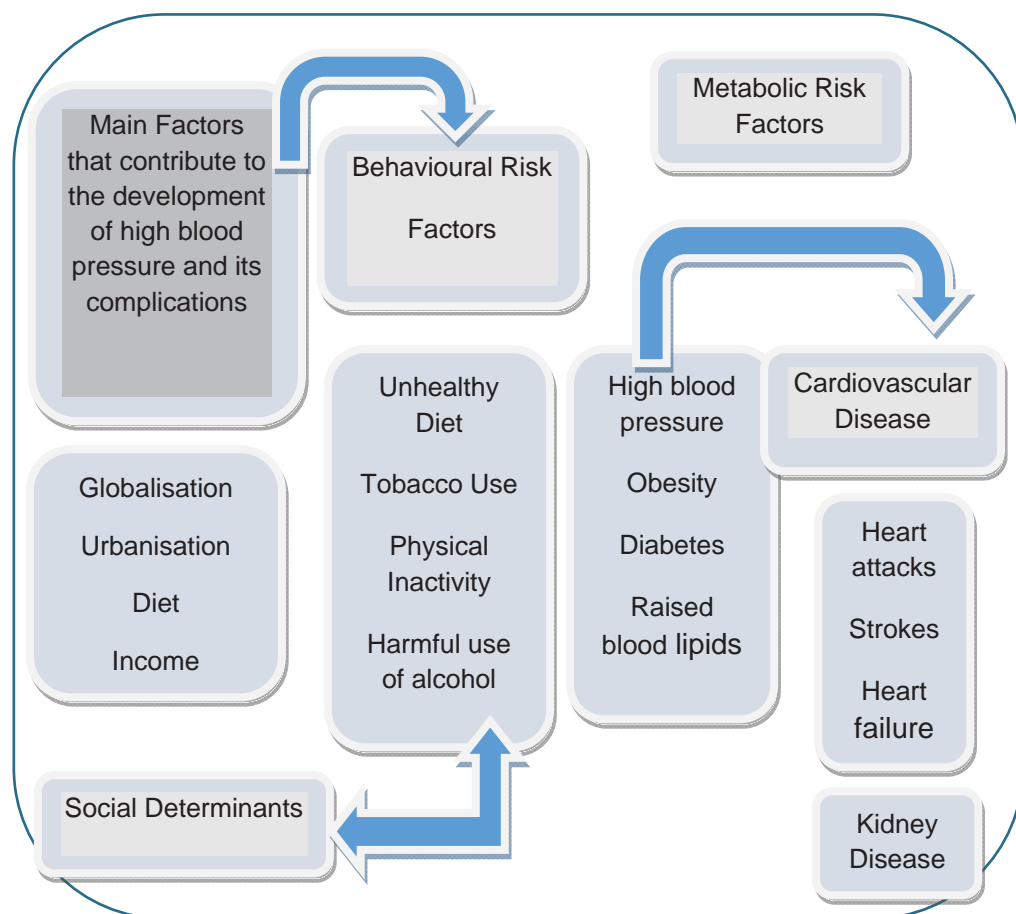
Figure 3: Factors that contribute to hypertension adapted from (WHO, 2015)

Figure 3 shows 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 1 indicates blood pressure categories and cut-off points.

Table 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 1 indicates the blood pressure categories for systolic and diastolic blood pressure. 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, Tsolekilei, Sandersi & Parkerii, 2008) and (Steyn & 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).

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).

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).

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 & Sitas, 2005).

Diabetes Mellitus

Diabetes is defined by Norris and Pettifor (2009) and 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.

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).

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 & 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, Akhavanzanangi, Ghiasvand, Khorvash & Askari, 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 D below.
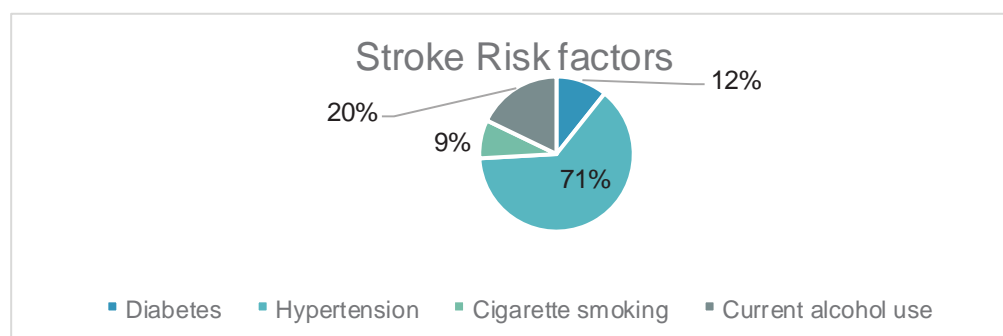
Figure 4: Risk factors of stroke

Dyslipidemia

Dyslipidaemia is described as low density lipoproteins or low levels of high density lipoprotein cholesterol by the American Family Physician (Fodor, 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 & Frans, 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 & Frans, 2005).

Communicable diseases

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 et al., 2011).

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, Gupta, Atreja & S, 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, Schneider, Norman & Bourne, 2005).

Chronic Respiratory Diseases

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

Results

Work Status and Education Levels

Table 2 presents the work status and income earned. The results in Table 2 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.

Table 2: 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 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.

Education and Language

Table 3 presents the level of education and language spoken.

Table 3: 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 3 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).

Household Food Security and Assets

Table 4 shows a breakdown of the food purchases and expenditure.

Table 4: 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 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 5 provides data on the person responsible for food preparation in the household.

Table 5: 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 6 presents results on the amount of meals consumed.

Table 6: 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 6).

Table 7 presents substance usage patterns among the participants in the study.

Table 7: 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	10	16.00	7	9.10
20-30 per day	1	1.60	0	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 7 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.

Table 8 presents the summarized findings for the amount of money spent on food, BMI, waist circumference, blood pressure, fruit and vegetable intake, smoking cessation, alcohol intake, exercise and positive correlations. 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.

Table 8: Summarized findings

Research		Finding/Results
Amount Of Money Spent On Food		• 72.46% spent (>R500) a month
Bmi	**Men**	• Overweight – 37.70% • Obesity class 1- 16.39% • Obesity class 2 – 8.20% • Obesity class 3- 1.64% • **Total number (obese men)- 63.93%**
Bmi	**Women**	• Overweight – 23.38% • Obesity class 1- 20.78% • Obesity class 2 – 15.58% • Obesity class 3- 11.69% • **Total number (obese women)- 71.43%**
Waist Circumference	Exceeded cut-off point's women – 88cm.	• Women (42.86 %)
	Exceeded cut-off points – men 102cm	• Men (16.39%)
Blood Pressure	**Men**	• Prehypertension- 42.62% • High Blood Pressure category 1- 4.92% • High Blood Pressure category 2 - 3.28% • **Total Hypertensive Men- 8.20%**
Blood Pressure	**Women**	• Prehypertension - 25.9% • High blood pressure- category 1- 5.19% • High Blood Pressure Category 2 - 3.90% • **Total Hypertensive Women- 5.90%**
Fruit And Vegetable Intake Who Recommendation Of >400g Per Day	**Men** WHO recommendation of >400g per day	• 134.44g - 175.69g per day
Fruit And Vegetable Intake Who Recommendation Of >400g Per Day	**Women** WHO recommendation of >400g per day	• 124.00g - 183.30 g per day

Research		Finding/Results
Nutrient Analysis	Nutrient adequacy ratios Men and Women	• Energy, dietary fibre, vitamin A, vitamin D. calcium, magnesium and iodine were below the nutrient adequacy ratio of >100%.
Positive Correlations	**Men and Women**	• Age and Systolic blood pressure. • Waist circumference and systolic blood pressure. • Waist circumference and diastolic blood pressure. • Waist-to-height ratio and BMI- Men and Women
Exercise	Light- no exercise	• Men- 32.78% • Women – 45%
Alcohol	Consumption	• Men – 44.26% • Women – 22.08 %
Smoking	Cessation	➢ Men – 21.31% ➢ Women – 12.99%

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.

BMI increased as waist-to-height-ratio increased among men in the group. This relationship was statistically significant ($p= 0.000$). This relationship between BMI and waist-to-height ratio was statistically significant ($p= 0.050$). Systolic blood pressure increased as waist circumference increased ($p=0.000$). This relationship was statistically significant. Diastolic pressure increased as waist circumference increased. The correlation was not strong, but was statistically significant ($p= 0.037$). Systolic blood pressure increased with age.

Table 9 presents the relationship between BMI and age and other variables. The correlation between age and systolic blood pressure was strong ($p=0.005$). This relationship was statistically significant.

Table 9: 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).

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 contradictory

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.

The health survey indicated that there is a greater risk for woman to have obesity than their male counterparts while the males in this group were at higher risk for hypertension than the females in the group. 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.

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 and 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.

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).

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.

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.

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, Wilcox, Dowda & Baruth, 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.

Conclusion

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 World, so also does the presence of non-communicable disease. The literature and results have 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.

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