EXPLORING THE KNOWLEDGE, ATTITUDES, PERCEPTIONS AND PRACTICES OF TEACHERS AROUND OBESITY AND NUTRITION RELATED NON-COMMUNICABLE DISEASES

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November 2018

KEYWORDS

Teachers

Knowledge

Attitude

Perceptions

Non-communicable diseases

Nutrition related non-communicable diseases

Obesity

Overweight

Cardio vascular disease

Diabetes

ABSTRACT

Introduction: Non-communicable diseases (NCDs) are among the leading causes of premature death in South Africa. As is the case with many countries in transition, in South Africa the burden of pre-NCDs such as overweight and obesity is increasing. The aim of this mixed method study was to gain an understanding on the knowledge, attitudes, practices and perceptions and related factors of primary and secondary school teachers in Limpopo Province of South Africa regarding nutrition related non-communicable diseases (NR-NCDs).

Methodology: A mixed method approach, parallel convergent study design was used to collect both qualitative and quantitative data from a group of randomly selected public school teachers in Rakwadu Circuit, Limpopo, with due consideration of the ethical issues involved. For the quantitative inquiry, a previously validated structured questionnaire was adapted to collect data from 114 teachers, while 2 Focus Group Discussions (FGDs) were conducted by the researcher to collect the qualitative data. Information collected included teachers' dietary practices, physical activity levels and their knowledge, attitudes and perceptions towards nutrition related non-communicable diseases. Each of these variables had a number of questions which were scored and a mean score for each participant was obtained. Anthropometric measurements collected included Body Mass Index (BMI) and waist circumference (WC).

Analysis: Statistical Package for Social Sciences (SPSS) software was used to generate descriptive statistics for quantitative data. Pearson's correlation was used to find associations between the variables. Major themes were extracted from the FGD discussions. The themes from the qualitative data were then compared with the quantitative findings to determine if the findings correlated or not.

Results: The quantitative analysis showed that 85.1% of the participants were either obese or overweight. There was high prevalence of high blood pressure followed by diabetes within the participants. Most participants reported low physical activity levels (83.3%) and unhealthy dietary practices (67.5%). Furthermore, a number of participants reported low consumption of fruits and vegetables, but high consumption of sugary and

fatty foods. There was positive non-significant association between BMI and dietary intake practices. BMI was negatively associated with physical activity levels though non-significant. Dietary knowledge among these participants was very poor (72.8%) but they portrayed a positive attitude (57%) towards good practices regarding, diet, diabetes and CVD risk factors. The majority of the participants perceived their body weight as normal, even though they were overweight or obese. Similarly, BMI was negatively associated with dietary knowledge score. Unexpectedly, a statistically significant inverse correlation was found between knowledge and attitude. The qualitative results revealed that the participants had a better understanding of unhealthy diet than was reflected by the quantitative results. Both qualitative and quantitative results revealed that low physical activity and consumption of larger portion sizes increased the risk for obesity in teachers. However, there was a misalignment between the knowledge and the practice of consumption of fruit and vegetables. Participants regularly mentioned fruit and vegetables as part of a healthy diet, but did not consume fruit and vegetables regularly. Financial implications and lack of facilities emerged as the perceived barriers to eating a healthy diet and physical activity.

Conclusion: The findings of this study call for a holistic approach, in which lifestyle intervention programmes should be implemented to prevent overweight and obesity in individuals, particularly in schools as such intervention may positively impact the children. More insight is needed on whether intervention programmes can modify the school food environment, perceptions of body weight and increase physical activity at schools with teachers being actively involved.

DECLARATION

I declare that this thesis entitled "*Exploring the knowledge, attitudes, perceptions and practices of teachers around obesity and nutrition related non-communicable diseases"* is my own work. It has not been submitted for any degree or examination in any other university and that all the references I have used or quoted have been acknowledged.

Roselyn Mbangani

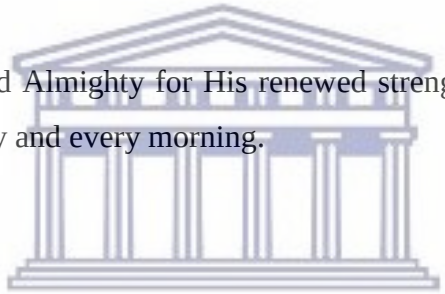
Signed: 

Date: 09/11/2018

ACKNOWLEDGEMENTS

I would like to extend my heartfelt gratitude to the following people:

- My supervisor, Prof. E.C. Swart, for her continued advice and support throughout my studies;
- My co-supervisor, J. Wilkenson for her support and assistance;
- Dr E. Kunneke for her support and guidance during the initial stages of my research proposal;
- Participants for taking part in this study;
- My husband, Donald Tigere for his love and continual support;
- My children, Wesley, Wayne and Megan Tigere for their support and patience and
- Above all, to God Almighty for His renewed strength, love and mercies which are new every day and every morning.



ABBREVIATIONS

NCD:	Non-Communicable Diseases
NR-NCD:	Nutrition Related Non-Communicable Diseases
CVD	Cardiovascular Diseases
KAP:	Knowledge, Attitude and Practices
WHO:	World Health Organization
Q-FFQ:	Quantified Food Frequency Questionnaire
IPAQ:	International Physical Activity Questionnaire
FGD:	Focus Group Discussions
PA:	Physical Activity
MMR:	Mixed Method Research
LMIC:	Low and Medium Income countries
T2DM:	Type 2 Diabetes Mellitus
BMI:	Body Mass Index
SANHANES:	South African National Health and Nutrition Examination Survey

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CHAPTER 1

ORIENTATION OF THE STUDY

1.1 Introduction

According to the World Health Organization (WHO), 38 million people died due to Non-Communicable Diseases (NCDs) in 2012, but projections indicate that this number might increase to 52 million by 2030 (WHO, 2014). In addition, 82% of these deaths are from the four major NCDs which are cardiovascular disease (CVD), cancer, chronic respiratory disease and type 2 diabetes mellitus (T2DM). However, low- and middle-income countries (LMIC) are most affected, with 82% of NCD deaths occurring before the age of 70 (premature deaths) (WHO, 2014). South Africa (SA) is no exception to this NCD epidemic, with 43% of total deaths due to NCDs while 27% of premature deaths are due to the four major NCDs (WHO, 2014).

This makes NCDs the key barriers to poverty alleviation and sustainable development in the country (WHO, 2014). It has been well established that NCDs affect the quality of life and increase healthcare expenses at household, personal and country level (Bradshaw, Steyn, Levitt & Nojilana, 2011), subsequently driving poor households further into poverty. The multi-morbidities of these conditions also result in high staff turnover, absenteeism and liability to employers (Van Nuys, K., Globe, D., Ng-Mak, D., Cheung, H., Sullivan, J. and Goldman, D, 2014)

According to Bradshaw *et al.* (2011), overweight and obesity are major risk factors associated with NCDs. Following a healthy diet, participating in regular physical activity (PA), not using tobacco, and avoiding harmful use of alcohol (WHO, 2011) are key behaviours that reduce NCDs. A few studies undertaken amongst teachers in SA revealed that teachers have poor knowledge of nutrition and PA (Draper, De Villiers, Lambert, Fourie, Hill, Dalais, Abrahams & Steyn, 2010; Dalais, Abrahams, Steyn, De Villiers, Fourie, Hill, Lambert & Draper, 2014) and fall into overweight and obesity categories (De Villiers, Steyn, Draper, Hill, Dalais, Fourie, Lombard, Barkhuizen & Lambert, 2012). The poor knowledge of nutrition and PA indicate a

likelihood of adopting unhealthy behaviours and lifestyles. Most of this research has been undertaken in primary school teachers in the Western Cape. Provinces like Limpopo have little published information on NCD risk factors, knowledge, attitude, practices and perceptions of rural teachers related to obesity and NCDs. Teachers' lack of understanding of NCD risk factors is a concern as teachers are an integral part of the school environment and influence the lifestyle and behaviours of learners (Kupolati, MacIntyre & Gericke, 2014).

1.2 Problem statement

The number of people suffering from NCDs is increasing in SA (Mayosi, Flisher, Lalloo, Sitas, Tollman & Bradshaw, 2009) and so are the pre-NCD conditions such as obesity and overweight (Puoane, 2013). In addition, low birth weight and stunting, which have been identified to be associated with increased risk of developing NR-NCDs later in life, remain prevalent. Lack of knowledge, poor diet, physical inactivity and inappropriate early childhood feeding practices are key drivers of overweight and obesity (Darnton-Hill, Nishida & James, 2004) with poverty being a significant underlying factor.

Researchers argue that individual attitudes and beliefs regarding the causes of obesity may influence beliefs related to the appropriate solutions for obesity. Empirical research is needed to understand how these attitudes are clustered in particular population subgroups, what leads to these attitudes, and how attitudes may be changed (Sikorski, Luppa, Schomerus, Werner, König & Riedel-Heller, 2012). Hence, this study sought to explore knowledge, attitudes, practices and perceptions of public school teachers around obesity and NR-NCDs. This will serve to motivate and inform all stakeholders to plan interventions to address the problem.

1.3 Rationale for the study setting

Teachers form part of the school environment. As such they play an important role in creating an enabling environment for health promotion (Nutbeam, 2000),

delivering health education to empower learners with the knowledge and skills for healthy living to prevent NCDs (Kupolati, MacIntyre & Gericke, 2014) and they can model healthy dietary and physical activity behaviours for learners (Herlihy, 2012; Hawkes, 2013).

Besides being role models for learners, local communities also look up to teachers (Lumpkin, 2008). According to the South African Council of Education (SACE), in 2014 the number of registered teachers was approximately 500 000, making up a significant proportion of the public service; therefore, their health status is of much concern. For instance, health problems commonly reported among teachers in the public sector are high blood pressure, stomach ulcers and T2DM (Shisana, Peltzer, Zungu-Dirwayi & Louw 2005). Such multi-morbidities are detrimental to the execution of their duties as teachers considering the fact that these conditions are associated with high levels of absenteeism and high staff turnover. These will in turn affect the learner performance and impact on success rates in schools.

1.4 Purpose

The purpose of this study was to explore the knowledge, attitudes, practices and perceptions of primary and secondary school teachers in Limpopo Province regarding NR-NCDs in order to propose workplace interventions to create a more health promoting environment for learners.

1.5 Study aims and objectives

1.5.1 Aim

The aim of this research was to explore the knowledge, attitudes, practices and perceptions and related factors of primary and secondary school teachers in Limpopo Province regarding NR-NCDs.

1.5.2 Specific Objectives

i) To determine the anthropometric status (height, weight, BMI and waist circumference) of teachers.

ii) To assess the teachers' dietary patterns and PA.

iii) To assess the knowledge attitude and perceptions of teachers on factors associated with obesity and NR-NCDs.

iv) To assess the association between the teachers' anthropometric measurements, dietary intake and PA with their knowledge, attitude and perceptions regarding obesity and NR-NCDs.

v) To explore the teachers understanding on the factors associated with obesity and NR- NCDs and the challenges they face regarding healthy lifestyle.

1.6 Thesis outline

Chapter 1: Provides an orientation of the study where background, research problem, aims and objectives, rationale of study were discussed.

Chapter 2: Comprises detailed information on literature review.

Chapter 3: Covers information on research design and methods used.

Chapter 4: Presents study results.

Chapter 5: Discusses the study results and limitations

Chapter 6: Includes the conclusions and recommendations for future studies.

1.7 Conclusion

This chapter introduced the orientation of the study. This included the research problem, rationale for the study, the purpose, and the study objectives. The next chapters of the dissertation will elaborate further each component of the research process. Literature review will be discussed in the next Chapter two.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The aim of this chapter is to gain a better understanding of the determinants of obesity and NCDs as well as knowledge, attitudes and perceptions around obesity and nutrition and NR-NCDs.

2.2 Overview of overweight and obesity

Obesity is often defined simply as a condition of abnormal or excessive accumulation of adipose tissue, to the extent that health may be impaired (Garrow, 1988:1-16). Body Mass Index (BMI) is a simple index of weight-for-height that is commonly used to classify overweight and obesity in adults. It is defined as a person's weight in kilograms divided by the square of his height in metres (kg/m^2) (WHO, 2016). WHO classifies a BMI greater than or equal to 25 as overweight; and a BMI greater than or equal to 30 as obese.

However, the amount of excess fat, its distribution within the body, and the associated health consequences vary considerably between obese individuals. Even though BMI is a useful population-level measure of obesity, it does not account for the wide variation in body fat distribution, and may not correspond to the same degree of fatness or associated health risk in different individuals and populations (WHO, 2000). Obese individuals with excess intra-abdominal fat deposits are at particular risk of the adverse health consequences of obesity. This makes waist circumference measurement an apt method of identifying individuals with increased risk of obesity-associated diseases due to adnominal fat distribution (WHO, 2000).

There are certain methods and tools which can be used to give a more accurate characterisation of the obesity status of an individual. These include methods of measuring body composition (for example, underwater weighing), determining the

anatomical distribution of body fat (for example, magnetic resonance imaging), and measuring energy intake (for example, prospective dietary record) and energy expenditure (for example, doubly labelled water) (WHO, 2000). However, these methods are costly which limits their usefulness in research.

2.2.1 Prevalence of obesity

A WHO (2016), study reports that in 2014 about 13% of the world's adult population was were obese while 39% was overweight. A systematic analysis of obesity from 1980 to 2013 reveals that rates of overweight and obesity among adults have increased for both men (from 29% to 37%) and women (from 30% to 38%) (Ng, Fleming, Robinson, Thomson, Graetz, Margono, Mullany, Biryukov, Abbafati, Abera & Abraham, 2014:766-781). This analysis also reveals that in developed countries, men had higher rates of overweight and obesity than those in developing countries, while women in developing countries exhibited higher rates than women in developed countries. Additionally, the United States of America, China, India, Russia, Brazil, Mexico, Egypt, Germany, Pakistan and Indonesia are the 10 countries in which more than 50% of the world's 671 million obese people live. However, of the countries in sub-Saharan Africa, South African women emerged as having the highest obesity rates of approximately 42% (Ng *et al*., 2014).

2.2.2 Prevalence of obesity in South Africa

According to Sartorius, Veerman, Manyema, Chola and Hofman (2015), the prevalence of obesity increased significantly from 23.5% in 2008 to 27.2% in 2012, with a significantly higher prevalence among females (37.9% in 2012) compared to males (13.3% in 2012). These findings concur with those of with Ng *et al*. (2014), but the percentage for women is of great concern. Sartorius *et al.* (2015:1-20), report a prevalence 37.9% in 2012 while Ng *et al*. (2014), report that in 2013, 42% of South African women were obese. This is a considerable increase in such a short time. The SANHANES report in 2013 also reported 39.2% obesity prevalence in females compared to 10.6% in males. The same applies to the prevalence of overweight individuals with 24.8% females and 20.1% of males being overweight (Shisana *et al.*, 2014).

The findings of the recent most recent (2016) South African Demographic Health Survey (SADHS) reflects that SA women (68%) are still in the majority in terms of obese or overweight compared to men (31%). (National Department of Health, 2017). One of the most alarming findings in the SADHS of 2016 was not just the high levels of overweight and obesity among women, but also the high prevalence of severely obese women (1 in 5 women) with BMIs greater than 35 (NDoH, 2016). South Africa has one of the highest prevalences of obesity in sub-Saharan Africa. The above-mentioned trends indicate a rapid epidemiological transition within South Africa as is indicated by Micklesfield, Lambert, Hume, Chantler, Pienaar, Dickie, Goedecke and Puoane (2013).

2.2.3 Prevalence of obesity in teachers

There seems to be a prevalence of obesity in certain sub-populations (such as in teachers) which is even higher than the national percentage in South Africa. For example, a HealthKick sub-study by Senekal, Seme, De Villiers and Steyn (2015), revealed that primary school teachers in low socioeconomic areas had high levels of overweight (37%) and obesity (47%). The prevalence of abdominal obesity was higher in females (67% WC) than in males (38% WC). These percentages exceed the national prevalence mentioned earlier. Similarly, Dalais *et al.* (2014), reported a higher prevalence of these conditions in teachers. Laurence, Volmink, Esterhuizen, Dalal and Holmes (2016), found an even higher prevalence (84.7%) of obesity or overweight in their research on teachers. It was found that 15% were in the normal range while 31.1% were overweight and 53.6% obese. Abdominal obesity was also as high as 61.2%. However, these studies were all conducted in the Western Cape.

2.3 Overview of nutrition related non-communicable diseases

According to Burns (2004), obesity is diet-related and hereditary but with appropriate intervention can be managed to avoid reaching the stage of causing NCDs. The consequences of overweight and obesity include NR-NCDs such as T2DM (Xu, Song, You, Zhang, Greenland, Ford, He & Liu (2010), CVDs and certain cancers (Arnold, Pandeya, Byrnes, Renehan, Stevens, Ezzati, Ferlay,

Miranda, Romieu, Dikshit & Forman (2015). For instance, overweight and obesity are estimated to contribute to approximately 58% of T2DM cases (Xu *et al*., 2010), while an estimated 3.6% of all new cancer cases in adults (aged 30 years and older after the 10-year lag period) in 2012 were attributable to high BMI (Arnold *et al.*, 2015).Worldwide, these NCDs accounted for around 38 million deaths in 2012 (WHO, 2014: 9).

NCDs and injuries account for 49% of mortality and approximately 2 out of 5 deaths in South Africa were attributable to NCDs in 2013 (NDoH, 2013). Of all the NCDs, CVD is the leading NCD globally, contributing to 17 million deaths annually (Mendis, Alwan and Eds, 2011). In South Africa, 43% of total adult deaths are estimated to be caused by NCDs while CVDs account for almost a fifth (18%) of these deaths (WHO, 2014). According to WHO (2013), 1 in 3 South African adults (33.7%) have hypertension which can increase risk of heart attack, heart failure, kidney disease or stroke.

2.3.1 Prevalence of NR-NCDs in teachers.

Among the South African working population, teachers are also at risk of CVDs. A South African study in the Cape Metropole Area (Western Cape) whose aim was to determine the prevalence and distribution of CVD risk factors and self-reported heart disease and stroke among teachers, revealed that teachers represent a group at high risk of chronic NCDs, in particular CVD. Of the total population studied, 48.5% had hypertension, 10.1% had diabetes and a further 3.3% were at an increased risk of diabetes (Laurence *et al*., 2016).

Domingo, Asmal, Seedat, Esterhuizen, Laurence and Volmink (2015:1057-1060), also reported on the same study as Laurence *et al.* (2016), but involved secondary analysis of SA baseline data from the Partnership for Cohort Research and Training pilot study. This study investigated the association between T2DM, depression and psychological distress in teachers. The prevalence of self-reported psychological distress (28.1%) and depression (15.5%) was found to be high in teachers.

The occurrence of T2DM has also increased in South Africa. Recent data from the International Diabetes Federation SA (2015), estimates that 7% of South Africans between the ages of 21 and 79 years have T2DM. This means that approximately 3.85 million South Africans in this age group may have T2DM. South African teachers have also been found in the group of people affected by this condition. For example, 7.7% of teachers in the PACT study had T2DM, and this was associated with a threefold increase in the odds of psychological distress and depression (Domingo *et al*., 2015).

2.4 Determinants of obesity and NCDs

The causes of the main chronic disease epidemics are well established and well known. WHO categorises them into underlying, modifiable and non-modifiable risk factors. Globalisation, urbanisation and population ageing are the underlying drivers of NCDs. Modifiable risk factors include unhealthy diet and excessive energy intake, physical inactivity and tobacco use while non-modifiable risk factors include age and heredity as shown in Figure 2.1 (WHO, 2005).

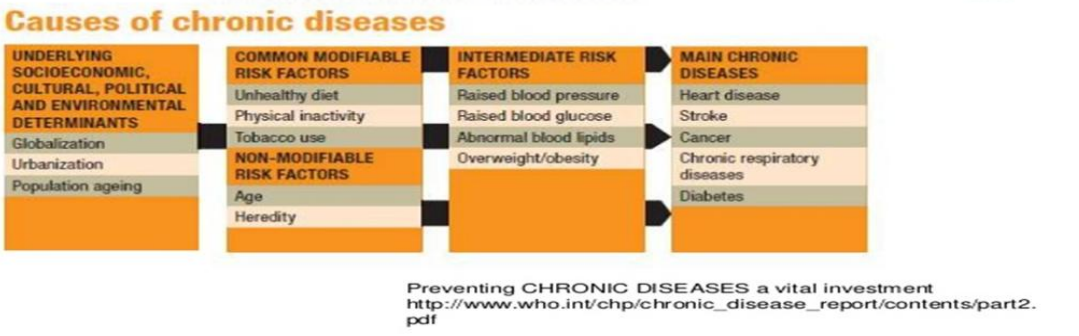

Figure 2.1: Causes of chronic diseases (**Source:** WHO, 2005).

Unhealthy diet, insufficient physical activity, lack of knowledge as well as poor early childhood feeding practices have also been identified to be the key causes of obesity in South Africa (Figure 2.2).

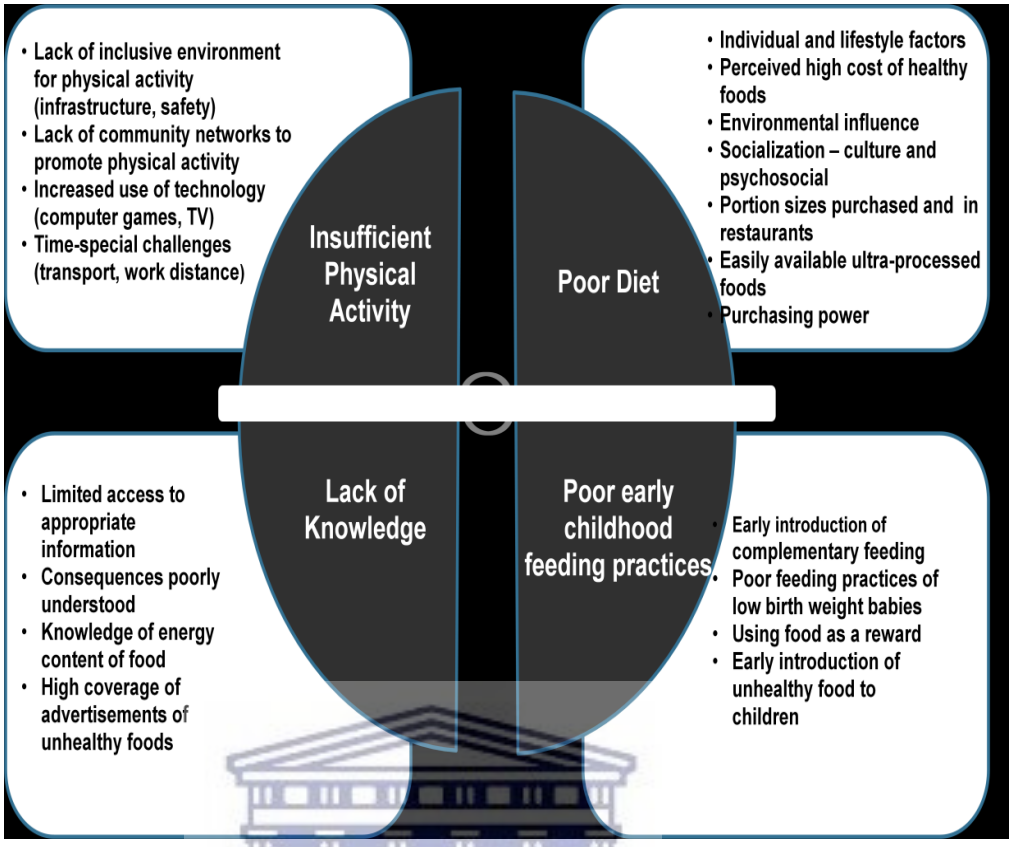

Figure 2.2: Key drivers of obesity in South Africa (**Source:** Department of Health, South Africa, 2016).

For the purposes of this study the following factors will be discussed as the determinants of obesity and NCDs: genetic factors; socio-economic factors; social or household factors; lifestyle or behavioural factors, as well as environmental factors. Knowledge, attitude and perceptions towards obesity and NCDs will also be discussed.

2.4.1 Genetic factors

For the purpose of this study, gender, ethnicity and age will be discussed. However, these are non-modifiable risk factors of obesity and NCDs.

2.4.1.1 Gender

Overweight and obesity levels have been found to be dissimilar between men and women. Many studies in Low- and Middle-Income Countries (LMIC) have reported a high prevalence of obesity in women compared to men. For example, a South African study by Sartorius *et al.* (2015: 2008-2012), reported that in 2012 37.9% of

women were obese compared to 13.3% of men. However, a secondary data analysis of SANHANES-1 also found that nearly one third (32.5 %) of the males were overweight and obese compared to twice as many (64.3 %) females (Mchiza, Parker, Makoae, Sewpaul, Kupamupindi & Labadarios, 2015:3-4). A similar pattern was also observed among female and male teachers in the Western Cape (Senekal *et al*., 2015; Laurence *et al.*, 2016; De Villiers *et al*, 2012). For instance, the HealthKick risk survey discovered that 55% of females were obese compared to 35% of males (De Villiers *et al*. 2012).

Some researchers have postulated that the high prevalence of overweight and obesity in women could be because those women (compared to men) who were nutritionally deprived as children are more likely to be obese in adulthood (Case & Menendez, 2009). The WHO (2005), pointed out that there is now evidence that conditions before birth and in early childhood influence health in adult life. For instance, low birth weight is now known to be associated with increased rates of high blood pressure, heart disease, stroke and T2DM (Barker, 2004). Case and Menendez (2009), also claim that nutritional deprivation in childhood leads to a higher risk of being overweight or obese in later life, especially for women in SA. Some researchers also suggest that body image and larger body preferences in Black women were also significant factors (Puoane, Fourie, Shapiro, Rosling, Tshaka & Oelefse, 2005).

Some studies have revealed that there is a high prevalence of hypertension in teachers in SA. There have also been gender disparities in the prevalence of hypertension. A study by Laurence *et al*. (2016), revealed that almost half (48,5%) of the educators fell in the hypertension category, with male teachers being more likely to be hypertensive (54.1%) compared to women (46.1%). On the other hand, the study of Senekal *et al*. (2015), on teachers agrees with Laurence *et al.* (2016), that almost half of the teachers fell in the hypertension category, but that women were more likely to be hypertensive than men. This could be because women are more likely to be overweight. However, hypertension seems to be a problem in both sexes.

2.4.1.2 Age

According to WHO (2005), ageing is an important marker of the accumulation of modifiable risks for chronic disease, while the impact of risk factors increases during the course of life (WHO, 2005). This is clearly illustrated below in Figure 2.3.

Studies have shown that advancing age increases the risk of developing obesity, CVD (Niccoli & Partridge, 2012), and T2DM (Peer, Steyn, Lombard, Lambert, Vythilingum & Levitt, 2012). This could be because morphological and physiological changes over the time alter the cardiovascular system function (Niccoli and Partridge, 2012). One theory suggests that ageing is associated with increasing metabolic factors (Barzilai, Huffman, Muzumdar & Bartke, 2012). Older populations are increasing in the poorest regions in low- and middle-income countries, SA included.

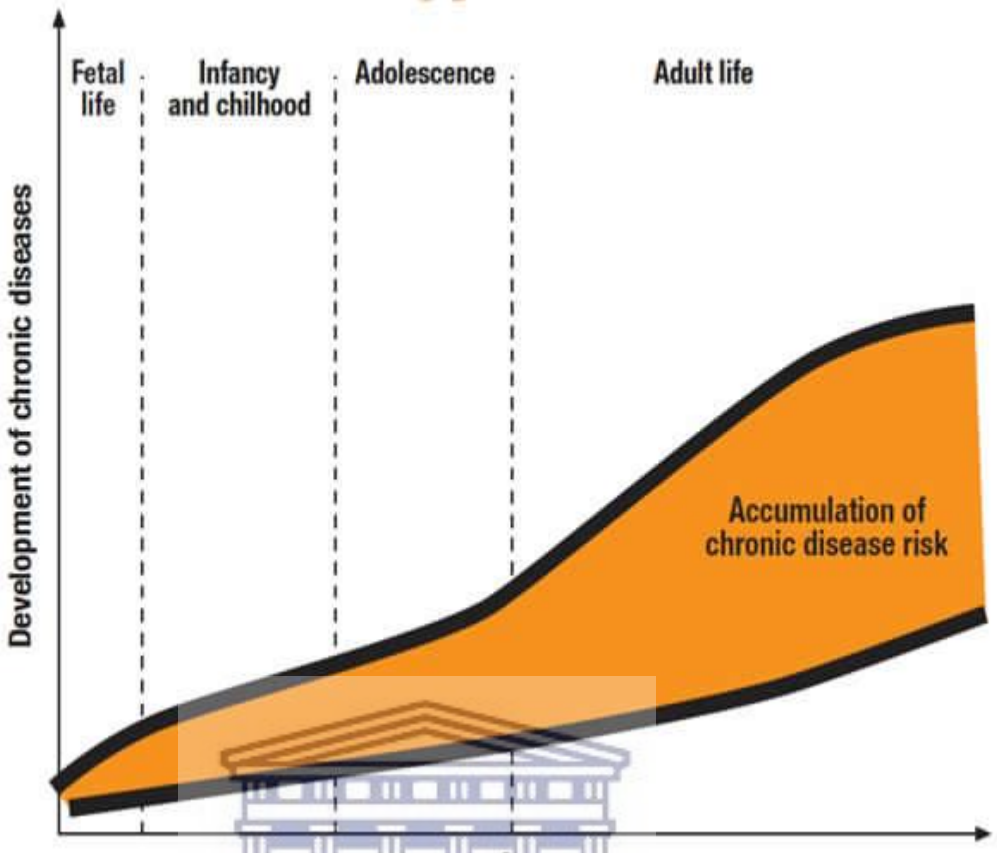

Figure 2.3: A life course approach to chronic diseases (**Source:** WHO, 2005).

Approximately 7.8% of South Africans are 60 years and older and are at risk of developing NCDs. The SAHANES also reveals that the risk of developing NCDs increases with increasing age. In a study on teachers Senekal *et al.* (2015), state that the likelihood of being obese increased significantly with age, with 20% of those younger than 30 years being obese, compared to 58.5% of those older than 50 years who were obese.

2.4.1.3 Ethnicity

All races are affected by obesity and NCDs but the distribution varies between population groups. China has the highest number of T2DM cases, followed by India (Xu *et al*., 2010). In South Africa there are also differences in the prevalence of obesity and NCDs amongst different ethnic groups. For instance, the highest levels of obesity, as well as the greatest increase in prevalence from 2008 to 2012, was observed amongst Whites (Sartorius *et al*., 2015). This study also reported that

females of Black/African and White ethnicity were subject to a higher obesity risk in South Africa. On the other hand, Asian women had lower obesity compared to other races while Black women had higher obesity levels (Cois & Day, 2015).

The risk of certain NCDs is higher in specific ethnic groups than others. For instance, it has been seen that T2DM is more common among the South African Indian population followed by the Coloured and Black population (Bradshaw, Pieterse, Norman & Levitt, 2007). Research conducted in the period 1984 to 1986 showed that in the urban Black population strokes caused the greatest number of deaths, followed by hypertension, T2DM and then ischaemic heart disease (Vorster, 2002).

A study by Nojilana, Bradshaw, Pillay-van Wyk, Msemburi, Laubscher, Somdyala, Joubert, Groenewald and Dorrington (2016), revealed that in 2010 in the Asian population there was a high number of deaths due to ischemic heart disease and renal disease. In contrast, Black Africans are in the midst of a cardiovascular epidemic with relatively high number of deaths while White African people mainly reflect a pattern of death caused by heart attacks (Nojilana *et al.*, 2016). On the other hand, Black African people reflect a pattern of death caused by stroke and diseases of the heart muscle and from high blood pressure (Steyn & Fourie, 2007). Differences in obesity and disease prevalence between these ethnic groups may be partly attributed to or mediated by social inequalities.

2.5 Socioeconomic status

Lower Socioeconomic status (SES) has been associated with reduced risk of obesity in developed countries while in LMIC the opposite is true. McLaren (2007), postulated that there was a negative association (63%) between SES and body size of women in high income countries, while lower SES was associated with higher body size. According to these findings, as one moves from high to medium then to low income countries, the proportion of positive associations increase. Specifically, in a medium income country there is a positive association between income and

material possession as indicators of SES and high body size (McLaren, 2007). SA studies and other SSA countries show a consistent positive association between obesity and higher SES as cited by Micklesfield *et al.* (2013). For example, a recent SADHS 2016 reported that severity of obesity in South Africa increased with increase in wealth. For the purpose of this study, specific SES indicators such as education and poverty (as an indicator if income) will be examined in more detail.

2.5.1 Education

In low income countries, education has been found to be positively associated with obesity (McLaren, 2007). In South Africa, some primary or secondary schooling is associated with increased risk of obesity when compared to those with no schooling. (Sartorius *et al*., 2015). On the other hand, individuals with tertiary level education are not at a significantly higher risk of obesity when compared to those with no schooling (Sartorius *et al*., 2015). On the contrary, the SADHS in 2016 revealed that those with tertiary education had a higher prevalence of obesity compared to those with no education – regardless of gender.

Current studies on teachers show a high prevalence of obesity (Senekal *et al.*, 2015; Dalais *et al*., 2014; Domingo *et al*., 2015), even though they have tertiary education. This contradicts Sartorius *et al.* (2015), who explain that highly educated individuals tend to be the early adopters of healthier preferences. The same study also states that SA is probably in transition towards the pattern of western countries, where obesity is more prevalent in lower SES strata. Nevertheless, teachers – regardless of their education levels - seem to be slow in adopting healthier behaviour in this regard.

Lower education levels have been associated with T2DM (Yang, Lu, Weng, Jia, Ji, Xiao, Shan, Liu, Tian, Ji & Zhu, 2010), tobacco use, hypertension and physical inactivity (Reddy, Prabhakaran, Jeemon, Thankappan, Joshi, Chaturvedi, Ramakrishnan & Ahmed, 2007), increased risk of coronary heart disease (Falkstedt & Hemmingsson, 2011). In the United States, an additional four years of schooling was associated with a decreased risk of heart disease and DM (Cutler & Lleras-Muney, 2007). Some researchers suggest that individuals with more education have

lower cardiovascular mortality rates than those without formal education (Hoang, Dao, Wall, Nguyen & Byass, 2006). This implies that individuals with lower levels of education are likely to be more subject to NCD risk factors. For example, in Singapore the prevalence of physical inactivity, daily smoking and regular alcohol consumption was found to be consistently highest among men and women with the least education (Fong, Bhalla, Heng, Chua, Chan & Chew, 2007).

2.5.2 Poverty

The National Strategy for Prevention and Control of Obesity in South Africa points out that poverty influences what we know, where we live, how and what we eat, how we travel and who we associate with. Food prices pressure low-income people to consume energy-dense, nutritionally inferior diets (Temple & Steyn, 2009). This could explain the link between poverty and obesity. Burns (2004), concurs, pointing out that the risk of obesity is 20 to 40% higher in individuals who are food insecure.

As mentioned previously, NCDs are fundamentally a developmental and socioeconomic issue, effecting both rich and poor, but inflicting more ill-health and other consequences on the poor in all countries. The poor in the community have higher mortality due to NCDs (Vorster, 2002). This could be because poverty increases the risk of being exposed to a number of NCD risk factors, including second-hand smoke, excessive alcohol use, indoor air pollution, leading to asthma and other chronic diseases (Bradshaw & Steyn, 2001). Figure 2.4 illustrates how poverty contributes to NCDs and how NCDs contribute to poverty.

Studies have shown that poor people are more likely to smoke (Bradshaw & Steyn, 2001; Efroymson, Ahmed, Townsend, Alam, Dey, Saha, Dhar, Sujon, Ahmed & Rahman, 2001; Rani, Bonu, Jha, Nguyen & Jamjoum, 2003), be alcohol dependent (Schneider, Bradshaw, Steyn, Norman & Laubscher, 2009) and be obese. Conversely, household survey data in South Africa showed that factors such as hypertension and obesity increased with increasing wealth (Schneider *et al*., 2009). This could explain why the burden of NCDs is a much greater burden in South

Africa. In addition, people of low income are more likely to buy high energy-dense foods which are nutritionally poor. This is because they are relatively cheap. This could shed light on the association between obesity and low socioeconomic status. A study on dietary costs in South Africa revealed that the healthier diet option costs 69% more (Temple & Steyn, 2011).

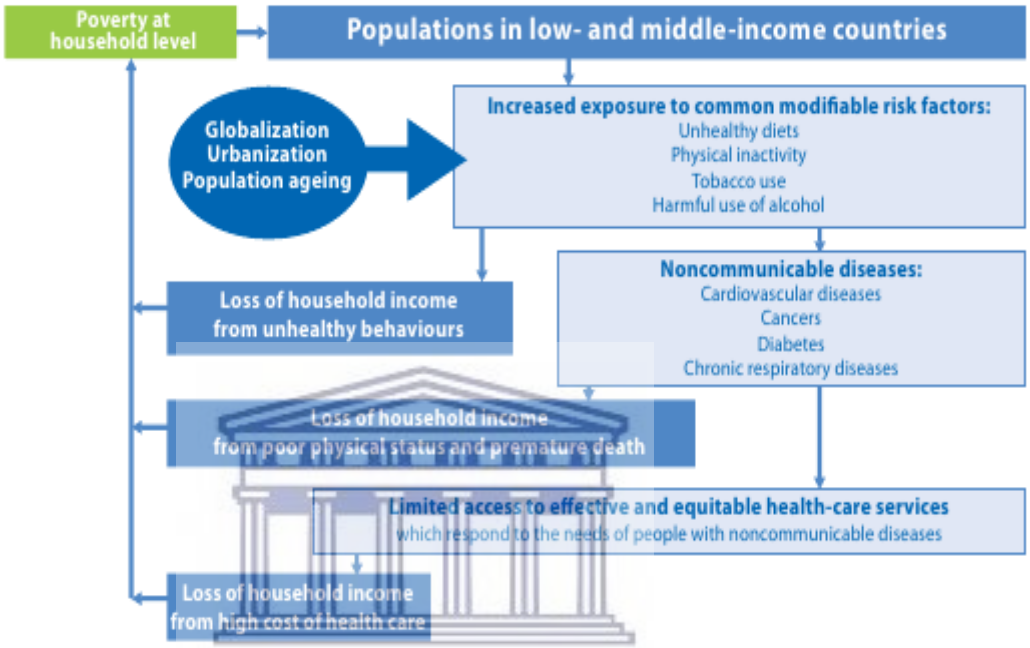

Figure 2.4: Poverty contributes to NCDs and NCDs contribute to poverty disease. **Source**: (WHO, 2011).

NCDs which are the leading cause of premature death and poor people are more likely to die prematurely from NCDs. This could be due to the vulnerability of the poor population to NCDs (WHO, 2011). Some researchers suggest that that a child born into poverty is at a higher risk of poor *in utero* nutrition with subsequent low birth weight. Such infants have a greater risk of developing CVD and diabetes later in life (Tamayo, Herder & Rathmann, 2010; Norris, Osmond, Gigante, Kuzawa, Ramakrishnan, Lee, Ramirez-Zea, Richter, Stein, Tandon & Fall, 2011). In addition, a recent study revealed that middle-aged adults born with a low weight have a higher risk of developing DM and obesity and also higher leptin levels and leptin to fat mass ratio than adults who were born at a normal birth weight (Jornayvaz, Vollenweider, Bochud, Mooser, Waeber & Marques-Vidal, 2016).

Low birth weight could be a reflection of poor maternal nutrition both before and during pregnancy (Ramakrishnan, 2004). Several non-nutritional factors, such as infections, hypertension, smoking and environmental factors (indoor air pollution due to cooking smoke and poor housing quality) are known determinants. In addition, underlying factors such as poverty and women's socio-economic status are of major concern in this regard.

The chronic nature of NCDs results in economic consequences in households. Since it has been established that poverty is linked to NCDs, the cost of NCD treatment places a considerable burden on household income (WHO, 2011). It has been shown in Malawi that CVD medicine can cost the equivalent of 18 days' wages while in Tanzania, DM can cost 25% of the minimum wage (WHO, 2011). These expenses can further push the already impoverished households into deep poverty. Most NCDs are known to have comorbidities, for example, hypertension is the commonest comorbid condition in T2DM, epilepsy, asthma and COPD (Lalkhen and Mash, 2015). However, the cost of NCDs does not only end at household level, but also impacts at a national level. Obesity, being a pre-NCD condition, carries substantial direct and indirect costs for the national economy, such as economic disenfranchisement, lost productivity and disability. The WHO (2011), estimates that high BMIs account for between 2% and 7% of global healthcare spending with up to 20% of all healthcare spending attributable to obesity, through related diseases such as T2DM and heart disease.

2.6 Social or household factors

2.6.1 Marriage

Some researchers suggest that marriage promotes better health and increases longevity (Wilson, 2012). This could support the health regulation model that suggests that satisfying relationships facilitate the functions of marriage that promote health (Meltzer, Novak, McNulty, Butler & Karney, 2013). This suggests that if spouses are unhappy in marriage, they likely to make poor dietary decisions

and are likely to gain weight. This could be because marital strain could cause stress that may interfere with self-regulatory behaviour. Richardson, Arsenault, Cates and Muth (2015), suggest that stress is positively associated with severe obesity.

However, other studies in South Africa refute this concept. Being married was identified as a prominent determinant of obesity, especially in males (Sartorius *et al.,* 2015). This conflicts with the opinion of Malhotra, Hoyo, Ostbye, Schwartz, Tsolekile, Zulu & Puoane (2008), who state that married females were more likely to have a high BMI and large WC, while married men tend to have lower BMI than those who were unmarried. This implies that marital status alters food consumption habits either negatively or positively. For example, the mating market model suggests that weight maintenance is motivated primarily by the desire to attract a mate (Mertz *et al,* 2013). This implies that unmarried individuals are likely to have low BMI in order to be attractive. However, this model is probably more widely applicable to the western culture. Like most African cultures, being overweight is a sign of good health, wealth and being treated well by one's husband (Pouane *et al.,* 2005).

Floud, Balkwill, Canoy, Wright, Reeves, Green, Beral and Cairns (2014), state that women who were married or living with a partner both had a similar risk of developing ischemic heart disease. However, married women had a substantially lower ischemic heart disease mortality compared to women who were not married. This could be because partners could be supportive in the management of such conditions and encourage each other to adhere to medication.

2.6.2 Urbanisation

South African census data reveals that 63% of the 52 million people in the country live in urban centres (Statistics South Africa Census, 2011). Urbanisation of the Black population has increased rapidly, particularly since democratisation in South Africa. Furthermore, this rapid urbanisation combined with globalisation has been accompanied by large shifts in the health problems among South Africans, which include the increasing prevalence of obesity and NCDs (Puoane, 2013).

Urbanisation initiated a change from traditional to a Westernised diet which includes consumption of diets low in fruit and vegetables, rich in refined carbohydrates and saturated fat, lack of physical activity, alcohol abuse and smoking.

A recent South African study by Steyn *et al.* (2016), which investigated the associations of dietary data and degree of urbanisation, reflected a nutrition transition that typically occurs the longer the duration of time spent in urban areas. In this research there were significant positive correlations between urbanisation and the intake of total fat, saturated fat, and monounsaturated fat. On the other hand, urbanisation was inversely associated with intake of carbohydrate.

2.7 Dietary Factors

2.7.1 Diet transition in South Africa

There has been a dramatic change in dietary patterns in South Africa over the past decades and there is also a possibility that these changes will continue in future decades (Ronquest-Ross, Vink & Sigge, 2015). South African dietary patterns have shifted towards a westernised diet which includes an increase in the daily consumption of high energy food, sugar-sweetened beverages and processed foods, packaged foods including edible vegetable oils, animal source foods and caloric sweeteners and shift away from vegetables (Ronquest-Ross, Vink & Sigge, 2015). This concurs with the work of Steyn *et al*. (2016), who examined the dietary changes amongst Black South Africans between 1990 and 2009. A transition to a more urbanised diet over the last two decades was mirrored in this particular research.

2.7.2 Healthy Diet

Diet is one of the modifiable risk factors in the development and prevention of obesity as well as NR-NCDs. A healthy diet protects against malnutrition as well as NR-NCDs such as DM, heart disease, stroke and cancer. In addition, healthy dietary practices start early in life though breastfeeding which fosters healthy growth and improves cognitive development, and may have longer-term health benefits, like

reducing the risk of becoming overweight or obese and developing NCDs later in life (WHO, 2015).

According to the WHO (2015), a healthy diet contains fruits, vegetables, legumes (e.g. lentils, beans), nuts and whole grain (e.g. unprocessed maize, millet, oats, wheat and brown rice). At least 400g (5 portions) of fruits and vegetables a day is recommended for adults. WHO also recommends reducing saturated fats to less than 10% of total energy intake, and trans-fats to less than 1% of total energy intake, and replacing both with unsaturated fats in the diet is essential to prevent unhealthy weight gain in the adult population. Salt intake of less than 5g per person per day is recommended by WHO and the intake of free sugars should be reduced throughout life (WHO, 2015).

2.7.3 Unhealthy diet

Unhealthy dietary habits have been found to contribute significantly to obesity and subsequently the NCD burden. There has been increasing evidence of a causal link between dietary behaviour patterns, nutrients and NCDs (Ruel *et al*., 2014; Shi, Ruel, Dal Grande, Pilkington & Taylor, 2015). For example, there was a positive association of soft drink consumption and multi-morbidities among adults worldwide. (Shi *et al.*, 2015). On the other hand, dietary factors were responsible for 60,402 deaths in Ethiopia – almost a quarter (23.0%) of all NCD deaths (Melaku, Temesgen, Deribew, Tessema, Deribe, Sahle, Abera, Bekele, Lemma, Amare & Seid, 2016). For the purpose of this study, consumption of high fat foods, low consumption of vegetables and fruits as well as the consumption of sugar sweetened beverages will be discussed.

2.7.3.1 High fat diet

Fat is the most energy dense macronutrient and its overconsumption has been linked to obesity (Allioua, Djaziri, Mahdad, Gaouar, , Derradji, Boudjemaa & Belbraouet, 2015), cardiovascular disease and T2DM (Swinburn, Sacks, Lo, Westerterp, Rush, Rosenbaum, Luke, Schoeller, DeLany, Butte & Ravussin, 2009). Drewnowski and Specter (2004), state that a reduction in fat reduces the gap between total energy

intake and total energy expenditure. They further conclude that this is an effective strategy for reducing the present worldwide obesity epidemic.

South Africa's Food Based Dietary Guidelines recommend eating fats sparingly. Nevertheless, human preferences tend to favour foods with both fats and sugar (Drewnowski & Almiron-Roig, 2010). These preferences tend to inform dietary choices, affect energy balance and consequently regulate body weight in the long term. Obese individuals are more likely to choose unhealthy foods and increase the risks of and mortality. For instance, some studies reveal that obese individuals prefer foods high in fat (Pepino, Finkbeiner & Mennella, 2009) and obese adolescents tend to choose towards high-energy, sweet-fatty or salty-fatty foods/meals (Allioua *et al*., 2015).

A diet high in saturated fats (e.g. cheese) and trans-fats (often used in cakes, cookies and fast food) leads to high levels of cholesterol as saturated fats are found in animal products (Vorster, Badham & Venter, 2013). Trans-fats are oils that have been hydrogenated for conversion into semi-hard fats. Hydrogenated fat is found in processed food like shop-bought cakes, biscuits, stock cubes and a range of other products. Saturated and trans-fats raise cholesterol levels in the blood, which in turn can lead to atherosclerosis. Studies have discovered that trans-fatty acids have been associated with high levels of CVD mortality (De Souza, Mente, Maroleanu, Cozma, Ha, Kishibe, Uleryk, Budylowski, Schünemann, Beyene & Anand, 2015). Unsaturated, polyunsaturated and monounsaturated fats are beneficial for heart health. They are present in fish, nuts, seeds and vegetables. The essential fatty acids omega-3 and omega-6 are found in oily fish and in nuts and seeds (Vorster, Badham & Venter, 2013).

2.7.3.2 Low vegetable, fruit and nut consumption

The South Africa's Food Based Dietary Guidelines recommend eating fruit and vegetables daily and regular consumption of beans, peas, lentils and soya (Vorster, Badham & Venter, 2013). Fruit and vegetable consumption plays a vital role in providing a micronutrient-dense diet. Adequate consumption of fruit and vegetables

reduces the risk of cardiovascular disease, stomach cancer and colorectal cancer. The WHO (2011), notes that approximately 1.7 million (2.8%) of deaths worldwide are attributable to low fruit and vegetable consumption. Vegetables were historically a major part of the Black African diet, but that has been latterly largely been replaced by the western diet. It appears that the move from rural to urban areas areas might be associated with a lower vegetable intake. Inadequate consumption of fruits and vegetables in the South African population has been revealed by the recent SANHANES-1 study. However, people in formal housing in urban areas appeared to consume more fruit and vegetables compared to those in rural areas (Shisana *et al.*, 2014).

2.7.3.3 Soft drink consumption and fast foods

Sugar sweetened beverages (SSB) are liquids rich in sugar and energy, but poor in other nutrients and have harmful effects on the body. SSB do not necessarily have the same effect as other foods that contain sugar. (Tugendhaft, Manyema, Veerman, Chola, Labadarios & Hofman, 2016). Excess consumption of SSB has been associated with weight gain and increased risk of developing T2DM and CVD (Hu & Willett, 2002). However, soft drink sales and availability has increased alongside with packaged foods and fast food (Igumbor, Sanders, Puoane, Tsolekile, Schwarz, Purdy, Swart, Durão & Hawkes, 2012). This poses a public health challenge because some researchers have discovered that drinking a single SSB daily increases the likelihood of being overweight by 27% for adults and 55% for children (Te Morenga, Mallard & Mann, 2013). On the other hand, daily consumption of one or two SSB increases the risk of developing T2DM by 25% (Malik & Hu, 2012).

Igumbor *et al.* (2012), suggested that the South African government develops a plan to make healthy foods such as fruit, vegetables, and whole grain cereals more available, affordable, and acceptable, and non-essential, high-calorie, nutrient-poor products, including soft drinks, some packaged foods and snacks, less available, more costly, and less appealing to the South African population. The South African government has adopted the recommended SA salt reduction strategy (NDoH, 2013), and South Africa is regarded as a leading country in terms of strategy for

dietary salt reduction. This initiative aims for maximum salt targets across a wide range of processed foods (Webster, Crickmore, Charlton, Steyn, Wentzel-Viljoen & Naidoo, 2017).

In addition to the salt reduction strategy, the NDoH proposed a SSB tax (Stacey, Tugendhaft & Hofman 2017), known as a "sugar tax" which was implemented in April 2018. SSB tax was proposed for all non-alcoholic drinks containing added sugar, such as soft drinks, fruit drinks, sports and energy drinks, vitamin water drinks, sweetened iced tea and lemonade, among many others (National Treasury, 2016). Future research will determine the impact of the SSB tax on the consumption of sugary drinks and consequently the incidence and prevalence of obesity and NR-NCDs.

2.8 Physical activity

The World Health Organization has implemented several public health recommendations to increase PA in an attempt to reduce disease risk. The global recommendations of PA for health are referred to as "sufficiently active" suggest at least 150 minutes of moderate-intensity activity per week; or 75 minutes of vigorous-intensity activity per week; or an equivalent combination of moderate- to vigorous-intensity physical activity (MVPA) (World Health Organization, 2010). According to a South African study in Black women, adherence to the PA guidelines was associated with a decreased risk for CVD and T2DM (Dickie, Micklesfield, Chantler, Lambert & Goedecke, 2014).

There is evidence that PA has a positive impact by reducing the risk of CVD (Sesso, Paffenbarger & Lee, 2000), T2DM (Vorster, Badham & Venter, 2013), and metabolic syndrome. PA was associated with a lower risk of CVD mortality independent of traditional and inflammatory risk factors. In combination, these results suggest that PA may protect against CVD mortality regardless of the presence of metabolic risk factors such as dyslipidaemia, T2DM, obesity, hypertension, inflammation, and insulin resistance (Reddigan, Ardern, Riddell &

Kuk, 2011). In addition, individuals who achieve total PA levels several times higher than the current recommended minimum level have a significant reduction in the risk of breast cancer, colon cancer, DM, ischemic heart disease, and ischemic stroke events (Kyu, Bachman, Alexander, Mumford, Afshin, Estep, Veerman, Delwiche, Iannarone, Moyer & Cercy, 2016.).

2.9 NCD risk factors among teachers

However, the major modifiable risk factor for NCDs in teachers has been found to be unhealthy dietary habits (Sharma, Dortch, Byrd-Williams, Truxillio, Rahman, Bonsu & Hoelscher, 2013), characterised by high energy foods, an unhealthy lunch, and low vegetable and fruit consumption (Hartline-Grafton, Rose, Johnson, Rice & Webber, 2009; Sharma *et al.*, 2013; Senevirathne & Katulanda, 2014). A high proportion of teachers consume less than 5 portions of vegetables and fruits per day. This coincides with the findings of Hoy, Rao, Nhung, Marks and Hoa (2013), who suggest that most diets do not meet international criteria for fruit and vegetable consumption. A study in Cape Town revealed that 35% of educators reported eating three meals and snacks every day, while 63% reported regularly bringing a healthy lunch to school. Almost half of the sample (49%) reported a sedentary lifestyle, which included sitting most of the time, little walking and no participation in exercise or any sport (Dalais *et al*., 2014). Several other studies have also discovered that there is low prevalence of high and moderate PA among public school teachers (Brito, Santos, Marcolongo, Campos, Bocalini, Antonio, Silva Junior, Tucci & Serra, 2012; Dalais *et al*., 2014).

However, some researchers have postulated that over longer periods of time individuals with a higher level of education are less likely to be become obese than their less educated counterparts, suggesting that the level of education influences the incidence of obesity in the long term (Devaux, Sassi, Church, Cecchini & Borgonovi, 2011). Paradoxically, despite the fact that teachers are a well-educated group, unhealthy dietary habits, physical inactivity, overweight and obesity are high amongst teachers. This could be because of their perceptions, beliefs or attitude

towards pre-NCDs (Sikorski *et al.*, 2012). Some studies have documented that cultural beliefs and attitudes contribute to the acceptance of a larger body size among the Black female population in South Africa. (Puoane *et al*., 2005).

2.10 Knowledge, attitude and practices

Many models have evolved over the years to explain behaviour or practices but for the purposes of this research, knowledge-attitude-behaviour (KAB) model and Health Belief Model (HBM) will be discussed.

2.10.1 The Knowledge-Attitude-Behaviour (KAB) model

The Knowledge-Attitude-Behaviour (KAB) model, sometimes called the knowledge-attitudes-skills behaviour model, is probably the oldest of the behaviour models. This model is the assumed model that underlies most educational settings from ancient times to today. The KAB model proposes that as knowledge accumulates, attitudes change and that these changes in attitude promote behaviour change (Baranowski, Cullen, Nicklas, Thompson & Baranowski, 2003). In other words, there is an element of self-empowerment when knowledge provides the individual with the skills or self-efficacy to change behaviour.

Baranowski *et al*. (2003), are of the opinion that knowledge is a prerequisite to intentional performance of health-related behaviour. Other studies have shown that not maintaining a healthy diet and not having sufficient nutrition knowledge leads to issues such as health problems, overweight and obesity (Bano, AlShammari, Fatima & Al-Shammari, 2013). However, the type and level of knowledge that could elicit a behavioural change is not well explained. Different types of knowledge could influence decisions related to eating and physical activity (Baranowski *et al.*, 2003).

However, regardless of knowledge, the act of eating, whether it is a meal or a snack, is complex, involving many decisions, from whether a meal should be eaten to when to stop is influenced by a number of factors (Baranowski *et al.*, 2003). Figure 2.5 illustrates the factors that could influence decisions to eat a certain kind of food at a

particular point in time. The same applies to physical activity decisions, as indicated in Figure 2.6. Some researchers have even alluded to the possibility that despite the well-known benefits of PA, most adults and many children lead a relatively sedentary lifestyle and are not active enough to achieve the health benefits (Bano *et al*., 2013).

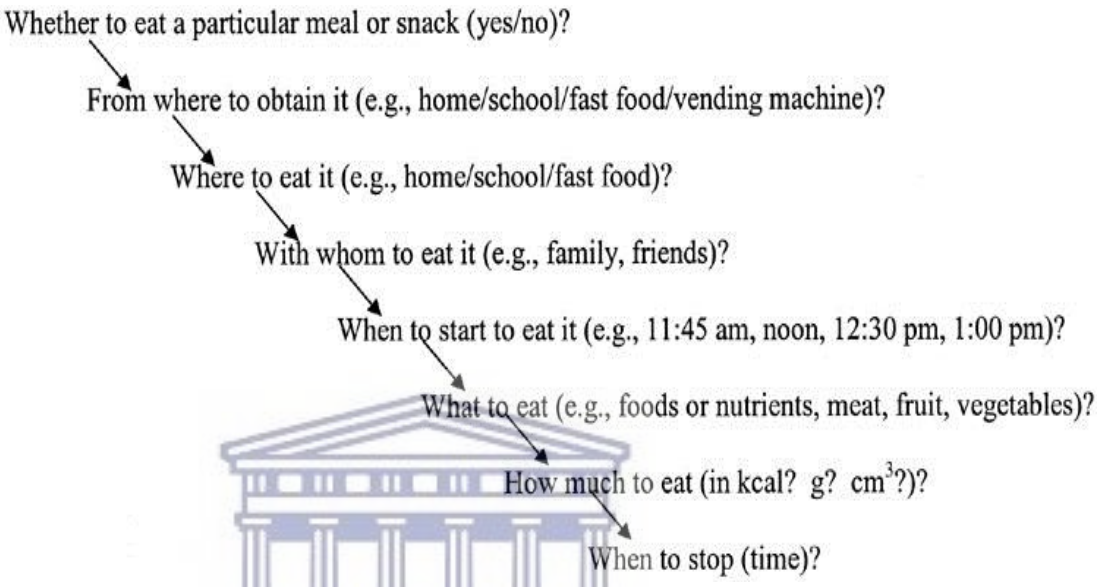

Figure 2.5: Decisions of eating a certain kind of food (**Source:** Baranowski *et al.*, 2003).

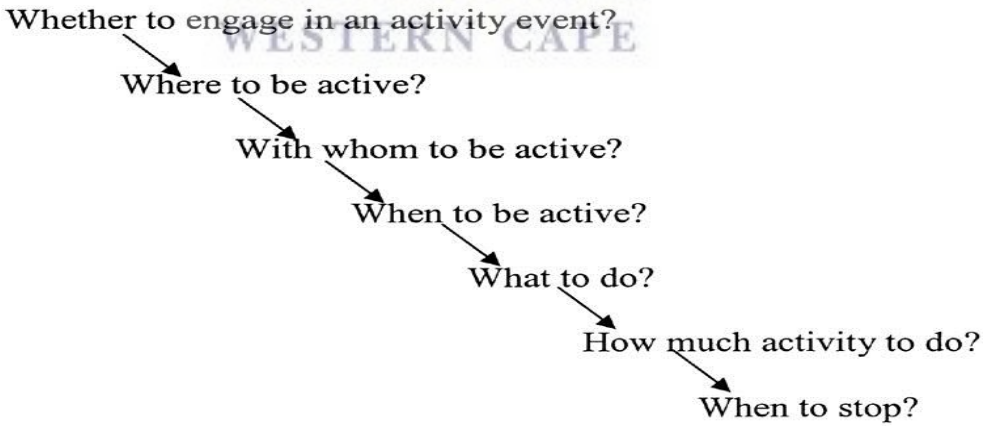

Figure 2.6: Decisions of engaging in physical activity (**Source:** Baranowski *et al*., 2003).

The process by which behavioural change occurs in KAB models has not been specified. The most common procedure for promoting change by use of this model has been the provision of information, most often in the form of school curricula.

2.10.2 Health Belief Model

The Health Belief Model (HBM) incorporates several primary concepts that predict why people will take action to prevent, to screen for, or to control illness. These include perceived susceptibility, severity, benefits and barriers to behaviour, cues to action and most recently, self-efficacy about performing a specific health behaviour (Glanz, Rimer & Viswanath, 2008). Figure 2.7 shows that knowledge underlies most of them – knowledge about susceptibility and risk, knowledge about disease severity, knowledge about behaviour benefits, and knowledge about changing behaviour.

The HBM is similar or possibly an extension of the KAB model for behaviour change (Baranowski *et al*., 2003). Furthermore, attitudes are closely linked to knowledge in the HBM. Perceptions about obesity are the same as attitudes about obesity, which are rooted in knowledge. Knowledge and attitudes, then, are the primary motivators for change within the HBM. Self-efficacy, in the HBM, is what allows the person to make a successful behaviour change (Baranowski *et al*., 2003).

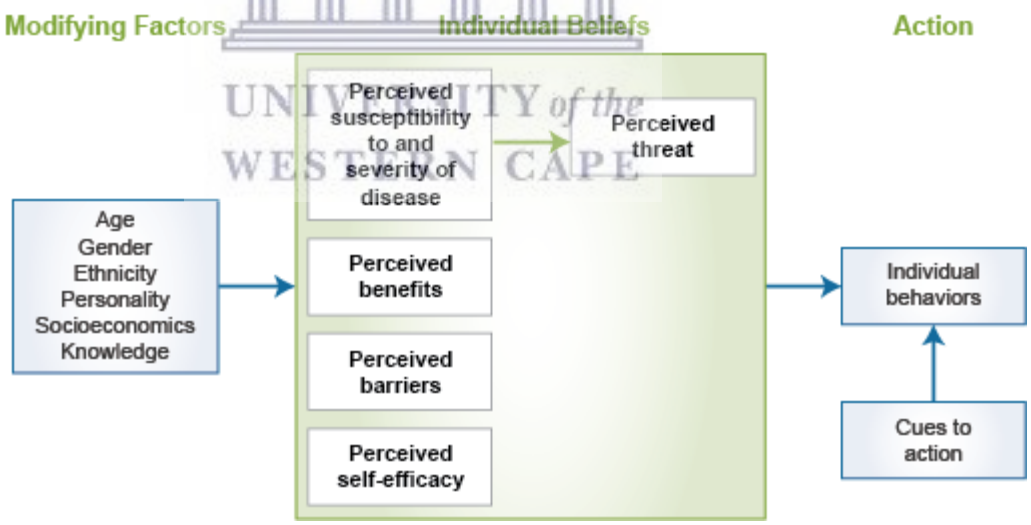

Figure 2.7: Health Belief Model (**Source:** Glanz, Reimer & Viswanath., 2008).

2.10.3 Knowledge, attitude, practices and perceptions among teachers

Research undertaken in Mamelodi Hospital in Gauteng Province of South Africa investigated knowledge, attitude and practice regarding lifestyle modification amongst patients with T2DM. Despite the positive attitudes of respondents toward

healthy lifestyle modifications, knowledge and practice regarding lifestyle modifications amongst participants was generally poor (Okonta, Ikombele & Ogunbanjo, 2014). Conversely, a qualitative study which was conducted in 2012 by Dalais *et al*. (2012), to describe primary school educators' perceptions regarding body weight, related health risks and barriers to weight management, found that 58% of teachers were obese, while 26% were overweight regardless of the fact that they appeared knowledgeable about overweight/obesity and its health risks for particular NCDs.

A Nigerian study focusing on the determinants and perception of cardiovascular risk factors among secondary school teachers revealed that their knowledge about CVD and the risk factors was inadequate. Even though the results showed that most of the teachers were physically active (80% performed exercise regularly), hypertension (84.5%) and heart disease (87.6%) were rampant (Familoni & Familoni, 2011).

Steyn (2010), suggests that dietary knowledge has an effect on nutrition behaviour and this can be imparted at school. Other studies have also shown that there is a link between individuals' beliefs about the causes of obesity and their health behaviour. In addition, school-based curriculum nutrition programmes have been found to significantly increase nutrition knowledge and dietary behaviour of children (Steyn, 2010). Teachers are the point of contact with the children therefore their knowledge, attitudes practices and perceptions towards the pre-NCDs and NCDs is of paramount importance. On the other hand, the majority of South African research in teachers has been mainly on primary school teachers, such as the HealthKick Programme in Western Cape Province (De Villiers, Steyn, Draper, Hill, Dalais, Fourie, Lombard, Barkhuizen & Lambert, 2015). This leaves gaps in the knowledge of other provinces such as Limpopo. Considering the diversity and inequality of the South African population, these knowledge gaps should be addressed.

2.11 Conclusion

Overweight and obesity are the major risk factors associated with NR-NCDs. In this chapter the risk factors of NR-NCDs and the prevalence of overweight, obesity and

NR-NCDs were discussed. Determinants of NCDs as well as knowledge, attitude, practices and perceptions towards these conditions were discussed.

The following chapter gives an account of the study design and methods utilised in the study to achieve the study objectives.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter will present the research methods used for the study. Polit and Beck (2012:733), define methodology as the steps, procedures and strategies for gathering and analysing data in a study. This chapter will explain how the data was collected including all the procedures followed. The first section will discuss the study design, study area and setting. Thereafter, sampling procedures, data collection process and research analysis approaches followed in this research will be reviewed. Measurement instruments such as questionnaire and anthropometric measurement namely weight, height, waist circumference (WC) as well as Body Mass Index (BMI) will also be discussed. Validity, reliability, trustworthiness and generalisability of the study will be included in this section. The last section deals with ethical issues.

3.2 Study design

A study design is an action plan for getting from "here", (which are the initial set of questions to be answered) to "there" (which are some set of conclusions or answers) (Yin, 2003:19). This creates a logical plan that clearly outlines how the research is to be conducted, linking the data to be collected to the initial study questions. Polit and Beck (2012:733), define it as the architectural backbone of the study. Burns and Grove, (2005), further note that it provides guidelines to address the research problem and to promote the validity of the results. All this indicates that the most appropriate study design must be selected for research questions to be answered accurately.

Researchers have categorised three study designs – quantitative, qualitative and mixed method study design. A mixed method research, parallel convergent design was deemed as the most suitable design for this study. This is because the researcher would like to have a thorough understanding of the problem (Creswell, 2014:219).

However, the abovementioned study designs differ in approach to research, methodology and their philosophical assumptions.

3.2.1 Quantitative studies

Quantitative studies examine the effects of specified circumstances (independent variables) on an outcome of interest (dependent variable) in ways that can be expressed numerically. It uses a formal measuring instrument that will to provide numeric information that is statistically analysed (Polit & Beck, 2012). This involves testing objective theories deductively by examining the relationship among variables which are measured using instruments and analysed using statistical procedures. A quantitative inquiry's main characteristics are that it is positivistic. According to Polit and Beck (2012:733), positivism assumes that "nature is basically ordered and regular and that an objective reality exists independent of human behaviour".

3.2.2 Qualitative studies

Qualitative studies explore and understand the meaning of individuals or groups ascribed to a social or human problem (Creswell, 2009:4). This process of research involves emerging questions and procedures, data collection in the study participants' settings, data analysis that is inductively built from particulars to general themes and interpretation of meaning of data. Some researchers say that qualitative methods are most revealing when contextual forces are ill-defined, uncontrolled or situational (Lakshman, Charles, Biswas, Sinha & Arora, 2000). These research methods address causation and involve observation and interpretation of events. Unlike quantitative research, it seeks to answer the "what", "why" and "how questions, not the "how often" of a particular issue (Lakshman *et al.*, 2000).

3.2.3 Mixed methods research

Mixed methods research (MMR) is an approach that systematically integrates, or "mixes" quantitative and qualitative data within a single investigation or sustained programme of inquiry (Creswell, 2014). The basic foundation of this methodology is

that such integration permits a more complete and more synergistic utilisation of data than separate quantitative and qualitative data collection and analysis. According to Greene (2007: 20), this form of design is also seen as "an orientation toward social inquiry that actively invites us to participate in dialogue about multiple ways of seeing and hearing, multiple ways of making sense of the social world, and multiple standpoints on what is important and to be valued and cherished".

MMR gives voice to the study participants and ensures that study findings are grounded in participants' experiences. In addition, mixed methods have great flexibility and are adaptable to many study designs, which gives the researcher liberty to choose all methods possible for addressing the problem. This makes the research process more practical as it tends to solve problems using deductive and inductive thinking (Creswell, 2014). This approach is termed a pragmatic worldview.

3.2.3.1 The pragmatic worldview

For this study, the researcher identified the pragmatic research worldview as appropriate. In this approach, the researcher adopts a "whatever works" strategy to obtain answers to the research problem questions. Greene (2007), notes that researchers are always confronted by complex and multiplex phenomena. Therefore, pursuing only a single line of inquiry will not provide complete information to answer the research questions. These multifaceted situations require the use of various analytical tools with due regard for ethical issues and the maintenance of practical and reliable standards. In this study, the pragmatic approach is reflected in the homogeneity of the target population (all public primary and secondary schools), the schools used for FGDs. In addition, the study was planned with a problem-centred, real-world goal in mind.

The advantages of mixed methods study are:

- Mixed methods are especially useful in understanding contradictions between quantitative results and qualitative findings;
- Mixed methods give a voice to study participants and ensure that study findings are grounded in participants' experiences;

- Such studies add breadth to multidisciplinary team research by encouraging the interaction of quantitative, qualitative, and mixed methods scholars;
- Mixed methods have great flexibility and are adaptable to many study designs, such as observational studies and randomised trials, to elicit more information than can be obtained in only quantitative research; and
- Mixed methods mirror the way individuals naturally collect information – by integrating quantitative and qualitative data. For example, sports stories frequently integrate quantitative data (scores or number of errors) with qualitative data (descriptions and images of highlights) to provide a more complete story than either method would alone.

Limitations of the MMR

Mixed methods studies are challenging to implement, especially when they are used to evaluate complex interventions.

- Mixed methods studies are complex to plan and conduct.

  They require careful planning to describe all aspects of research, including the study sample for qualitative and quantitative portions (identical, embedded, or parallel); timing (the sequence of qualitative and quantitative portions); and the plan for integrating data. Integrating qualitative and quantitative data during analysis is often a challenging phase for many researchers.
- Rely on a multidisciplinary team of researchers.

  Conducting high-quality mixed methods studies requires a multidisciplinary team of researchers who, in the service of the larger study, must be open to methods that may not be their area of expertise.

Types of MMR designs

There are six MMR designs, these include the convergent parallel design, the explanatory sequential design, the exploratory sequential design, the embedded

design, the transformative design and the multiphase design. A convergent parallel design was used for this study to explore the KAP and perceptions as well as the related factors of primary and secondary school teachers in Limpopo province regarding obesity and NR-NCDs.

3.2.4 The convergent parallel design

The convergent parallel mixed method design (Figure 3.1) is characterised by the collection of both qualitative and quantitative data concurrently, while equally prioritising the methods, analysing them separately and then comparing the results to see if the findings are corroborated (Creswell, 2013:219). This method is most suitable for this study because the researcher would like to understand the correlation between KAP and perceptions and the unhealthy lifestyle factors contributing to obesity and NR-NCDs among teachers. Qualitative inquiry provided the insights to KAP and perceptions and lifestyle factors that were not discovered by quantitative inquiry. Quantitative approach alone would have provided the general understanding of the problem since the research is on all teachers in public schools, but the in-depth understanding or holistic view of their perceptions would be lacking. Hence, this limitation would be obviated by the qualitative enquiry which will provide a deeper understanding of the research problem. These two data types will be linked together through analysis to enrich the data, provide a deeper understanding, and yield a more complete picture. The key assumption of this approach is that both qualitative and quantitative data will provide different types of information which will yield comparable results (Creswell, 2014:219).

This design is used most often in health behaviour sciences as a quantitative instrument in the form of a survey, test or questionnaire coupled with qualitative interviews or focus groups. This study uses a quantitative knowledge survey questionnaire and qualitative focus group discussions. The efficiency of being able to collect both quantitative and qualitative data in one phase or at the same time made this design most suitable for this study. The data collection phase of the study was a short period (one month). In addition, this concurrent data collection takes a shorter period of time compared to one of the sequential approaches.

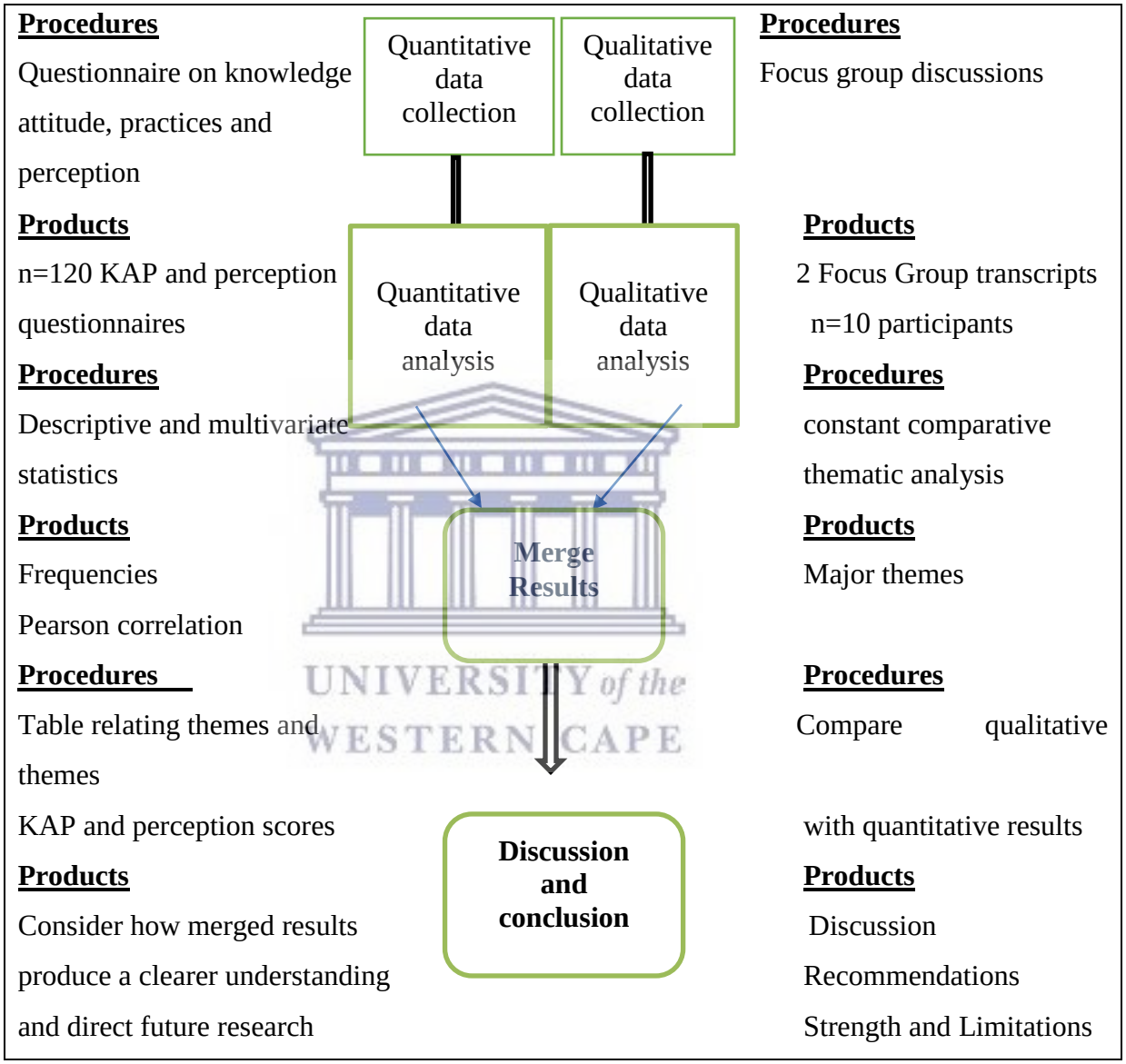

Figure 3.1: Convergent parallel mixed method design (**Source**: Stenger, 2012).

Challenges of the convergent parallel design

There are a few challenges to note when using a convergent mixed methods design (Creswell & Clark, 2011). One major challenge is that appropriate expertise is required during the execution of the phases of the study. This challenge was addressed by utilising the researcher consulting other researchers with expertise in each of the areas of the study. Another challenge lies in having different samples and different sample sizes for each component.

In this study, a larger quantitative sample was used compared to that used in the qualitative study. The quantitative sample includes extra participants of the same demographic so as to improve the validity and to cater for refusals. Another challenge of mixed methods study is the ability to properly merge the data sets. To offset this challenge, specific concepts are used for both the qualitative and quantitative components with the purpose of easing the merging process. A final challenge to this design is deciding what to do with contradictions in results from the quantitative and qualitative data sets. In this study diverging results will form a basis for further research.

3.3 Study population

According to Polit and Beck (2008:337), the study population is defined as the entire aggregation of cases in which the researcher is interested.

Target population

Polit and Beck (2008:338), define target population as the total group of subjects in whom a researcher is interested and about whom results could reasonably be generalised. For this study, the target population included all male and female teachers in public schools in Limpopo province.

Accessible population

According to Polit and Beck (2008:338), accessible population is the aggregate of cases that conform to designated criteria and are available as subjects for a particular study. Burns and Grove (2005:342), define it as the portion of the target population to which the researcher has reasonable access.

For this study, the accessible population for both quantitative and qualitative inquiries was all the male and female teachers in Rakwadu circuit, Tzaneen district in Limpopo Province. They must be teaching in primary or secondary public schools in the circuit. The names of the schools presented in the qualitative study will be replaced by an alphabetical letter (A,B,C etc.) to ensure confidentiality.

3.3.1 Inclusion criteria

According to Polit and Beck (2008:338), inclusion criteria are the specific attributes that determine inclusion or exclusion of the target population in a study. The following inclusion criteria were used to identify the study population:

- Primary and secondary school teachers regardless of gender;
- Must teach in public schools in Rakwadu circuit; and
- Must include both males and females of age greater than 18 but than 60 years.

3.3.2 Exclusion criteria

The following exclusion criteria were used to identify the study population:

- Teachers from independent schools;
- Student teachers;
- Teachers who were pregnant, on sick leave or ill; and
- Teachers above the age of 60.

3.4 Study setting

According to Polit and Beck (2008:57), a research context is defined as a specific place where data collection occurs. This study was carried out in Rakwadu circuit, in Limpopo Province. Geographically, this circuit is situated in the east of the Greater Letaba local municipality in the Mopani District.

However, the Rakwadu circuit falls under Tzaneen education district because it is geographically located closer to Tzaneen. The Rakwadu circuit has 50 schools of which 32 are primary and 18 are secondary schools. Of these 50 schools, 47 are

public schools only one of which is situated in an urban area and the remainder are rural schools. The number of teachers in the public schools in our study was 732 teachers according to the School Administration Management System (SA-SAMS-January 2017).

3.5 Sampling and sampling technique

A sample is a subset of the study population that is selected for a particular study and the members of the sample are the respondents. In this study the sample sizes for qualitative and qualitative inquiries were not the same and are explained below:

3.5.1 Sampling for the qualitative inquiry

The sample size for the quantitative enquiry was calculated using the following formula at 95% confidence interval:

$$n = (\frac{Z\sigma}{E})^2$$

Where

- n is the is required sample size
- Z is the Z-score = 1.96
- σ is the population standard deviation = 11
- E is the standard error = 2

The required sample should be 117 teachers. However, 136 teachers will be sampled to make allowance for 17% refusals. This has been calculated using the current response rates (83%) for the South Africa Demographic and Health Survey (SADHS) 2016 (National Department of Health, Statistics South Africa, 2017)

Sampling is defined by Burns and Grove (2005:41), as the process of selecting a group of people, events, behaviour or other elements with which to conduct a study. A sampling technique is the method used to select a sample from the study population.

The probability sampling technique was used in this study to select the respondents for the quantitative enquiry. This technique ensures that every member or element of the population has an equal chance of being selected into the study, prevents subjectivity and bias, and allows the results to be generalised to the target population. The sampling frame was a list of names of teachers employed in Rakwadu Circuit obtained from SA-SAMS data from the circuit offices. The names were arranged in alphabetical order and assigned numbers. Thereafter, a random number table was used to select the partcipants. (Cottrell & McKenzie, 2011:128-130).

3.5.2 Sampling for the qualitative inquiry

The qualitative enquiry used two Focus Group Discussions (FGD) with a total of 10 participants. Focus group discussions have been defined as "a form of group discussion with smaller number of participants guided by the facilitator, where the group members will talk freely and spontaneously about a topic" (Lakshman *et al.*, 2000). Another definition describes FGD as an interactive discussion between 5-10 pre-selected participants, led by a moderator and focusing on a specific set of issues (Hennink, 2013).

FGD was deemed most appropriate for this study as the researcher wanted to:

- Obtain details regarding perceptions of health by individuals in their own context;
- Identify perceived needs for health care services, developmental activities and solutions for specific program problems;
- Illustrate relative importance of health behaviours in everyday life;
- Explore the range of ideas or feelings that teachers have about health and obesity; and
- Uncover factors that influence opinions, behaviour or motivation.

According to Krueger and Casey (2015), focus groups can provide insight into complicated topics when opinions or attitudes are conditional or when the area of concern relates to multifaceted behaviour or motivation.

The researcher used convenience sampling to select schools in order to conduct FGD. The schools were chosen due to their close proximity to the researcher for convenience and for the most efficient use of limited funds. Hence, one FGD was conducted in each of two schools. Each FGD was composed of at least 5 teachers who volunteered to participate, irrespective of their BMI or PA practices. However, this sampling approach could introduce volunteer bias. Volunteers are not representative of the general population of the study, limiting generalisability of the study. In addition, people who volunteer in research studies often relate to the disease or conditions being studied.

3.6 Instrument development

3.6.1 Quantitative questionnaire

A questionnaire is a method of gathering information from respondents. The development of the items was guided by a combination of questions from other questionnaires whose validity was examined. As described by Bryman (2012:185), the following were considered to adapt the questions in the questionnaire:

- A comprehensive literature review to determine what is already known on the subject;
- Consultation and evaluation of existing validated instruments from studies where the operational definitions correspond with the planned study;
- Arrangement of the questions in a logical flow according to the set objectives of the study; and
- Review of existing and validated instruments to adapt to the South African context.

The validated questionnaires used were:

1. The HealthKick study questionnaire (De Villiers *et al*., 2012) for teachers.
2. International Physical Activity Questionnaire (IPAQ)

The questionnaire (Appendix 4) was divided into 3 sections and covered the following variables:

Section 1 – socio-economic and socio-demographic information as well as anthropometric measurement.

Section 2 – knowledge, attitudes and perceptions.

Section 3 – participants' practices.

3.6.1.1 Operational definitions and techniques

Socio-economic and socio-demographic information (Section 1)

For the purposes of this study, socio-economic and socio-demographic information referred to basic demographics such as gender, age, marital status, number of children, home language and the professional level of the teachers.

Anthropometric measurements (Section 1)

For the purpose of this study, anthropometry comprised of Body Mass Index (BMI) of the participants, and measuring the waist circumference (WC).

i. Body Mass Index (BMI)

The BMI refers to the ratio of body mass or weight to and height. It can be calculated by dividing the weight (kg) of a person by his or her height (m) squared.

$$BMI = \frac{Body\ Weight\ (kg)}{body\ height^2 (m^2)}$$

Table 3.1 indicates the different classifications of body weight status based on BMI that was used in this study.

Table 3.1: Classification of BMI (**Source**: Classification of BMI [WHO], 1995**).**

BMI classification	
Underweight	< 18.5
Normal range	18.5 - 24.9
Overweight	⩾ 25.0
Preobese	25.0 - 29.9
Obese	⩾ 30.0
Obese class I	30.0 - 34.9
Obese class II	35.0 - 39.9
Obese class III	⩾ 40.0

Body Weight

The participants' weights were measured using a SECA 813 digital scale. (200kg/Division:100g). The scale was placed on a hard surface. The participants were weighed without shoes and with minimal clothing. The participants had to stand in the middle of the scale and could not hold onto anything. The weight was measured accurately to the nearest 0.1 kg (WHO, 2008:9).

Height

The height of the participants was measured to the nearest 0.1 cm, using a SECA stadiometer. The stadiometer was placed on a hard surface. All participants were measured without shoes. The participants stood erect & bare footed on a stadiometer with a movable head piece. The head piece is levelled with skull vault. The height was recorded to the nearest 0.5 cm.

Waist circumference

For the purpose of this study, waist circumference referred to the minimum abdominal circumference located midway between the lower rib margin and the iliac crest (Lee & Nieman, 2010). Waist circumference was measured at the midpoint between the lower margin of the least palpable rib and the top of the iliac crest, using a stretch-resistant tape that provides a constant 100g tension. The cut-off points are shown on Table 3.2.

Table 3.2: Waist circumference cut-off points.

Indicator	**Cut-off points**	**Risk of metabolic complications**
Waist circumference	>94 cm (M); >80 cm (W)	Increased
Waist circumference	>102 cm (M); >88 cm (W)	Substantially increased

M = men; W = women **(**WHO, 2008).

Knowledge, attitude and perceptions (Section 2)

The knowledge questions responses were categorised as 'Yes', 'No' and 'Unsure' For the purpose of this study, participants were required to respond to the following knowledge-related questions:

- Risk factors for NCDs (T2DM, CVD, stroke);
- Weight management;
- Unhealthy and healthy foods;
- Sugary foods, salty foods;
- Water consumption;
- Benefits of exercise;
- Alcohol consumption; and
- Smoking.

Attitude questions in the questionnaire were designed to measure the teachers' prevailing attitudes, beliefs and possible misconceptions related to T2DM, CVD and NCDs. These questions covered the following topics:

- Socio-demographic information;
- Knowledge about T2DM, CVD and NCDs;
- Beliefs related to T2DM, CVD and NCDs;
- Knowledge and perceptions about diet and PA.

Practices (Section 3)

For this study, the questionnaire consisted of 20 questions related to dietary intake and the Quantitative Food Frequency Questionnaire (QFFQ). Questions related to food intake covered the following aspects:

- Dietary intake practices:

  – Questions included consumption of fatty foods, sugary foods, sweetened drinks, vegetables;

  – A QFFQ was also included. This included a list of 37 different foods and beverages with various possible responses to indicate usual frequency of consumption over the time period under review. The food and beverages on the QFFQ list were those that are commonly consumed in the area in which the study was conducted.

- Alcohol consumption and smoking:

  – Questions included whether the participants currently smoked, had previously smoked, and, if applicable, the number of cigarettes they smoke per day;

  – Questions included whether participants ever drank alcohol and, if so, the quantity per day or week or month.

- Physical activity

  – Questions included related to the frequency (days/week) and duration (minutes/day) of participation in vigorous and moderate intensity activities, and walking in bouts of at least 10 minutes in the previous 7 days. This was according to the International Physical Activity Questionnaire (2005).

3.7 Validity and reliability of quantitative inquiry

The validity and reliability of the questionnaire and anthropometric measurements follows.

3.7.1 Validity

Validity refers to the extent to which the measurement instrument actually measures what it is meant to measure (Polit & Beck, 2012:336). This can be classified as internal validity and external validity. These are discussed below.

Internal validity

Internal (contextual) validity is an essential manifestations of validity in quantitative research. This is because when quantitative research is undertaken, researchers want to draw valid conclusions from a study, given the research design and controls. In research, given the study design and controls employed, it is of great importance whether valid conclusions and be reached (Ryan, Scapens & Theobald, 2002). Internal validity is the extent to which the investigator can conclude that there is a cause and effect relationship among variables (Creswell & Clark, 2011), not from other confounding factors.

Threats to the internal validity of quantitative work may occur throughout the research process, from the initial research design, to data collection, analysis and or interpretation. This is illustrated in Table 3.3.

Table 3.3: Threats to internal validity (**Source:** Ihantola & Kihn, 2011).

Research Stage/Process	**Threats to internal validity**
Research design:	Insufficient knowledge of, or contradictions in the logic. The design is not consistent with the research questions/purpose)
Data collection:	Instrumentation issues (inadequate content, criterion and/or construct validity)), order bias and researcher bias in the use of techniques
Analysis/interpretation:	Statistical testing, illusory correlation and causal error

How threats to internal validity were minimised in this study

i. **Research design –** Extensive literature review was conducted

ii. **Questionnaire –** Existing questionnaires used in another study were adapted. Questions were based on the literature related to the topic. A pre-test before data collection was conducted to ensure that all questions were easily understood by participants.

iii. **Anthropometric measurements –** The validity of the anthropometric measurements was ensured by using reliable instruments and following standardised methods as recommended by Lee and Nieman (2010).

External validity is the extent to which the researcher can conclude that the results apply to a larger population (Creswell and Clark, 2011). Some scholars are of the opinion that external validity determines whether one can draw more general conclusions on the basis of the model used and data collected, and whether results may be generalised to other samples, time periods and settings (Ihantola and Kihn, 2011). Threats to external validity of a quantitative study are: population, time and environmental validity (Ryan *et al*., 2002).

Population validity refers to whether inferences can be drawn from a study of a given population (Ihantola and Kihn, 2011). This implies that the relationship that exists between two variables in the sample should also exist in the population at large (Ihantola and Kihn, 2011). Inadequate sample size and/or non-random sampling may result in incorrect estimates or generalisations, thereby posing a serious threat to external validity. In this study, the population validity was assured by using an appropriate sample size and a random sample.

Time validity shows the extent to which the results of a particular study at a point in time can be generalised to other time periods (Ihantola and Kihn, 2011). Threats to time validity come about if there are structural changes in the relationships between variables. In this study the data was collected in a short period of time (1 month).

Environmental validity indicates whether results can be generalised across settings. Findings from this study can only be generalised to teachers in Rakwadu circuit – not nationally or internationally.

3.7.2 Reliability

Reliability generally refers to the extent to which a variable or set of variables is consistent in what it is intended to measure. Some researchers assert that it is the degree of consistency with which the data collection instrument produces the same results every time it is applied in the same subject or when used by different investigators (Polit & Beck, 2012). If measurement results are not reliable, it becomes more difficult and precarious to test hypotheses or to make inferences about the relations between variables in quantitative research (Ihantola and Kihn, 2011).

Threats to reliability include the following:

- Lack of clear and standard instructions;
- Measurement instruments describe items ambiguously leading to misinterpretation;
- Lack of pre-testing;
- No alternative answers to questions are provided;
- Questions are not presented in the proper order; and
- The questionnaire is too long or too difficult to read, and the interview is too long (Ihantola and Kihn, 2011).

How threats to reliability were minimised in this study:

i. Questionnaire

- Existing questionnaires which had been used in another study were adapted to construct the structured questionnaire.
- The researcher submitted the questionnaire to the supervisor who ensured that:

  – the questions were ordered in such a way that previous questions did not influence answers to subsequent questions.

  – the questionnaire instructions were clear and simple.

ii. Anthropometric measurements

- All anthropometric measurements were taken by the same trained researcher (a nutritionist) who was collecting data throughout the research process.
- The same equipment was used to measure the anthropometric measurements throughout the data collection procedure.
- The equipment was calibrated and standardised.
- The researcher repeated all anthropometric measurements and noted the average of the two measurements.

3.8. Trustworthiness of the qualitative inquiry

Lincoln and Guba (1985), state that in qualitative enquiry, trustworthiness involves credibility, dependability, conformability and transferability.

3.8.1 Credibility

Credibility is the confidence in the truth of the data and its interpretations (Polit & Beck 2012:584-85). Some authors suggest that the primary focus of qualitative research is to capture authentically the lived experiences of people and to represent them in a convincing text which demonstrates that the researcher fully understands the case. (Ryan *et al*., 2002, 158).

Threats to credibility

- Insufficient or biased knowledge of earlier studies and theories.
- contradictions in the logic (mismatch between research question and study design).
- observer-caused effect, observer bias, researcher bias, data access limitations, and complexities and limitations of the human mind (Ihantola and Kihn, 2011).

How threats to credibility were minimised in this study:

- The researcher audio recorded all the FGDs and kept a manual record of transcribed field notes.

- The researcher who has extensive experience (8 years as a teacher, 2 years as a nutritionist) conducted all the FGDs.
- The researcher made continuous observations during FGDs. This is to ensure that a record is kept of interactions among group members as such interactions are also considered a valuable part of the data collection in FGDs.
- Debriefing with a colleague or the supervisor was continuously done by the researcher.

3.8.2 Dependability

Polit and Beck (2012:585), define dependability as the stability or reliability of data over time and conditions.

Threats to dependability include:

- Inaccurate and unsystematic interview questions;
- Inaccurate transcriptions;
- Failure to tape-record or take notes;
- Not having a coherent set of field notes on all evidence; and
- Relationships that develop between researchers and participants.

How threats to dependability were minimised in this study:

- The researcher kept all the field notes and audio tapes of the FGDs in a lockable cabinet;
- The researcher transcribed audio tapes and cross checked the information as captured in the field notes; and
- In this study the researcher remained objective, setting aside past experience and relationships (with participants) and focused on the goal of data collection, analysis and reporting.

3.8.3 Generalisability and transferability of the study

3.8.3.1 Generalisability

The random sample size from the quantitative study can be generalised to the rural teachers in Limpopo but cannot be generalised nationally or internationally.

3.8.3.2 Transferability

This is concerned with whether the research results are transferable (Lincoln & Cuba, 1985). Polit and Beck (2012:585), state that transferability refers to the extent to which findings can be transferred in other settings or groups. In this study this was ensured by providing a thorough description of study. This refers to rich, extensive descriptive information regarding the research setting, the study participants, and the observed transactions and processes.

3.9 The pre-test

Polit and Beck (2012:195), define a pre-test or a pilot study as a mini version of the larger study which is undertaken to guide the planning of the research. The questionnaire and FGD were piloted in Modjadji circuit in the Tzaneen District. The questionnaire for the pilot study was completed with a sample of five teachers teaching at a school in Modjadji circuit. The researcher completed the questionnaire in English, estimated the time that would be required to complete each questionnaire, and made a determination on how well the questions were understood by participants. After the pre-test, it was apparent that that most teachers preferred to complete the questionnaire individually. Consequently the researcher took the anthropometric measurements and the participants completed the questionnaires themselves.

3.10 Study procedures

Approval to undertake this study was obtained from the Biomedical Research Ethics Committee of the Faculty of Health Sciences of the University of the Western Cape (Appendix 1). Another approval was sought (Appendix 3) from the Limpopo Department of Education (Appendix 2) to conduct a research in schools. The researcher informed the Rakwadu circuit manager about the study on teachers in the circuit. The researcher also provided the circuit manager with a copy of the approval letter from the Limpopo Department of Education. The names of all the teachers and the schools where they taught were obtained from the SA-SAMS database at the

circuit office. After drawing a random sample of teachers, the researcher contacted the school principals of the selected teachers.

During the data collection process, the researcher visited the schools after making appointments with the principals and the sampled participants. FGDs were conducted in the first 2 schools visited by the researcher. All participants signed an informed consent form (Appendix 7), an FGD confidentiality binding form (Appendix 8) and were provided with an information document (Appendix 6). The researcher left the questionnaire (Appendix 4) with the participants (for self-completion) after taking their anthropometric measurements.

After assigning a code to each participant the researcher conducted the FGDs (Appendix 6) in English is this is the official medium of instruction in schools. However, participants were given the option of responding either in English or Sepedi. The FGDs were recorded. The aims and objectives of the research were explained to each participant, as well as the procedure that would be followed to complete the questionnaire (as mentioned in the information document).

3.11 Data analysis

In order to answer the research objectives, data analysis was divided into three parts, quantitative, qualitative and mixed data analysis.

3.11.1 Quantitative data analysis

All the information collected was captured on an Excel spread sheet for data cleaning and was then imported into Statistical Package for the Social Sciences (SPSS) version 21.0 for data analysis. (IBM Corp, 2012). Prior to analysis, the raw data was coded. Each response was assigned a numerical value, data entry errors were cleaned and responses that were not useful for analysis were removed. Quantitative analysis was done in 2 parts. The first part was descriptive statistics and then the second part were associations.

Descriptive analysis was performed to summarise the socio-demographic information, anthropometric measurements, knowledge, attitude, perceptions, dietary practices and physical activity levels. Analysis of specific variable was done as follows:

- For the knowledge questions, the participants had to choose the answer which they thought was correct. A correct answer was coded as 1 and an incorrect answer was coded as 0. (Table 3.4). Appendix 9 shows how all the knowledge questions were coded in this study. A total score for each participants was obtained.

Table 3.4: Adjustments of knowledge variables categories.

Item	**Initial category**	**New category**	**Coding**
How many fruits and vegetables should be eaten?	1 fruit and/or vegetable a day; 3-4 fruits and/or vegetables a day; There is no need to eat fruits and vegetables a day	poor knowledge	0 0
	5 or more fruits and/or vegetables a day	Good knowledge	1 1

- The questions related to attitude were assessed using a Likert scale which was adjusted into different variables for the purpose of easier calculations. Positive attitude was coded 1 while negative attitude was coded 0. Appendix 9 shows how the attitude responses were coded. A total attitude score was then obtained. This is shown on Table 3.5.

Table 3.5: Adjustment of attitude variable categories.

Item	**Initial category**	**New category**	**Coding**
Please tell me if you strongly	Strongly	Positive	1

disagree, disagree, agree or agree strongly with the following sentences: If you are eating a healthy diet there is no need for you to be physically active	disagree, Disagree Agree Strongly Agree	Attitude Negative Attitude	1 0 0

To determine the total dietary intake practice score, the healthy dietary practices were coded 1, while poor dietary practices were coded 0. (Table 3.6). (Appendix 9). Dietary scores were calculated as the sum of correct answers to the dietary intake questions. As mentioned on the methodology chapter, the questionnaire had 20 dietary intake questions. Accordingly, the dietary scores ranged from 0 to 20, with 0 indicating wrong answers to all items and 20 correct answers to all the questions. A total score for each participant was calculated. An average score of the participant's total score was used to categorise the participants' habits into poor practices or good practices. Participants whose scores were below the mean score were categorised as poor practices, while those with scores greater than the mean as good practice (Folasire, Akomolafe & Sanusi, 2015). Increased consumption of high sugary foods, fatty foods and salty foods was categorised as poor practices, while an increased consumption of fruits and vegetables as good practices (Vorster, Badham & Venter, 2013).

The responses from the QFFQ were excluded from the data analysis because most participants did not complete it correctly.

Table 3.6: Adjustment of dietary practices variables categories.

Item	Initial category	New category	Coding
How often do you eat vegetables in a typical week?	Never, 1-2 times	Poor practices	0
	3-4 times	Poor practices	0
	5-6 times	Good practices	1
	More than 6 times	Good practices	1

Physical activity. To determine the total PA level, scores were calculated for vigorous, moderate, and activity in MET-minutes per week. This was done by multiplying the MET intensity for each activity with the minutes per week spent in each activity. Table 3.7 shows how the PA scores were obtained.

Table 3.7: Physical activity level scoring (**Source**: International Physical Activity Questionnaire, 2005).

	High physical activity level	**Moderate physical activity level**	**Low physical activity level**
How MET-score was calculated	8.0* Vigorous intensity minutes per day * no of days per week in which vigorous intensity activity was reported.	4.0* moderate intensity minutes per day * no of days per week in which moderate intensity activity was reported	3.3 * walking minutes per day * no of days per week in which walking was reported.
Total Physical activity score	≥ 1500 MET-minute/week or 3000	≥ 600 and <1500 MET-minute/week	< 600 MET minute/week

The physical activity levels were classified into three categories. These are as follows:

Category 1: Low

This is the lowest level of physical activity. Those individuals who do not meet criteria for categories 2 or 3 were categorised as low/inactive.

Category 2: Moderate: Any one of the following 3 criteria:

3 or more days of vigorous activity of at least 20 minutes per day OR 5 or more days of moderate-intensity activity or walking for at last 30 minutes per day OR 5 or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least 600 MET-min/week.

Category 3: High: Any one of the following 2 criteria:

Vigorous-intensity activity on at least 3 days and accumulating at least 1500 MET-minutes/ week OR 7 or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least 3000 MET-minutes/week (International Physical Activity Questionnaire [IPAQ], 2005)

Secondly, multivariate analysis was used to explore associations between the variables anthropometric measurements, dietary intake and physical activity with their knowledge, attitude and their perception after controlling for confounders. Pearson correlations between the knowledge, attitude and practice scores were also reported.

3.11.2 Qualitative data analysis

The researcher translated FGD to cater for responses that were given in Sepedi into English to improve consistency in terms of the language. Audio recordings were transcribed and coded by the researcher. The researcher replayed the tapes numerous times in order to investigate patterns, identify common themes and build concepts and theories within the data. Next, the codes were reduced into major categories (Polit & Beck, 2012:722).

3.11.3 Mixed data analysis

Lastly, the quantitative and qualitative data was merged in the mixed data analysis and interpretation phases of the study. The themes from focus group discussions were compared with quantitative data results using the health belief model. Themes

which were frequently mentioned or emphasised in the FGDs and which also had a higher percentage in the quantitative study were interpreted as converging or agreeing. Again, if a theme or a practice is frequently mentioned in the FGD but has low responses in the quantitative study, then the results are contradictory, which amounts to a misunderstanding.

3.12 Ethics considerations

The researcher followed the principles of research ethics. Ethics clearance was obtained from the UWC Biomedical Research Ethics Committee (BMI17/9/3) and permission was obtained from Limpopo Department of Education prior to the research. Written informed consent was sought from all participants after providing sufficient information about the purpose, benefits of the research and the nature of involvement to each of the selected participants. The researcher emphasised voluntary participation and the right of the participant to withdraw at any given time. All the participants were treated equally (justice), and selection was based on study requirements and not on a group's vulnerability (Polit & Beck, 2012:155).

The principle of beneficence entails maximising benefits and minimising harm or wrongs to the participants. This was ensured by developing a properly phrased questionnaire which did not pose any possibility of harm to the participants. The questionnaires were given to the participant for self-completion. This was after the researcher had taken their anthropometric measurements conducted in a private room that ensured confidentiality at the school. In addition, names of participants were not mentioned or recorded on questionnaires but a participant code were assigned. Furthermore, information gathered will not be publicly reported in a manner that identifies the participants and the data collected will be kept under lock and key as well as password protected for computerised data. The research transcripts, tapes, questionnaires, informed consent forms, transcripts as well as the analysis will be kept for a five-year period after completion of the research study. The research findings will be published in journals but confidentiality will be

maintained. Contact details of the researcher, the supervisor and research ethics committee was disclosed to participants on the information sheet.

3.13 Conclusion

Chapter 3 outlined the study design, study population and sampling methodology for this research. The data collection tools and procedures were described as well as how threats to validity and reliability would be minimised. Furthermore, the researcher discussed how ethical principles were observed. The research findings and results analysis will be presented in the next chapter.

CHAPTER 4

RESULTS

4.1 Introduction

This chapter gives a summary of the research findings of the study based on how the participants responded to the questionnaire and the focus group discussions conducted by the researcher during the data collection period. It comprises the analysis, presentation and interpretation of the findings. This was carried out in three parts in an attempt to answer the research objectives. The first part will present descriptive statistics from the quantitative data while the second part will present qualitative results consisting of descriptions, themes and quotes generated from the data. The third part will comprise of the mixed analysis which will merge the results from both qualitative and quantitative findings.

4.2 Quantitative results

4.2.1 Socio-economic, demographic information, health and nutritional status of participants

4.2.1.1 Socio-economic and socio-demographic information of participants

The researcher distributed 136 questionnaires and only 114 (83.8%) participants agreed to participate. The socio-economic and socio-demographic information is shown in Table 4.1. All the participants were of Black ethnicity. The majority of the participants (70.2%) were females and 53.5% were married. The majority of participants (44.7%) were aged between 50-60 years old with only a few being in their twenties (1.8%). More than half (57%) of the participants were teaching in secondary schools. Most of the participants reside in formal housing with 53.5% in rural areas and 43.9% living in town.

Table 4.1: Socio-economic and socio-demographic information.

Variables	Label	N	%
Gender	Male	34	29.8
	Female	80	70.2
Age group (Years)	20-29	2	1.8
	30-39	20	17.5
	40-49	41	36
	50-60	51	44.7
Marital Status	Single	45	39.5
	Married	61	53.5
	Widowed	8	7
Residential Area	Town (Informal housing)	1	0.9
	Town (Formal housing)	50	43.9
	Rural (informal housing)	2	1.8
	Rural (formal housing)	61	53.5
School level being taught	Primary school	49	43
	Secondary school	65	57

4.2.1.2 Self-reported and family NCD prevalence

The most commonly self-reported NCD was high blood pressure (52.6%), for which 89.5% of participants also reported a family history, followed by T2DM (self-reported diagnosis 36.8%, family history 57%) (Table 4.2). Half of the participants (50.9%) reported having a family member who had had a stroke.

Table 4.2: Self-reported prevalence of NCD.

NCD	Self-reported diagnosis n (%)	Family history n (%)
High blood pressure	60 (52.6%)	102 (89.5%)
Heart attack	16 (14%)	37 (32.5%)
Stroke	15 (13.2%)	58 (50.9%)
High blood cholesterol	7 (6.1)	11 (9.6%)
Diabetes	42 (36.8%)	65 (57%)
Cancer	4 (3.5%)	10 (8.8%)

4.2.1.3 Anthropometric measurements

None of the teachers were underweight. Of the participants, 85% were either obese or overweight. The prevalence of obesity was slightly higher in women with 1 in 2 women being obese (Table 4.3) and a slightly greater proportion of men being overweight, while a slightly greater proportion of women were obese but this was not statistically significant.

Table 4.3: BMI classification.

BMI classification	Male n (%)	Female n (%)	Total n (%)
Normal weight (BMI-18.5-24.5)	5 (14.7%)	12 (15.0%)	17 (14.9%)
Overweight (BMI-25.0-29.9)	14 (41.2%)	27 (33.8%)	41 (36.0%)
Obese (BMI>=30)	15 (44.1%)	41 (51.2%)	56 (49.1%)
Total	34 (29.8%)	80 (70.2%)	114
Chi-square (p value)	$X^2 = 0.614$ p = 0.736		

4.2.1.4 Waist circumference

Based on waist circumference, more than half of the participants (56.1%) were at substantially increased risk of metabolic complications, with more women (62.5%) than men (41.2%) being in this category (Table 4.4) although this is not statistically significant. Only a few participants (21.9%) had a waist circumference that is not associated with an increased risk for metabolic complications.

Table 4.2: Waist circumference classification.

Risk of metabolic complications	**Men n (%)**	**Women n (%)**	**Total n (%)**
Lower risk ≤94 cm (Men); ≤80 cm (Women)	11 (32.3%)	14 (17.5%)	25 (21.9%)
Increased risk >94≤102 (Men); >80 ≤88 cm (Women)	9 (26.5%)	16 (20.0%)	25 (21.9%)
Substantially increased risk >102 cm (Men); >88 cm (Women)	14 (41.2%)	50 (62.5%)	64 (56.1%)
Total	34	80	114
Chi-square (p value)	$X^2 = 4.788$ (p = 0.091)		

4.3 Practices

The practices were divided into dietary practices, alcohol consumption, smoking and physical activity. These are presented in the sections that follow.

4.3.1 Dietary practices

The results given in this section represent dietary practices in terms of meal consumption patterns, snack consumption, sources of meals consumed, frequency of consumption of various foods such as fruits and vegetables, salt consumption as well as source of nutrition knowledge. In terms of the consumption of critical nutrients such as salt, sugar and fat, the following were regarded as good dietary practices; relatively low consumption of salt (not adding salt when eating, or sometimes, rarely, never eat processed foods high in salt), relatively reduced intake of sugar or fat (i.e. never or 1-2 times a week). Increased consumption of fruits (i.e. 3-4 times per day) and vegetables (5-6 times or more per week) were also regarded as good practices (Appendix 9) (Vorster, Badham & Venter, 2013).

Dietary practices scores were calculated for each participant using the scoring system described in the methodology. To determine the total dietary practice score, good dietary practices were coded 1, while poor dietary practices were coded 0.

Those that chose ‘don’t know’, or ‘none in particular’, were coded as 0. A total score for each participant was obtained and the mean, median and quartiles are presented on the Table 4.5. The dietary practices score of the participants were graded as follows; participants who scored below the mean (0-7) were classified as having poor dietary practices while those whose score was above the mean had good practices (8-20) (Folasire, Akomolafe & Sanusi, 2015).

The results in Table 4.5 show that 67.5% of the participants had poor dietary practices, while 32.5% had good dietary practices. The mean score (±SD) was 7.1 ±1.9 with the median score (Q1; Q3) being 7 (6; 8). Since the mean and median score equal 7, this implies that the data was normally distributed. The participants who were below the mean were regarded as having poor practices.

Table 4.5: Dietary practices score.

Dietary practices score	**N**	**%**
0-7 (Poor dietary practices)	77	67.5
8-20 (Good dietary practices)	37	32.5
Total	114	100
Mean score 7.1±1,8		
Median score (Q_2) = 7		
Lower Quartile (Q_1) =6	Upper Quartile (Q3) = 8	

4.3.2 Consumption of various foods

- Fruit and vegetable consumption

Fruit was consumed more frequently than vegetables with 77.2% reporting consumption of fruits 1-2 times a day whilst 60.5% of participants consumed vegetables 1-2 times per week. Only 0.9% of the participants consumed fruits 5-6 times per day whilst only 2.6% consumed vegetables almost once daily (i.e. 5-6 times per week) (Table 4.6).

- Consumption of high sugar and fatty foods

The consumption of high energy foods such as sugary and fatty foods was high in this sample. Forty percent consumed high sugary foods 5-6 times per week and 45% consumed fatty foods at the same frequency (Table 4.6). Almost three out of four participants reported adding extra salt to their meals, whilst 48.2% reported that they sometimes eat processed foods high in salt, while 71.1% usually add salt to their meals (Table 4.6).

Table 4.6: Critical food consumption.

Consumption of vegetables per week	**n**	**%**
Never	4	4.4
1-2 times	69	60.5
3-4 times	30	26.3
5-6 times	3	2.6
More than 6 times	7	6.1
Consumption of fruits per day		
Never	4	3.5
1-2 times	88	77.2
3-4 times	17	14.9
5-6 times	1	0.9

Table 4.6 continued

Consumption of sugary and fatty foods		
Never	12	10.5
1-2 times	11	9.6
3-4 times	44	38.6
5-6 times	46	40.4
More than 6 times	1	0.9
Consumption of fatty foods per week		
Never	6	5.3
1-2 times	17	14.9
3-4 times	39	34.2
5-6 times	51	44.7
More than 6 times	1	0.9
Consumption of processed foods high in salt		
Never	1	0.9
Rarely	15	13.2
Sometimes	55	48.2
Often	42	36.8
Always	1	0.9
Adding salt before or when eating	81	71.1

4.3.3 Food preparation methods and eating patterns

The majority (93%) reported that they use vegetable/sunflower oil when cooking (Table 4.7), while boiling was the most common cooking method (45.6%). The participants' eating patterns were assessed using questions on the daily number of meals – breakfast, lunch and sources of food they eat at work (Table 4.7). Almost half of the participants (47.4%) eat 1-2 meals a day without eating anything between meals, while a third eat 1-2 meals a day and eat snacks between meals. Almost half (44.7%) of the participants ate breakfast on week days (44.7%) whereas 86.8% ate breakfast over weekends (86.8%). The participants were asked where they normally obtain food for their lunch/break during working hours. Most of their responses were

as that they bring food from home (62.3%), while about a third (35.1%) buy from the tuck shop. The participants' responses also revealed that they have bought food from the tuck shop (79.1%) and take-away shop (78.1%) during the past week (Table 4.7).

Table 4.7: Eating patterns.

Usual eating pattern		
Number of meals per day	N	%
3 meals per day (no eating between meals)	19	16.7
3 meals per day (with eating between meals)	8	7
1-2 meals per day (no eating between meals)	54	47.4
1-2 meals per day (with eating between meals)	33	28.9
Breakfast consumption per week		
Never	6	5.3
1-2 days	35	30.7
3-4 days	22	19.3
Everyday weekday	51	44.7
Saturdays and Sundays	99	86.8
Source of food during working hours		
From a fast food restaurant e.g. KFC	1	0.9
Tuckshop	40	35.1
I carry food from home	71	62.3
I don't eat lunch	2	1.8
Where you bought food in the past week		
Tuckshop	91	79.8
Vendors	40	35.1
Take away	89	78.1
Other (Supermarket)	35	30.7

Table 4.7 continued

Food preparation methods		
Oil used for cooking		
Olive oil	8	7
Vegetable/ sunflower oil	106	93
How usually cook chicken		
Fry it	20	17.5
Cook it in an oven	38	33.3
Boil it	52	45.6
I don't know/no answer	4	3.5

4.3.4 Sources of nutrition information

Most participants in this study obtained their nutrition information from television (43%), while almost a quarter (19.3%) obtained information from their families. Pharmacies, clinics, dieticians or hospitals are the least-mentioned sources of nutrition information in this study (0.9%).

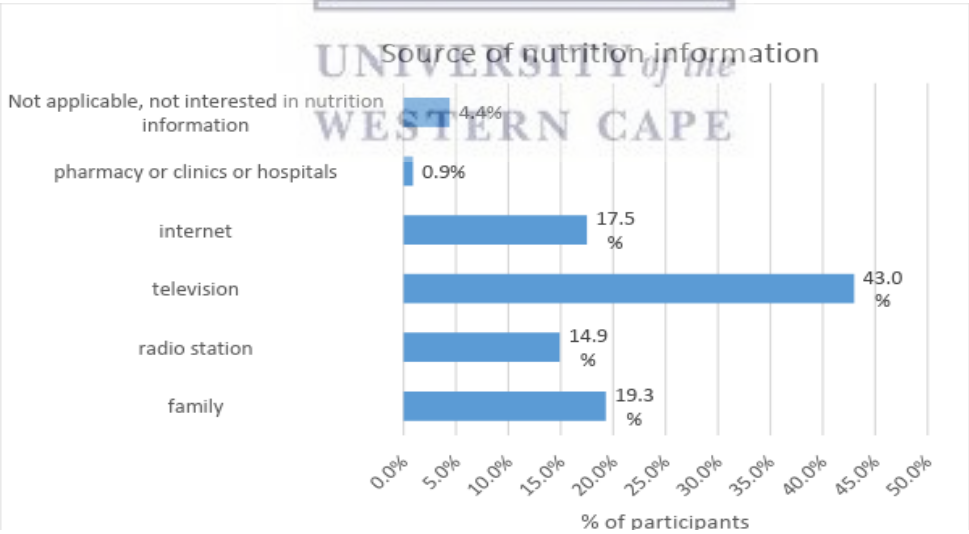

Figure 4.1: Source of nutrition information (n=114).

4.4 Alcohol consumption and smoking

- Alcohol consumption

In terms of alcohol consumption, 66.7% of participants reported that they never consume alcohol, while 36.8% had consumed alcohol within 30 days prior to the interview (Table 4.8). Fifty percent of the participants who did consume alcohol, consumed at least 6-12 standard drinks at a sitting.

- Smoking

Only 11.4% of the participants reported being current smokers. Among those who smoked, only 10.5% smoked tobacco daily (Table 4.8).

Table 4.8: Alcohol consumption and smoking.

Have you ever consumed any alcohol such as beer, wine, spirits or home (Traditional) brewed beer?		
	N	%
Yes	38	33.3
No	76	66.7
Have you consumed any alcohol within the past 30 days? (113)		
Yes	42	36.8
No	71	62.3
During the past 30 days, how frequently have you had at least one standard alcoholic drink? (n=42)		
Daily	3	7.1
5-6 days per week	14	33.3
3-4 days a week	8	19
1-2 days a week	8	19
1-3 days a month	9	21.4

Table 4.8 continued

During the past 30 days, when you drank alcohol, how many standard drinks on average did you have during one drinking occasion? (n=42)		
Don't know	12	28.6
6-12	21	50
7-12	6	14.3
13-20	2	4.7
6	1	2.4
Do you currently smoke any tobacco products, such as cigarettes, cigars or pipes? (n=113)		
Yes	13	11.4
No	101	88.6
Do you currently smoke tobacco products daily? (n=13)		
Yes	12	92.3
No	1	7.7
How many cigarettes do you smoke per day? (n=12)		
1-5	5	41.7
5-10	3	25
a whole pack(20 cigarettes)	3	25
more than 20	1	8.3
In the past, did you ever smoke any tobacco products (n=101) not smoking)		
Yes	4	4

4.5 Physical activity

Physical activity levels were categorised as low, moderate or high in the methodology. Results presented in Table 4.9 show that teachers mostly had low physical activity (83.3%) and a small proportion had moderate physical activity levels (16.7%). No teacher reported high physical activity. The majority of the teachers rarely or never did moderate exercise (64.9%) or vigorous exercise

(62.3%), while about 38.6% teachers rarely or never walked. The results show that only 7% of the participants walked every day. (Figure 4.2).

Table 4.9: Physical activity levels.

Physical activity	**N**	**%**
Low	95	83.3
Moderate	19	16.7
High	0	0
Total	114	

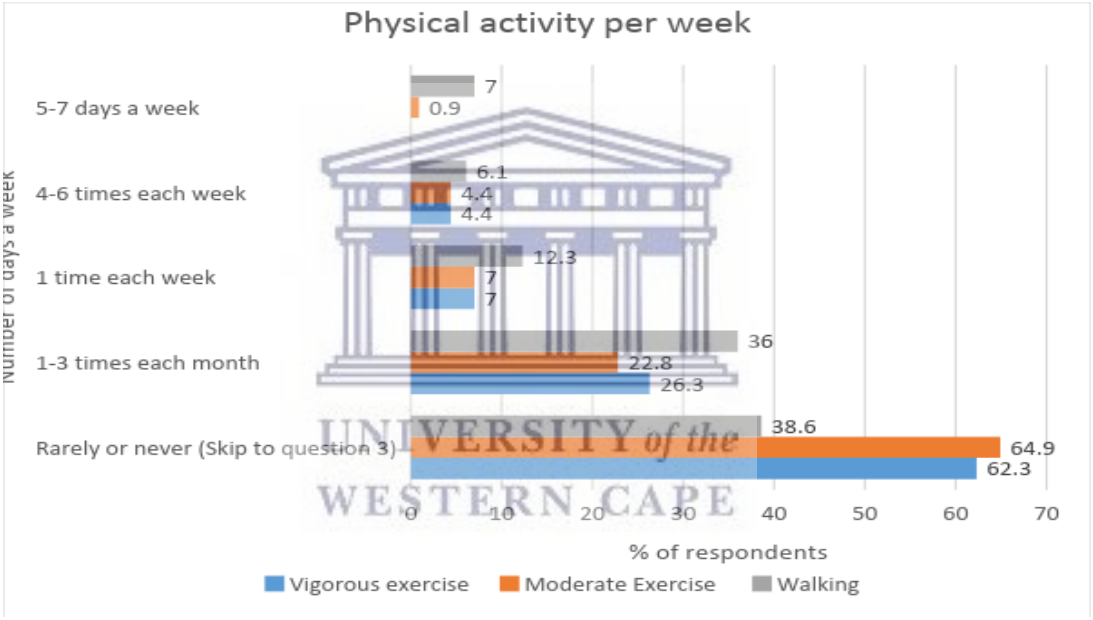

Figure 0.2: Physical activity levels per week (n=114).

4.6 Knowledge, attitude and perceptions

4.6.1 Knowledge

The study had 22 knowledge questions which were divided into knowledge regarding diet and knowledge regarding diabetes and CVD. Correct knowledge was scored as 1 while incorrect knowledge was scored 0 (Appendix 9). A total

knowledge score was obtained. Participants were considered to have poor NR-NCD knowledge level on risk factors, signs and dangers of diabetes, physical activity and healthy diet when knowledge scores were less than the mean score (0-11); and good knowledge level when their knowledge scores were greater than the mean (12-22). The overall knowledge scores are shown in Table 4.10 show generally that, teachers had a mean knowledge score ((±SD)) of 11.89 ((±2.8)) with the median score (Q1; Q3) of 12 (10;14). More than half of participants (54.9%) had good knowledge. The results also revealed that 72.8 % of participants had poor dietary knowledge (Table 4.10).

Table 4.10: Distribution of knowledge.

Overall knowledge score	**N**	**%**
0-11 (Poor Knowledge)	51	45.1
12-22 (Good Knowledge)	62	54.9
Total*	113	
Mean Score 11.89±2.8		
Median Score 12,		
Lower Quartile (Q1) =10 Upper Quartile (Q3) = 14		
*1 missing value		
Dietary Knowledge		
0-2 (Poor dietary knowledge)	83	72.8
3-5 (Good dietary knowledge)	31	27.2
Mean Score 2.11±0.78		
Median Score 2		
Lower Quartile (Q1) = 1 Upper Quartile (Q3) = 3		

4.6.1.1 Knowledge regarding diet and NR-NCDs

Results related to the individual questions of the knowledge of the participants are shown in Table 4.11. More than half (54.4%) of participants believed that the most important reason why people gain weight is hereditary, while 22.8% believed that unhealthy eating is the main reason. In response to the questions regarding fruits and vegetable consumption per day (Table 4.11), about three quarters of the participants (76.3%) reported that one fruit and/or vegetable should be eaten per day. Only 2

participants said that they should be eaten 5 or more times a day. However, with regard to the amount of water that should be drank a day, most participants (46.5%) indicated 1 to 3 glasses which is inadequate according to the SA dietary guideline. Only a quarter of participants correctly indicated that 6 to 8 glasses should be consumed daily. The results on general knowledge of NCDs revealed that the majority (85%) did not know that NCDs cannot be spread between people, while only 22.8% knew (Table 4.11). Knowledge regarding T2DM was assessed by asking questions listed in Table 4.12 More than half of the participants were knowledgeable about most of the dangers, signs, symptoms as well as best treatment for T2DM, with stroke having the highest responses (91.2%).

Table 4.11: Knowledge regarding diet and NCD.

Variable	**N**	**%**
Which one of the following do you think is the most important reason why people gain weight?		
It runs in the family	62	54.4
They eat too much	22	19.3
They eat too much unhealthy foods	26	22.8
Lack of knowledge	4	3.5
Eating starchy foods at most meals may:		
Be unhealthy	61	53.5
Cause weight gain	41	36
Cause diseases	8	7
Be important for a balanced diet	4	3.5
From which group of foods should you eat the most every day?		
Bread, samp, rice, porridge	76	66.7
Apples, bananas, spinach, carrots	30	26.3
Chicken, fish, beans, eggs	8	7

Table 4.11 continued

How many fruits and vegetables should be eaten?		
1 fruit and/or vegetable a day	87	76.3
3-4 fruits and/or vegetables a day	25	21.9
5 or more fruits and/or vegetables a day	2	1.8
How much water should you drink a day?		
1 to 3 glasses	53	46.5
4 to 6 glasses	39	34.2
6 to 8 glasses	22	19.3
A non-communicable disease is one that cannot be spread between people?		
True	26	22.8
False	3	2.6
I don't know	85	74.6

Table 4.3: Knowledge regarding T2DM and CVD.

Variable	**N**	**%**
What do you think is the BEST way to treat diabetes?		
Medication only	7	6.1
Proper diet only	3	2.6
Weight loss only	1	0.9
Exercise only	3	2.6
Proper diet and weight loss	8	7
Proper diet and exercise	22	19.3
Proper diet, weight loss and exercise	13	11.4
Proper diet, weight loss, exercise and medication	57	50
How would you reduce your chances of getting diabetes?		
Eating little or no sugar and sweets	36	31.6
Prevent weight gain	8	7
Follow a healthy diet, manage weight	70	61.4

Table 4.12 continued

Which of the following signs of diabetes have you heard of?		
Being very thirsty	98	86
Urinating all the time	82	71.9
Weight loss	76	66.7
Constant hunger	57	50
Slow healing wounds	74	64.9
Blurred vision	63	55.3
Repeated infections	68	59.6
Which of the following dangers of diabetes have you heard of?		
Poor vision or blindness	77	67.5
Lung problems	72	63.2
Kidney problems	46	40.4
Foot problems or gangrene	60	52.6
Heart disease	66	57.9
Stroke	104	91.2

4.6.2 Attitude

The study included 21 attitude questions regarding risky dietary practices, DM and CVD behaviour. The participants' attitude scores were graded as follows: participants with a score less than the mean (0-15) were considered to have negative attitude, participants who scored above the mean (16-21) had a positive attitude. Negative attitude meant that the participants incorrectly agreed or disagreed with a given practice, which was coded 0, while positive attitude meant that the participant correctly agrees or disagrees, which was coded 1 (Appendix 9). A total attitude score was obtained.

Results as indicated Table 4.13 show that out of total score of 21, the overall mean score (±SD) was 15.2 (±2.33) with a median ($Q_{1;}$ Q3) of 16 (14; 17). Just more than half of the participants (57%) had a positive attitude.

Table 4.13: Distribution of overall attitude score of participants.

Attitude Score	**N**	**%**
0-15 (Negative attitude)	49	43
16-21 (Positive attitude)	65	57
Total	114	
Mean Score 15.2±2.3		
Median Score 16		
Lower Quartile (Q1) =14 Upper Quartile (Q3) = 17		

The questions related to attitude were divided into 3 sections which included attitude towards risky dietary practices, risky DM behaviour and risky CVD behaviour.

The results showed that the majority of teachers had a positive attitude towards good practices about DM. Almost all the participants agreed that being overweight or obese (94.7%) and eating fatty foods (96.5%) and drinking too much alcohol (78%) are risky factors for T2DM. The majority of the participants agreed and strongly agreed to most of the risk factors of CVD or heart disease such as unhealthy diet (78.1%), family history (82.4%) low physical activity (93.8%) and smoking (69.3%) (Table 4.14) The results also show that the majority of the teachers had a positive attitude towards good practices about T2DM. Almost all participants agreed that being overweight or obese (94.7%) and eating fatty foods (96.5%) and drinking too much alcohol (78%) are risky factors for T2DM. The majority of the participants agreed and strongly agreed to most of the risk factors of CVD or heart disease such as unhealthy diet (78.1%), family history (82.4%) low physical activity (93.8%) and smoking (69.3%) (Table 4.14).

Table 4.14: Attitude towards DM and CVD risky practices.

Attitude towards diabetes risky behaviour				
Variables	Strongly disagree n (%)	Disagree	Variables	Strongly disagree n (%)
Drinking sugar sweetened cold drinks	15 (13.2)	34 (29.8)	43 (37.7)	22 (19.3)
Supernatural forces	33 (28.9)	66 (57.9)	14 (12.3)	1 (0.9)
Being obese/overweight	3 (2.6)	3 (2.6)	73 (64)	35 (30.7)
Eating fatty food	1 (0.9)	3 (2.6)	35 (30.7)	75 (65.8)
Drinking too much alcohol	4 (3.5)	21 (18.4)	68 (59.6)	21 (18.4)
Attitude towards CVD risky behaviour				
Do you think the following are risk factors if CVD/heart disease?				
Smoking	9 (7.9)	26 (22.8)	56 (49.1)	23 (20.2)
High blood pressure	1 (0.9)	2 (1.8)	89 (78.1)	22 (19.3)
Low physical activity	1 (0.9)	10 (8.8)	101 (88.6)	2 (1.8)
Overweight/obesity	7 (6.1)	96 (84.2)	11 (9.6)	0
Family history	0	20 (17.5)	91 (79.8)	3 (2.6)
Unhealthy diet	1 (0.9)	24 (21.1)	81 (71.1)	8 (7)

The study findings (Table 4.15) show that the majority of participants (77.2%) had a positive attitude towards diet, DM and CVD risk practices. The positive attitude was shown in the following statements where they either agreed with healthy behaviour or disagreed with unhealthy behaviour. Most disagreed to eating too much meat (70.2%) and physical inactivity (89.5%). All the same, the majority of participants also agreed to the risk of excessive alcohol consumption (61.4%) and eating high energy foods (82.4) as risk factors of obesity.

Table 4.15: Attitude towards risky dietary practices.

Variables	Strongly disagree n(%)	Disagree n(%)	Agree n(%)	Strongly agree n(%)
Attitude towards a risky dietary practices				
You should eat a lot of sugar to give you enough energy	15 (13.2)	37(32.5)	55(49.2)	7(6.1)
If you are eating a healthy diet there is no need for you to be physically active	20 (17.5)	60(52.6)	32(28.1)	2(1.8)
Starchy foods should not be eaten when one is trying to lose weight	6 (5.3)	20 (17.5)	80 (70.2)	8 (7)
Your body only needs a little bit of salt to be healthy	17 (14.9)	16 (14)	80 (70.2)	1 (0.9)
Drinking a lot of wine, beer, and cider can cause weight gain	14 (12.3)	30 (26.3)	62 (54.4)	8 (7)
Salt should be added to all foods except fruits	33 (28.9)	35 (30.7)	39 (34.2)	7 (6.1)
You can eat as much meat as you want every day	52 (45.6)	50 (43.9)	10 (8.8)	2 (1.8)
Eating high energy foods, fatty foods or sugary foods is a risk factor of obesity	7 (6.1)	13 (11.4)	64 (56.1)	30 (26.3)
Eating less or smaller portions of food reduces the risk of overweight and obesity	2 (1.8)	8 (7)	85 (74.5)	19 (16.7)

4.6.3 Perceptions

The results related to the perceptions of the participants are presented in Figure 4.3 Only a few participants perceived themselves as overweight or obese, while three quarters (75.4%) perceive their body weight to be normal. A larger proportion of the participants (42.1%), were very concerned about developing diabetes and CVD (41.2%).

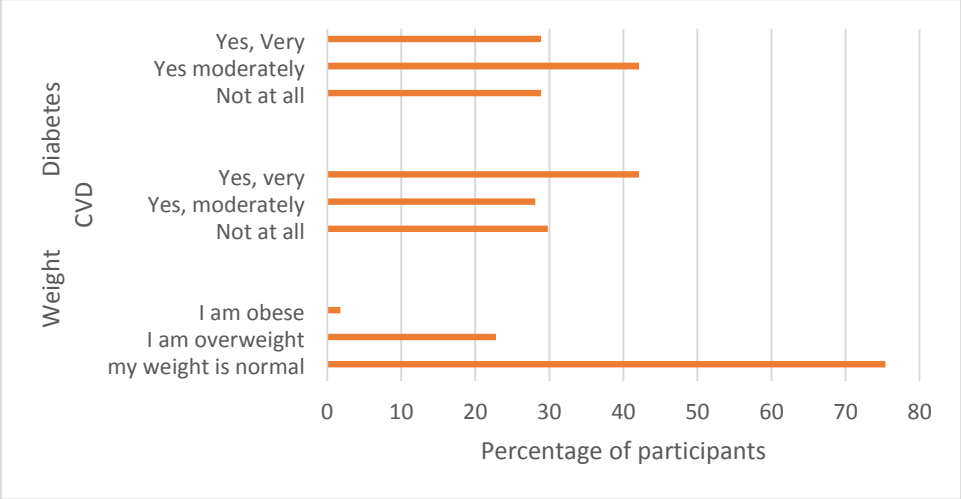

Figure 4.3: Perceptions towards weight, developing diabetes and CVD (n=114).

4.7 Associations between variables

The Pearson's correlation ($p<0.05$) was performed to assess the association between the teachers' anthropometric measurements, dietary intake and physical activity with their knowledge, attitude and perceptions regarding obesity and NR-NCDs. For the purposes of this study, non-significant and very weak correlations (where r is very close to 0, thus from -0.09 to 0.09) were indicative of no association.

4.7.1 Association of nutritional status with dietary intake practices, knowledge, attitude and perceptions

BMI was correlated to dietary practices, attitude, knowledge, perception and physical activity (Table 4.16). Positive and significant associations were found between BMI and perception of how dangerous non-communicable diseases are ($r=0.207$, $p=0.027$). A significant negative association ($r=-0.229$, $p=0.014$) between BMI and dietary knowledge score, which implies that those with good dietary intake practices had a lower BMI.

Table 4.16: Pearson correlations on BMI and dietary intake practices, physical activity, KAP and perception.

BMI (n=114)		
	r	P
BMI	1	-
Dietary intake Score	0.059	0.529
Attitude Total score	0.085	0.844
Physical Activity total score	-0.072	0.444
Knowledge Total Score	0.014	0.885
Dietary knowledge Score	-0.229*	0.014
Diabetes and CVD knowledge score	0.08	0.403
Normal body weight importance perception	0.035	0.714
Non communicable diseases danger perception	0.207*	0.027
*. Correlation is significant at the 0.05 level (2-tailed).		

The results also showed a very weak non-significant positive correlation (r = 0.059, p = 0.529) of dietary practices and BMI indicative of no association. BMI and physical activity level had a very weak negative but non-significant correlation, (r= -0.072, p=0.444), indicative of no association. The results show that 8 out of the 19 moderately active participants were obese while 50.5% of the 95 participants with low physical active participants were obese (Table 4.17) but this was not statistically significant. In addition, 72.8% of the participants who perceived their weight to be normal were either overweight or obese and this was statistically significant (add p-value).

Table 4.17: The relationship between nutritional status and physical activity.

		Physical Activity total score		Total n (%)
		Low n (%)	Moderate n (%	
BMI Classification	Normal weight (BMI-18.5-24.5)	14 (14.7%)	3 (15.8%)	17 (14.9%)
	Overweight (BMI-25.0-29.9)	33 (34.7%)	8 (42.1%)	41 (37%)
	Obese (BMI>=30)	48 (50.5%)	8 (42.1%)	56 (49.1%)
Total		95(83.3%)	19(16.7%)	114
Chi-square (p=value)		$X^2 = 0.479$ p= 0.787		
Perception of body weight				
		My weight is normal	1 am overweight	I am obese	Total n (%)
BMI classification	Normal weight (BMI-18.5-24.5)	17(19.8%)	0	0	17 (14.9%)
	Overweight (BMI-25.0-29.9)	36 (41.8%)	4 (15.4%)	1(50%)	41 (36%)
	Obese (BMI>=30)	33 (37.4%)	22 (84.6%)	1 (50%)	56 (49.1%)
Total		86 (75.4%)	26 (22.8%)	2 (1.8)	114
Chi-square (p=value)		$X^2 = 18.229$ p=0.001			

4.7.2 Association of dietary intake practices with knowledge, attitude, and perceptions

Pearson's correlation was also run to determine if there is an association between the participants' dietary intake practices, knowledge and their attitude (Table 4.18) The test showed no correlation (r=0.090, p=0.292) between participants' dietary intake practices score and their attitude score. Thus having a positive attitude does not necessarily result in healthy dietary intake practices. Another weak negative and non-significant correlation (r=0.126 and p=0.182) was found between participants' dietary intake practices score and their perception of body weight. The findings as shown in Table 4.18 show a significant positive correlation of dietary knowledge and dietary intake practices score (r=0.206, p=0.028) as well as some dietary intake

practices such as chicken cooking vegetable consumption per week and consumption of sugary foods and soft drinks.

Table 4.18: Correlations of dietary intake practices with dietary knowledge, attitude and perception.

Dietary intake practices	Dietary Knowledge Score		Attitude score		Perception of body weight	
	r	P	r	P	r	p
Dietary practices Score	0.206*	0.028	0.090	0.292	0.126	0.182
How you cook chicken	0.186*	0.047	-0.082	0.384	-0.07	0.458
Vegetable consumption per week	0.248*	0.008	-0.034	0.719	0.18	0.055
Consumption of fatty foods	0.12	0.204	-0.152	0.106	0.172	0.067
Consumption sugary foods, soft drinks	211*	0.024	-0.135	0.151	-0.067	0.48
Consumption of fruits per day	-0.086	0.363	0.133	0.158	0.021	0.825
Usual eating habits	-0.081	0.389	-0.079	0.405	-0.003	0.977
*Correlation is significant at the 0.05 level (2-tailed).						

4.7.3 Association of physical activity with perceptions, dietary practices and attitude

Physical activity levels of the participants were also correlated with the participants' attitude, knowledge, practices and perceptions (Table 4.19). A very weak negative correlation (not significant) existed between the participants' physical activity level and their attitude score (r=0 -0.033, p=0.731.). This is indicative of no association. Participants' knowledge level and physical activity had no association. The results also found that there was a significant positive correlation between physical activity levels on the participants and their perception of importance of normal body weight (r=0.184, p=0.05). This implies that those teachers who perceive normal body weight as very important are likely to be physically active.

According to the results shown in Table 4.19, negative but significant correlations existed between the participants' physical activity levels and their perception of developing CVD (r=-0.278, p=0.003) as well as with their attempt to lose weight in

the past year (r= -0.360, p=0.00). This implies that, even though the participants are concerned about developing CVD, they still have low physical activity levels.

Table 4.19: Correlation of physical activity with perceptions, dietary practices and attitude.

Association with Physical activity	**R**	P
Attitude physical activity CVD	0.066	0.483
Attitude total score	-0.033	0.731
Knowledge total Score	0.059	0.533
Normal body weight importance perception	.184*	0.05
Regarding your body weight, do you feel you are:	-0.096	0.311
Have you tried to lose weight in the past year?	-0.360*	0.00
Developing Diabetes perception	-0.178	0.059
Developing CVD perception	-.278**	0.003
*Correlation is significant at the 0.05 level (2-tailed).		

Results on Table 4.20 show some associations of the participants' perceptions and physical activity levels. For example, 83.16% of the teachers with low physical activity had not tried to lose weight in the past year. A majority of the teachers with low physical activity perceived their body weight as normal (73.7%, n=70). Although 64.2% (n=61) perceived normal body weight as important, they still had low physical activity.

Table 4.20: Association of perception and physical activity.

		Physical activity		
Perception				
Have you tried to lose weight in the past year?				
		Low n (%)	**Moderate n(%)**	**Total**
	Yes	16 (6.8%)	11 (57.8%)	27 (23.7%)
	No	79 (83.16%)	8 (42.1%)	87 (76.3%)
	Total	95 (83.3%)	19 (16.7%)	114
Regarding your body weight, do you feel you are:				
	my weight is	70 (73.7%)	16 (84.2%)	86 (75.4%)

	normal			
	I am overweight	23 (24.2%)	3 (15.8%)	26 (22.8%)
	I am obese	2 (2.1%)	0	2 (1.8%)
	Total	95 (83.3%)	19 (83.3%)	114

4.8 Qualitative Results

Two focus group discussions were conducted. Each FGD was conducted in a different school by the researcher using primarily English. Some participants responded is Sepedi for there was no language restriction. The characteristics of the interviewees are shown on Table 4.21.

4.8.1 A description of the characteristics of the interviewees

The majority of the participants were aged between 45 to 59 years. Each FGD consisted of male or females only, there was no mixture of gender.

Table 4.21: Characteristics of the interviewees.

Focus group A				**Focus group B**			
Participant Code	Sex	Age	Marital status	Participant code	Sex	Age	Marital Status
A1	Female	50	Married	B1	Male	59	Married
A2	Female	52	Single	B2	Male	50	Single
A3	Female	48	Single	B3	Male	45	Married
A4	Female	58	Widowed	B4	Male	48	Married
A5	Female	59	Married	B5	Male	52	Single

4.8.2 The focus group discussion results

Focus group recordings and transcripts yielded some insights into the teacher's healthy practices, understanding and perceptions as well as the barriers they face regarding healthy lifestyle. Major themes were deducted after consolidation of several themes that emerged from a combination of the recordings, transcripts and FGD questions derived from the research objectives.

The following are the 4 specific themes identified dietary factors, barriers to healthy lifestyle, perception on weight, and influence on learners:

Dietary factors

Sub themes were healthy, unhealthy diet as well as eating too much

a) Healthy and unhealthy diet

Several healthy and unhealthy foods were talked about in the both FGDs. Red meat was mentioned as both healthy and unhealthy. Some participants said red meat becomes unhealthy when it is consumed too much.

The following were mentioned as healthy foods:

Balanced diet, fruits, vegetables, food with minerals, milk, eggs

The following were mentioned as unhealthy foods:

Red meat, fatty foods, sugary foods, fizzy drinks, cakes, chips, acidic foods, and sweets.

"*We have foods like red meat more especially with too much fats and too much sugar which are unhealthy."*

"Fatty food like foods cooked with too much fat and too much alcohol, smoking."

b) Eating too much

Eating too much was an overarching theme that dominated in every focus group discussion. Participants were very aware that eating too much was a major problem in causing weight gain. Interestingly, "eating too much" emerged more than 5 times in one of the focus groups. Eating too much porridge was also mentioned. Some of the participants went on to further explain how eating too much had affected them individually. Other participants gave examples of their family members who ate too much. However, another interesting issue that came up was that one can eat foods that are unhealthy, like cakes, but in limited amounts. This is what they said:

"Like myself I was eating porridge too much, and I was too fat, nowadays I eat small, small and I am okay. I was more than this."

"We are not supposed eating red and chicken meat too much, we must limit them."

"That time I was eating everything, too much, I was 120kg and now I am 107kg. Eating too much is dangerous, its poison even if it is healthy food, too much of any food."

"The problem we have we blacks, is we put 2 litres of coke on the table, we drink it all alone until the bottle is empty. Even if you are eating healthy food but if you eat too much it becomes poison."

"My brother has high blood and his wife is diabetic. They say they were told to eat healthy, so they would go and buy a box of fruits (bananas, apples, mangoes) and finish them in 2 days. That's not right. If you have sugar diabetes doesn't mean that I don't eat what others eat. I eat cake sometimes but in small quantities. I limit."

c) Barriers to healthy living

Many participants said that fruits and vegetables are available in the market but are very expensive. This makes it difficult to eat them every day. However, there were some who felt that since teachers were employed they could afford to buy these foods. Frequently the teachers were referring to the learners' accessibility to these healthy foods instead of their own, and the moderator had to refocus them to the issue of their own accessibility. Some teachers mention that they sometimes eat healthy foods but not always. Some participants were eager to show their lunch packed with fruits as evidence to their ability to afford and access these foods.

The barriers mentioned were lack of equipment for exercise or the exercise venues were too far away. Some teachers mentioned that they show the learners how to exercise during life skills or Life Orientation lessons, but they themselves do not exercise.

"The fruits and vegetable are available, but are not accessible because they are expensive."

"Yes we can get these foods easily because we are working can buy them, but some people cannot because it's expensive."

"If you can see on my table, have fruits and juice. It's difficult, some others cannot buy them, and they struggle to get them."

"I can get money today to eat but once the fruits are finished, I can't buy again."

d) Relating to weight

When participants were asked about how they feel about their weight, almost everyone mentioned that their weight was fine and they felt good. Some mentioned that they lost weight when they reduced the amount of food they ate. Many participants mentioned that they have never tried to lose weight at all. Participants associated weight with diseases like sugar diabetes and high blood pressure. Heredity was also mentioned was as the main cause of weight gain among the participants. However, an interesting observation was noted in one of the groups when they did not mention that excess weight causes diseases. Instead, they said that chronic diseases cause weight gain or loss depending on one's response to medications. Misunderstandings occurred largely on this topic.

"Myself I am 107kg, I used to be 120kg, now I am okay and I feel good."
"Weight is related to disease sugar, high blood and heredity."

"We don't know who is sick or not, but sugar and high blood, diabetes are a problem to teachers."

"Some chronic diseases can cause weight gain or weight loss."

e) Relating to exercise

Exercise was not well understood among the participants. It appeared that the general concept of exercise was that it was considered activity that takes place at gyms. However, after some clarification, one participant mentioned that they do sometimes take a walk and do aerobics.

"I exercise sometimes, using aerobics using the TV, otherwise anywhere else I don't."

"Others we take a walk."

"Most of us don't exercise at all. Actually we just show the learners how to exercise in life skills or LO (Life Orientation) but we don't actually exercise. We just don't."

"We do not have the enough equipment, they are too far, you can't do that at home it's too difficult. We cannot go Tzaneen (nearest town) or Kgapane (nearest township)."

f) Relating to learners

The participants mentioned that they cannot drink alcohol or smoke in front of the children. They mentioned that some children will imitate the teachers in what they eat, or do as they see them as role models. It was also mentioned that when the school food and nutrition feeding programme started, the learners were not eager to eat the food until some of the teachers ate the food.

4.9 Mixed methods results

After merging the results, several themes in the qualitative study were aligned with quantitative data from the survey (Table 4.22). Conversely, some quantitative results were not coherent with qualitative themes indicating a misunderstanding of the factors associated with obesity and NR-NCDs implicating divergence in the combined results.

4.9.1 Specific mixed methods themes that emerged from the combined results

Unhealthy foods

Several different types of unhealthy foods were mentioned in focus groups. These included eating high sugary foods like cakes, sweets, fatty foods which also included frying food in oil, red meat, fizzy drinks, chips, acidic foods. Alcohol and smoking were mentioned periodically. In the quantitative results, questions regarding unhealthy foods were also answered correctly. For example, the majority of the participants (89.5%) disagreed with the statement "You can eat as much meat as you want every day". In another instance, the majority of participants (82.4%) agreed to the following statement, "Eating high energy foods, fatty foods or sugary foods is a risk factor of obesity".

Combining this data suggests that despite their poor dietary knowledge, the majority do have a good understanding of the most risky dietary factors for obesity and NR-NCDs.

Healthy Foods

In the qualitative study, fruits and vegetables were mentioned frequently as the healthiest food and that they should be eaten more frequently. However, in the quantitative result, very few participants ate adequate amounts of fruits and vegetables. For example, a few participants (26.3%), chose fruits and vegetables in response to the question "From which group of foods should you eat the most every

day?" In addition, the majority of the participants (76.3%) chose that only 1 fruit or vegetable (low quantities) should be consumed per day. All these responses imply that participants did not have a clear understanding on the adequate consumption of fruits and vegetables.

Drinking sufficient water was also mentioned several times in the qualitative study but in the quantitative study, most participants chose not to drink sufficient water per day. All this implies either a confusion in the consumption of fruits, vegetables and water or a discord between practice and knowledge due to affordability issues – as they pointed out in focus group discussions.

Barriers to healthy living

The qualitative study expressed sentiments that it was difficult to eat healthy food (such as fruits and vegetables) on a daily basis because they were expensive. This was reflected in low consumption of these commodities in the quantitative results. For instance, participants recorded a low consumption of fruits per day (77.2% of the participants consumed 1-2 fruits a day) and vegetables per week (60.5% consume vegetables 1-2 times a week). In addition, a greater proportion of participants (47.4%) indicated that they consume 2 portions of fruit and 1 portion or vegetables per week (43%). These results combined show a convergence of results on barriers to eating healthy food. Another barrier to healthy living was related to exercise. Many participants in the FGDs mentioned that a lack of exercise resources or infrastructure was a hindrance to exercise. This was confirmed by the quantitative study which showed that the majority of participants (83.3%) had low levels of physical activity.

Eating too much

One strong theme that was present in both focus groups was that of the consumption of large quantities of food being a major cause of obesity. Many participants expressed the opinion that eating too much food, regardless whether it is healthy food or not, was a risk factor for weight gain. In the quantitative study, most participants (89.5%) disagreed to the statement "You can eat as much meat as you

want every day", while most (82.4%) agreed to "Eating less or smaller portions of food reduces the risk of overweight and obesity". This implies that they had a better understanding on the right quantities of food. This was supportive of the findings in the qualitative results.

Perception of weight

When asked about how they perceive their body weight, the most common answer (75.4%) was, "my weight is normal". This was in line with the FGDs perceptions where participants felt that their weight was normal. However, these results conflicted with the nutritional status results from the quantitative results. Even though they perceived their body weight to be normal, most of the participants were obese (49.1%) and overweight (36.0%). Only, 14.9% were a normal weight. Viewing these findings together showed that there was no clear understanding of normal body weight. In addition, it was mentioned in one of the FGDs that weight gain is hereditary and can cause DM and high blood pressure. While in the other FGD, the participants felt that chronic diseases were responsible for weight gain or loss. These results are complex and need further exploration.

In relation to physical activity

There was a convergence of the qualitative and quantitative results with regard to exercise. Low physical activity was prevalent in the participants (83.3%), while the most of the participants in the FGDs confirmed that they rarely exercise

In relation to learners

The wellbeing of learners and their eating habits was frequently mentioned in the FGDs. Participants also expressed concern that learners might imitate the eating habits of teachers. These findings are of concern because a majority of the participants bring food from home, and also buy food from the tuck shop and take-away. These new themes need to be explored further.

Table 4.22: Mixed method interpretation and implications using comparison of qualitative themes and quantitative results.

Theme	Quantitative findings	Qualitative findings	Mixed method interpretation
Unhealthy diet	How the following questions were answered in the survey? "You can eat as much meat as you want every day" Majority disagreed "Eating high energy foods, fatty foods or sugary foods is a risk factor of obesity identified foods that increase risk" Majority agreed	Most frequently mentioned High sugary food, fatty food, Too much porridge Fruits and vegetables Drinking of water	A better understanding of dietary risk factors of obesity and NR-NCDs.
Healthy diet	"From which group of foods should you eat the most every day?" Majority chose wrong. Fruits and vegetables had a low response "How many fruits and vegetables should be eaten?" Majority chose wrong, they chose 1 fruit/vegetable per day "How much water should you drink a day? Majority chose wrong (less amount of water) amount of water	Most frequently mentioned were, more fruits and vegetables Drinking a lot of water.	Although fruits and vegetables were mentioned and identified in both qualitative and quantitative study. The quantitative study had low response. Diverging results involving fruits and vegetable consumption. There is need to explore this further Water consumption results were converging.
Barriers to healthy living	Participants had lowest consumption of fruit per day, and vegetable consumption per week. Participants had low physical activity score	Participants mostly mentioned that the fruits and vegetables are expensive, so sometimes you can buy or not. Participants mentioned that lack of resources to exercise	Findings in both data sets show that financial implications to healthy food and lack of resources for healthy lifestyle.

Table 4.22 continued

Eating too much	"You can eat as much meat as you want every day" most Participants disagreed "Eating less or smaller portions of food reduces the risk of overweight and obesity." Most participants agreed to this.	Participants mentioned that eating too much food, regardless of it being healthy is not good.	Findings in both data sets converged. Consumption of high portion sizes is a risk factor of obesity and NR-NCDs
Healthy weight	Majority of the participants were Obese, Normal weight had a lower percentage. A greater percentage perceived their weight as normal.	The majority of the participants felt that their weight was ok and normal. Wait gain is hereditary and can cause diabetes, high blood Others said chronic diseases result in weight gain or loss	The findings in qualitative data were divergent with the quantitative in this regard. The participants' perceptions were inline but not with their actual nutritional status.
Physical activity	The majority of the participants had low physical activity	The majority participants mentioned that they do not exercise.	The findings converge
In relation to learners	The majority of the participants bring food from home, and also buy food from the tuck shop and take-aways.	Learners eating habits and wellbeing was mentioned frequently. It was also mentioned that some learners can imitate the teachers on what they eat and their lifestyle.	The findings show that there is need to explore this further

4.10 Conclusion

In this chapter, tables and graphs were used to present and describe the results of the study. Descriptive statistics were presented. Associations of practices with

knowledge, attitude and perceptions of the participants were analysed. The data analysis was done for both quantitative and qualitative data. The results were merged in the mixed method analysis. The following section, Chapter 5 provides an overview of the results as well as the limitations of the study

CHAPTER 5

DISCUSSION AND LIMITATIONS

5.1 Introduction

This chapter will present the discussion of the study findings. The main objective of this study was to determine the knowledge, attitudes, practices and perceptions and related factors of primary and secondary school teachers in Limpopo Province regarding NR-NCDs using mixed methods research methodology. Therefore, the qualitative and quantitative findings were discussed jointly. The results were interpreted and discussed in five parts (5.2 to 5.6) according to the respective objectives. The study objectives were:

- To determine the anthropometric status (height, weight, BMI and waist circumference) of teachers;
- To assess the teachers' dietary patterns and physical activity;
- To assess the knowledge attitude and perceptions of teachers on factors associated with obesity and NR-NCDs;
- To assess the association between the teachers' anthropometric measurements, dietary intake and physical activity with their knowledge, attitude and their perceptions regarding obesity and NR-NCDs; and
- To explore the teachers understanding on the factors associated with obesity and NR- NCDs and the challenges they face regarding healthy lifestyle.

5.2 Nutritional status of the participants and history of NCD diagnosis

5.2.1 Nutritional status

Globally, the prevalence of overweight and obesity in 2013 was 39% and 13% respectively. In this study, 85.1% of the participants were either obese or overweight, with obesity having the highest prevalence (49.1%) followed by overweight (36%) and then normal BMI (14.9%). Of great concern is that the prevalence of obesity in this study was almost four times higher than to the global prevalence. This could be because of the nutrition transition that South Africa is

currently experiencing, mainly due to economic development, urbanisation and modernisation (Vorster, Kruger & Margetts, 2011).

Laurence *et al.* (2016), reported almost the same results (84.7% obesity and overweight combined, 53.6% obesity, 31.1% overweight and 15% normal weight), for teachers in the Western Cape province. In addition, this high prevalence of overweight and obesity in teachers concurs with other studies undertaken in South Africa, with obesity being on the increase (Dalais *et al.*, 2014; Senekal *et al.*, 2015).

The results also show that women (51.25%) were more likely to be obese compared to men (44.1%). These findings are in line with other South African studies on teachers (Dalais *et al.*, 2014; Senekal *et al.*, 2015) and in the adult South African population in general (Ng *et al.*, 2014; Shisana *et al.*, 2014; Sartorius *et al.*, 2015), as well as the in sub-Saharan Africa (Ng *et al.*, 2014). However, in comparison with the SADHS, the levels of obesity and overweight are higher in the current study (South Africa Demographic and Health Survey, 2017). Men in this study were 3 times more obese than the national prevalence. Globally, the high prevalence of overweight and obesity is of great concern. This is due to the increased risk of developing NR-NCDs (Xu *et al.*, 2010; Nojilana *et al.*, 2016), which are a major cause of morbidity and mortality in South Africa and worldwide (WHO, 2014).

5.2.2 History of diagnosis of NCDs

Some SA studies (Laurence *et al.*, 2016), have reported high prevalence of NCDs among teachers, with high blood pressure having the highest prevalence, followed by DM. The same pattern was reflected in this study. This high prevalence could be because most of the participants (67.6% men and 82.5% women) had WC > 94cm for men and > 88cm for women. Waist circumferences above these cut off points have been associated with increased risk of developing of obesity-associated metabolic diseases (WHO, 2000; Erasmus, 2013). In addition, most of the participants (80.7%) were aged between 40-60.

The self-reported prevalence of NR-NCDs was higher in participants whose family members (participant's father or mother) had been diagnosed with NR-NDCs. For instance, about 90% of the participants reported that either their mother or father

was diagnosed with high blood pressure, while stroke was about four times higher in the family than in the participants. These higher percentages compared to the participants could be due to age being a risk factor of NCDs (Barzilai *et al.*, 2012; Niccoli and Partridge, 2012; Peer *et al.*, 2012; Senekal *et al.*, 2015). This also suggests a significant future possible burden of disease for the teachers themselves as they advance in age.

5.3 Dietary intake practices and physical activity levels of the participants

5.3.1 Physical activity levels of the participants

The results of this study show that a greater proportion of the teachers rarely or never do vigorous exercise (62.3%), moderate exercise (64.9%) or walk (38.6%). These results of high levels of physical inactivity in teachers are consistent with findings of Brito *et al.* (2012) and Dalais *et al.* (2014). This could be due to lack of resources and facilities for exercise as mentioned in the FGDs. However, it has been well established that physical inactivity is a risk factor of NR-NCDs and that high levels of PA can reduce the risk of CVD (Sesso *et al.*, 2000), cancers, and DM (Kyu *et al.*, 2016).

5.3.2 Dietary intake practices

Previous studies have shown unhealthy dietary habits in teachers. This has been corroborated in this study. The majority of the participants in this study had poor dietary practices. For instance, a number of participants in this study consumed fruit 1-2 times a day (77.2%) but only 2.6% consumed sufficient vegetables per week. This constitutes to a low consumption of fruit and vegetables per day according to the Food-Based Dietary Guidelines for South Africa which recommends 5 servings per day (Vorster, Badham & Venter, 2013).

FGDs also mentioned fruits and vegetables as healthy foods that should be consumed regularly. These study results show a consumption of fruits and vegetables to be lower than international recommendations, in line with the findings of Hoy *et al.* (2013). The findings of this study agree with the SANHANES 1 study

that reported inadequate consumption of fruits and vegetables the South African population, particularly in rural areas (Shisana *et al.*, 2014). Consumption of fruit and vegetables data by teachers is not well-documented. However, it has been proven that adequate consumption of fruits and vegetables reduces the risk of CVD, DM and obesity (Dauchet *et al*., 2005; Schneider *et al.*, 2007; Carter *et al.*, 2010).

In the FGDs the cost of fruit and vegetables emerged as a factor which may account for the low consumption. Participants stated that they cannot afford to eat fruit every day. This concurs with another South African study, which discovered that healthier food cost 69% more than food that is unhealthy (Temple and Steyn, 2011). Financial constraints could also be the reason for the high consumption of energy dense foods, as they are cheaper. The majority of participants (40%) consumed sugary foods like tea, soft drinks, cake and biscuits 5-6 times a week.

Whilst financial constraints were the main reason for low consumption of healthy foods in this research, other factors such as food preferences and the food environment could also have played a role. For instance, researchers have postulated that people generally favour fatty and sugary foods (Drewnowski & Almiron-Roig, 2010). In addition, obese individuals tend to prefer unhealthy food which is high in fat, salt and sugar (Allioua *et al.*, 2015). This could be the reason why the majority of participants ate unhealthy food and the prevalence of obesity in this sample was very high. Continued consumption of high energy food by obese individuals could further drive them to morbid obesity. There was also a predominant theme of "eating too much" on the FGDs which could explain the high levels of obesity in the population. This coincides with other researchers in South Africa who identified excessive consumption of food as one of the reasons for weight gain in teachers (Mvo, 1999; Faber & Kruger, 2005; Puoane *et al*., 2005b).

As previously mentioned, unhealthy food environments at schools could be contributing to unhealthy dietary behaviours. In the week prior to the study a number of participants had bought food from tuckshops and vendors (takeaways) in the vicinity of the school. (In the context of this study, the street takeaways tuckshop

are similar to street vendors). According to the FGDs, these food outlets predominantly offer unhealthy foods (such as chips, pap and stew with a high fat and salt content and sugary soft drinks (De Villiers & Faber, 2015). Fruits and vegetables are not generally sold by these food outlets. A number of researchers in South Africa have made the same findings For instance, Steyn *et al.* (2011), conducted a national cross sectional study and discovered that street foods and fast foods were commonly consumed by the South African population. In addition, sweets, crisps, sweetened beverages, fried chips and white bread were mostly bought from tuckshops by adolescents in Soweto (Feeley, 2012). Street vendors mostly sold snacks, such as crisps or soft drinks and some cooked foods (Steyn *et al.*, 2011).

This study shows that 62.3% of the participants brought lunch from home mainly consisting of pap and chicken without vegetables. Maize meal pap was one of the foods which were found to be mostly consumed in South Africa (Labadarios *et al.*, 2005). Similar results were discovered in teachers in Cape Town, where 63% brought lunch except that their lunch was regarded as healthy (Dalais *et al.*, 2014). Again, this study reveals that the majority of the teachers skipped meals, thus only 7% of the participants ate 3 meals per day and ate snacks between meals. Another study in South African teachers reported that 35% of teachers ate three meals and snacks every day which is five times more than the current results (Dalais *et al.*, 2014). This was confirmed in the FGD where the participants mentioned that they sometimes skip lunch and eat snacks such as *makwinya* or *vetkoek* (fatty buns), *sephatlo*, (bread with atchar, chips and polony) and cola drinks because the food is cheap and readily available in the tuck shops. The current study results reflect a typical South African diet which is shifting from a traditional diet to a westernised diet (Ronquest-Ross *et al.*, 2015; Steyn *et al.*, 2016) as previously mentioned.

An increase in salt intake has been linked to an increase in blood pressure, while the Food-Based Dietary Guidelines for South Africa (2013), suggests "use salt and foods high in salt sparingly" (Vorster, Badham & Venter, 2013). Contrary to prudent dietary recommendations, this study recorded a remarkably high salt consumption

by participants. For example, the majority of the participants added salt to their food (71.1%) and 48.2% ate processed foods high in salt.

Only a few participants (0.9%) indicated that they get their nutrition information from a pharmacy or clinics or hospitals. This implies that there is a gap between nutrition health professionals and the study participants which requires further investigation. Television was the main source of nutrition information for most of the participants (43%). This was confirmed in the FGDs, in which the participants said that they follow what is shown on television. This is of great concern because relying entirely on the media for nutritional support and information could be misleading as the information provided on television may be for advertising purposes. In fact most television food advertisements are for high-energy and low nutrient foods and include desserts, sweets (22%), fast foods (20%), starchy foods (16%), condiments (14%), and sweetened drinks (10%), while only 2% of all food-related advertisements are for fruit and vegetables (Claasen *et al.*, 2016).

5.4 Knowledge, attitude and perceptions of teachers

5.4.1 Knowledge

The Health Belief Model (HBM) postulates that there are different kinds of knowledge which are; knowledge about susceptibility and risk, disease severity, behaviour benefits and changing behaviour (Glanz *et al*., 2008). It further states that knowledge and attitudes are the primary motivators for behavioural change (Baranowski *et al.*, 2003). However, a positive association between knowledge and attitude does not always result in good practices. This is in agreement with current study findings, in which more than half of the participants had good overall knowledge score (54.9%) but that knowledge did not translate to good practices. The majority of the participants had poor practices. Knowledge was divided into two categories, dietary knowledge and T2DM and CVD knowledge.

5.4.1.1 Dietary knowledge

Dietary knowledge among the participants was very poor (72.9%). Poor understanding of NCD risk factors such as unhealthy was also found to be the case by Dalais *et al.* (2014), in Cape Town and by Okonta, Ikombele & Ogunbanjo

(2014), in Gauteng province. The lack of dietary knowledge of participants is of concern as unhealthy eating habits are known risk factors for NCDs. In addition, Surka *et al.* (2015), note that poor understanding of risk may pose challenges in risk assessments for CVD in certain population groups.

In this study, most of the participants (54.4%) believe that weight gain was mostly caused by heredity as well as excess consumption of unhealthy food. This was a common understanding in another study on Black women in another South African Province, KwaZulu Natal by Faber and Kruger (2005). Most were of the opinion that obesity was caused by biological disorders, while a smaller proportion believed that obesity was caused by poor eating habits and excessive eating. To a certain extent, the FGDs agreed with these results. Heredity emerged as one of the causes of weight gain, while excessive eating was regarded as the predominant cause, which conflicts with the quantitative results.

The results show that the majority of the participants were not aware of the recommended daily intake of vegetables. Most participants believed that one fruit and/or vegetable should be eaten per day. This is far much lower than internationally or nationally recommended intake which is at least 5 portions per day (Vorster *et al*., 2013). This misconception of consumption of fruits and vegetables could have led to the low consumption of these foods as has been reported in this study. A knowledge gap on consumption of right amount of vegetables was also discovered among teachers (Sharma *et al.*, 2013; Dalais *et al.*, 2014).

Knowledge on water consumption was also poor, almost a quarter of the participants (19.3%) were aware of the recommended amount of water to be consumed daily which is 6 to 8 glasses (Vorster *et al.*, 2013). This concurred with the results of the FGDs which showed that generally the teachers rarely drink water.

5.4.1.2 T2DM and CVD knowledge

The majority of participants in the current study were knowledgeable about the signs and dangers of T2DM. This knowledge could be attributed to the fact that some

participants reported that they had a history of diagnosed diabetes and also had a family history of T2DM. This might have increased their knowledge of these diseases. The results of this study concurs those of a study by Surka *et al.* (2015), who discovered that respondents were more knowledgeable about CVD in general than the specific risk factors or causes of hypertension (Sengwana & Puoane, 2004).

5.4.2 Attitude

Previous studies have shown that teachers had a positive attitude towards healthy lifestyle modifications for NR-NCDs like T2DM (Okonta, Ikombele & Ogunbanjo, 2014). Similarly, the majority of the teachers (57%) in this study portrayed a positive attitude towards healthy diet, T2DM and CVD risk factors. The results coincide with the studies of Amarasekara *et al.* (2016). However, these positive attitudes did not translate to good practices as previously mentioned.

5.4.3 Perception

Some researchers suggest that amongst sample populations one of the primary obstacles to cardiovascular health is not being able to predict one's cardiovascular risk factors (Haidinger *et al.*, 2012). If individuals perceive that they are at risk, they are likely to engage in lifestyle and behaviour that is preventive (Schroetter & Peck, 2008). In this study, most of the participants were concerned about developing DM and/or CVD. This could be because most participants had been diagnosed or had a family history of these conditions. Similarly, women who had a history of T2DM and high cholesterol perceived themselves at high risk, while those who did not perceived themselves as healthy (Andsoy *et al.*, 2015). However, this was in contrast with the participants' perception of their body weight. The majority of the participants perceived their body weight as normal, even though those who were overweight or obese.

5.5 Associations between variables

5.5.1 Association of nutritional status with dietary intake, physical activity, knowledge, attitude and perceptions

5.5.1.1 Association of nutritional status and dietary intake

There was no association between BMI and dietary intake practices. This could be because of unhealthy dietary practices such as low fruit and vegetable consumption and high consumption of high energy dense foods which are low in nutrient content. In another study a low frequency of fruit and vegetable intake was associated with overweight and or obesity (BMI ≥25kg/m2) (Hausman *et al.*, 2011). In this present study, teachers with a BMI ≥ 25kg/m2 presented with unhealthy dietary practices and were likely to have the lowest intake of vegetables and fruits. These results are consistent with previous findings where the prevalence of obesity was associated with low consumption of fruit and or vegetables (Hausman *et al.*, 2011), while fatty, sweet or energy-dense foods were positively associated with BMI or obesity (Togo *et al.*, 2001). The higher BMI could also be as a result of consumption of larger portion sizes of food as indicated in the FGDs. Similar results have been reported in other South African studies (Puoane *et al.*, 2005b).

5.5.1.2 Association of nutritional status and physical activity

BMI level and physical activity were not associated in this study. On the contrary, other cross sectional studies have found an inverse relationship between PA and BMI (Ball, Crawford, Ireland & Hodge, 2003). In this study, the majority of teachers who were physically inactive were likely to be overweight or obese. This could be because of their larger body weight which discourages them from engaging in moderate or vigorous physical activities. As previously mentioned, the dynamics of the decision to engage in physical activity and actual engagement in physical activity is a complex behaviour that can be influenced by a number of factors such as social support from family, friends or colleagues and facilities available (Baranowski *et al.*, 2003). Although this research found no association between BMI and PA, some studies have discovered interesting associations which have proven otherwise. For instance, stronger association between PA and BMI was found in obese individuals (Hemmingsson & Ekelund 2007), while a weak association was

found in non-obese individuals. This could be because of inconsistent PA or embarking on an unsustainable physical regimen. Some researchers state that if PA is not sustained, weight can be easily gained or regained even by those individuals who were previously a healthy weight (Schoeller, Shay & Kushner, 1997; Tate, Jeffery, Sherwood & Wing, 2007).

5.5.1.3 Association of nutritional status and knowledge

A significant inverse association was found between BMI and dietary knowledge score ($p<0.05$). This implies that those teachers with a low BMI had more dietary knowledge compared to those with a high BMI. This contrasts with other findings which discovered that nutrition knowledge was not associated with BMI (O'Brien & Davies, 2006; Rose, Pretto, Paul, Emmett, Hensley & Henskens, 2016). However, researchers agree that while nutrition knowledge is important for weight control interventions (Rose *et al.*, 2016), it is not a sufficient factor for dietary behaviour change (O'Brien & Davies, 2006). However, a very weak positive and not significant correlation was found between BMI and knowledge of T2DM and CVD scores indicative of no associations.

5.5.1.4 Association of nutritional status with attitude and perceptions

The total attitude score and BMI showed a positive but not significant correlation in this study. Similar results were found in community health workers in South Africa which emphasises the prevalence of obesity among urban Black women (Puoane *et al.*, 2005). Researchers found that socio-cultural, behavioural and environmental factors also seem to influence the development of obesity in South Africa (Puoane *et al.*, 2005). For instance, dignity, respect, confidence, beauty and wealth have been associated with being overweight (BMI 27 kg/m2). There is a significant positive association of BMI and perception of body weight and the perceived danger of NCDs.

5.5.2 Association of practices with knowledge, attitude and perceptions

5.5.2.1 Association of dietary intake practices with knowledge

This study also revealed a positive but insignificant correlation between dietary knowledge level and dietary intake practices. Teachers with good dietary knowledge do not necessarily have good dietary intake practices. This concurs with the findings

of Okonta, Ikombele and Ogunbanjo (2014), who found a very weak and insignificant positive correlation between the nutrition knowledge level and the dietary practice level of participants in their study regarding T2DM.

Sharma *et al*. (2013), report that nutritional knowledge is significantly related to dietary practices such as consumption of green, red and yellow vegetables, fruits and the avoidance of fried foods. This study found a positive significant association between dietary knowledge with increased vegetable consumption, and increased consumption of sugary foods. Dietary knowledge was also significantly associated with healthy cooking practices of chicken.

5.5.2.2 Association of dietary intake practices, physical activity levels with attitude

Baranowski e*t al.* (2003), state that knowledge and attitude are the prerequisites of behavioural change. This indicates that positive attitudes can result in positive behaviour changes. This was not the case in this study. No correlations were seen between participants' attitudes to their physical activity levels and their dietary intake practices. This indicates that having a positive attitude did not necessarily result in good dietary practices or a change good practices that could reduce the risk of obesity and NR-NCDs. The participants had unhealthy dietary intake practices and low PA levels.

Some researchers are of the opinion that positive attitude can reinforce change in behaviour if the knowledge is practical. In this study it might be the case that the participants' knowledge was insufficient to reinforce good practices. In this study the majority of the participants were more knowledgeable on the dangers, signs and treatment of NR-NCD, but had poor knowledge in dietary practices that could change dietary behaviour. As mentioned in the literature, the decision to eat and/or engage in physical activity regardless of knowledge is quite complex and is influenced by a number of factors such as prices, environment, family and convenience (Baranowski *et al*., 2003).

5.6 Teachers understanding of the factors and challenges associated with obesity and NR- NCDs

The Health Belief Model (HBM) (Green & Murphy, 2014), will be used to discuss the participants' understanding of the factors and challenges associated with obesity and NR-NCDs.

Cues to action

According to the HBM cues to action, factors such as family members suffering from obesity or its related consequences such as DM, CVD or cancer, could motivate an individual to improve health behaviours (Green & Murphy, 2014). This was not the case in this study. The majority of participants reported a family history of hypertension, stroke, and DM. This could have been the reason why concern was expressed about developing DM or CVD (perceived susceptibility) but participants nevertheless still exhibited unhealthy dietary practices and low physical activity. The participants perceived their body weight as normal even though they were overweight or obese. Cultural beliefs and attitudes might have contributed to this perception of body size (Puoane *et al*., 2005).

Self-efficacy (a person's belief or confidence in one's ability to take action).

Even though participants were knowledgeable (perceived severity) about the signs and dangers of DM, they still exhibited low self-efficacy. This could be because of the dietary knowledge gap which prevented positive behavioural change. Literature avers that knowledge and attitudes are the primary motivators for change in the HBM. This was not the case in this study. The majority had average knowledge scores and positive attitudes towards healthy lifestyle but did not exhibit healthy dietary practices. This could be because the perceived barriers to eating a healthy diet and PA were predominant in this study. In developed countries, perceived barriers towards healthy eating are related to time, irregular working hours, and taste preferences (Seguin, Connor, Nelson, La Croix & Eldridge, 2014), and cooking skills (Hughes, Bennett & Hetherington, 2004). In contrast, perceived cost of fruits and vegetables in LMIC are the main hindrances to consumption of these foods. This was also the case in the current study. In addition, the food environment that is predominantly composed of high energy and low nutrient foods also presents

another barrier to healthy eating. A lack of forward planning i.e. to pack a lunchbox, may further support poor dietary practices as food is then purchased from vendors where healthy options are not available.

Lack of resources or facilities that can encourage physical activity is another barrier in this study. This is in line with Micklesfield *et al*. (2013), who highlight that in addition to the built environment, socioeconomic status influences PA in the South African context. Similarly, researchers in high income United States of America alluded that lower-SES results in reduced access to PA facilities which, in turn, was associated with decreased PA and increased overweight and obesity (Gordon-Larsen, Nelson, Page & Popkin, 2006).

5.7 Strengths and limitations

The researcher simultaneously collected two types of data which provided a better understanding of the complexities of the KAP and perceptions of teachers regarding obesity and NR-NCDs. This was one of the strengths of this study. This mixed method research approach provided a holistic view as well as a deeper understanding of the research problem, yielding a comprehensive picture. In addition, employing the HBM provided a theoretical framework for the interpretation of findings from the current study. Besides contributing to the growing literature on obesity and NR-NCDs, this study could also be expanded upon as a foundation for future studies and interventions in school environments.

Despite the strengths mentioned in this study, a number of limitations existed. For instance, the study population was limited to the rural public schools in one circuit. Therefore, it was not representative of teachers in private schools as well or those teaching in urban areas. A language barrier was another limitation in this study. The majority of the participants were Black Africans whose home language was Sepedi. The researcher used English for the questionnaires as English is the medium of instruction in the school curriculum. However, in an effort to compensate for the language barrier, participants had the option of responding in Sepedi during the

FGDs. The researcher did not use random sampling when selecting the participants for the FGDs. Instead, only participants who volunteered participated in the FGDs. Consequently, volunteer bias was another limitation to this study. Volunteers in a study tend to participate because they are more knowledgeable or have interest in the subject being researched. As a result, participants' responses are likely to be subjective. In addition, volunteers are not representative of the general population.

The length of the questionnaire was a major challenge in this study. The questionnaire was perceived by participants as taking a long time to complete. To overcome this limitation, the researcher allowed participants to complete the questionnaire in their own time. As a result, what was originally intended to be a researcher-administered questionnaire became a self-administered questionnaire. Besides having low response rate, and the drawback of a lack of direct observation by the researcher, self- administered questionnaires should be composed of simple questions which participants can easily understand and interpret. This restraint led to poor completion of the quantified food (QFFQ) resulting in the researcher removing the QFFQ from the analysis and leaving only the dietary questions in order to determine the dietary practices of the study participants.

5.8 Conclusion

This chapter discussed the findings of the study in line with the study objectives as well as the strength and limitations. The next chapter provides conclusions and recommendations

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The aim of this chapter is to summarise the findings of the study providing a conclusion that meets the objectives of the study. This parallel convergent mixed methods study intended to explore the knowledge, attitudes, practices and perceptions and related factors of primary and secondary school teachers in Limpopo Province regarding NR-NCDs. The qualitative component provided a numeric description of participants, while the FGDs gave and candid insight into the risk factors and challenges. The study had 5 specific objectives and the conclusions related to each of them will be presented separately in section 6.2. Thereafter, recommendations and future research will be discussed in sections 6.3 and 6.4 respectively.

6.2 Conclusion

6.2.1 Nutritional status

The first objective of the study was to determine the anthropometric status (height, weight, BMI and waist circumference) of teachers. The majority of the teachers in the study were overweight and obese with one in two teachers being likely to be obese. Women were more likely to be obese (1 in 2) than men. Men were more likely to be overweight than women. A larger proportion of both men and women had a WC above the cut-off points thus indicating high risk for morbidity. High prevalence of CVD (high blood pressure, stroke, heart attack) and diabetes were reported in teachers and their parents. These study findings reconfirm the extent of the burden of overweight, obesity and NR-NCDs risk factors in rural LMIC countries and among teachers in particular.

6.2.2 Teachers dietary patterns and physical activity levels.

The second objective was to determine the teachers' dietary intake patterns and their physical activity levels. The high levels of physical inactivity and unhealthy dietary

practices reported in this study are of concern. The teachers consume fatty foods, salty and sugary energy foods but less vegetables even though they displayed a positive attitude towards a healthy diet. In addition, they frequently buy food from tuckshops, street vendors in the vicinity of the schools. This corresponds with other research findings that teachers in rural areas encounter challenges such as lack of access to facilities for PA, and that their school food environments are highly obesogenic. This could explain their risky dietary practices and low PA levels.

6.2.3 Knowledge, attitude and perceptions of teachers

The third objective of this study assessed the knowledge attitude and perceptions of teachers on factors associated with obesity and NR-NCDs. The quantitative results produced an optimal score on the knowledge regarding their obesity and NR-NCDs. The teachers were well-informed on the signs and dangers of obesity but there were huge misconceptions related to nutrition knowledge. For instance, there was a knowledge on the daily recommended amounts of water, fruits and vegetables. These dietary misconceptions could be because television is the main source of nutrition information for the majority of the participants rather than the participants seeking information from health professionals. However, the quantitative results and FGDs conflicted on the causes of weight gain. Excess food consumption was the main factor that emerged in the FGDs while heredity was selected as the main cause in the quantitative results. This divergence of results calls for further research in this regard.

The teachers had a positive attitude towards good practices regarding nutrition, diabetes and CVD risk factors but this did not result in wise dietary practices. Participants were aware of the risk to themselves of developing diabetes and or CVD but perceived their body weight as normal even though they were overweight or obese.

6.2.4 Association between variables

The fourth objective of this study was to assess the association between the teachers' anthropometric measurements, dietary intake and their physical activity with their knowledge, attitude and their perceptions regarding obesity and NR-NCDs. In general, the participants in this study had positive attitudes, but exhibited poor nutrition knowledge and practices related to obesity and NR-NCDs.

Teachers who were overweight or obese had unhealthy dietary practices and consumed the lowest intake of fruits and vegetables as well as a high intake of fatty, sugary foods and larger food portion sizes. These findings are consistent with previous other studies which found an association between energy-dense foods, low consumption of vegetables and a BMI ≥ 25.

In this study an inverse association was found between BMI and PA as the majority of the teachers who were overweight or obese were likely to be physically inactive.
A positive non-significant association between BMI and diabetes and CVD knowledge was found in this study. A significant inverse association was found between BMI and dietary knowledge, inferring that having more nutrition knowledge is associated with a lower BMI. Some previous studies have discovered otherwise, where nutrition knowledge alone had no association with the BMI. Based on findings from this study, knowledge could have an influence on the BMI of individuals. A positive but statistically insignificant association between attitude and BMI was discovered. Teachers with a positive attitude did not necessarily have a low BMI, but as BMI increases, more the teachers will perceive themselves as having normal weight.

A statistically significant inverse correlation was found between knowledge and attitude. This suggests that positive attitudes exhibited in these participants were not as a result of good knowledge. This was in contrast with other research findings. An insignificant positive association of knowledge and with dietary practices was discovered in this study. For example, nutrition knowledge was significantly associated with high consumption of both some healthy (vegetables) and unhealthy foods (sugary foods), while no association was found with vegetable portion size and fruit consumption.

Attitude level and dietary practices had a positive but insignificant association, while no association existed between nutrition attitude and nutrition knowledge in this

study. Even though the participants had positive attitudes, they had poor dietary practices and low PA.

6.2.5 Teachers' understanding of factors and barriers associated with healthy lifestyle, obesity and NR-NCDs.

The fifth objective of this study was to explore the teachers understanding of the factors associated with obesity and NR- NCDs and the challenges they face regarding healthy lifestyle. Misconceptions between heredity and eating too much food as the main cause causes of weight gain were apparent in this study. Further study could provide better understanding to this area. This majority of the participants had family history of NR-NCDs and/or were knowledgeable but the signs and dangers of diabetes and NR-NCDs but the knowledge was did not elicit changes in behaviour as cues to action according to the HBM. The low self-efficacy of the participants in this study could be attributed to perceived barriers to healthy eating and physical activity. According to this research, these were mainly lack of money and a food obesogenic environment which were regarded as the main causes of unhealthy dietary practices while lack of resources or facilities for PA was seen as the main barriers to PA.

6.3 Recommendations

The findings of this study can be used as the basis upon which multiple recommendations for obesity and NR-NCD programmes and/or interventions could be developed. The recommendations in this section are classified into practices and further research.

Practical nutrition education

The study findings reveal variations in dietary practices, physical activity, nutrition knowledge, attitudes and perceptions and self-efficacy among the teachers. This suggests a need for health education among the participants to correct misconceptions and misinformation. Past research has shown that nutrition education geared towards overweight/obese individuals must be practical and should aim at behavioural changes (Acheampong & Haldeman, 2013). The gap in practical nutrition knowledge in this study can be addressed by trained nutrition professionals

such as dieticians or nutritionists who can target teachers and provide them with practical knowledge. This nutrition education should emphasise the consumption of the correct quantity of food and portion sizes, vegetable and fruit consumption and appropriate physical activity. In addition, the South African Food Based Dietary Guidelines should be used as a common resource for nutrition to provide education and knowledge in terms of the recommended consumption of different kind of foods and types exercise in the South African context.

This can be done by conducting workshops with teachers, amongst whom have a great there is high prevalence of obesity, T2DM and CVD. Such an intervention will provide secondary benefits as the teachers' improved awareness can positively influence the dietary behaviour of learners. As shown in this study, the significant impact and influence of television as a source of nutrition information, warrants an increased presence of nutrition expects on television as well as on social media platforms. In the primary health care sector, nursing sisters can also play a vital role in to identify and refer any individuals who need nutritional advice.

Enabling environment

In terms of nutrition, an enabling environment could be regarded as an environment which is socially, economically and politically favourable. This would require multi-sectoral collaboration between departments and organisations. For instance, to have enabling environments nutrition sensitive programmes can be implemented within the agriculture and manufacturing sectors. This could assist in the improvement of the nutritional content of the food available on the market. Nutrition sensitive policies can also be enforced in food industries so as to regulate the manufacturing and marketing of unhealthy foods.

6.4 Future research

Overweight, obesity, T2DM as well as CVD can be prevented and managed effectively if individuals are willing to make healthy lifestyle changes. Current research indicates a proliferation of these diseases and an associated number of

barriers that impede healthy food choices and PA. Further research on the barriers to choice of and access to healthy foods and physical activity is essential. For instance, more insight can be sought on the feasibility of nutrition gardens at home, at school or community as way of increasing consumption of vegetables.

The findings of this study call for a holistic approach, in which lifestyle intervention programmes should be implemented to prevent overweight and obesity in individuals particularly at schools as this will educate and provide long-term benefits for children. More insight is needed on intervention programmes that can modify the school food environment, the perceptions of body weight and increasing physical activity at schools, with particular emphasis on the active involvement of teachers.
This study reveals the necessity for physical activity opportunities in rural areas and the utilisation of currently available or accessible opportunities for physical activity. Additional research can be conducted on the possibility of adaptation of urban PA interventions to suit the needs of rural communities (Alexander, Grant, Pedrino & Lyons , 2014).

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APPENDICES

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Ethics Reference Number: BM17/9/3

Project Title: Exploring the knowledge, attitudes. Perceptions and practices of teachers around obesity and nutrition related non-communicable diseases.

Approval Period: 16 November 2017 – 16 November 2018

I hereby certify that the Biomedical Science Research Ethics Committee of the University of the Western Cape approved the scientific methodology and ethics of the above mentioned research project.

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

Please remember to submit a progress report in good time for annual renewal.

The Committee must be informed of any serious adverse event and/or termination of the study.

Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape

PROVISIONAL REC NUMBER -130416-050

Appendix 1: Ethics clearance

Appendix 2: Approval from Limpopo Department of Education

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

Ref: 2/2/2 Enq: MC Makola PhD Tel No: 015 290 9448 E-mail:MakolaMC@edu.limpopo.gov.za

Mbangani R
House No 112
Lossmycherry
Ga-Kgapane
0838

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH

1. The above bears reference.
2. The Department wishes to inform you that your request to conduct research has been approved. Topic of the research proposal: **"INVESTIGATE THE KNOWLEDGE, ATTITUDES, PERCEPTIONS AND PRACTICES OF TEACHERS IN PRIMARY AND SECONDARY SCHOOLS".**
3. The following conditions should be considered:

3.1 The research should not have any financial implications for Limpopo Department of Education.

3.2 Arrangements should be made with the Circuit Office and the schools concerned.

3.3 The conduct of research should not anyhow disrupt the academic programs at the schools.

3.4 The research should not be conducted during the time of Examinations especially the fourth term.

3.5 During the study, applicable research ethics should be adhered to; in particular the principle of voluntary participation (the people involved should be respected).

CONFIDENTIAL

Cnr. 113 Biccard & 24 Excelsior Street, POLOKWANE, 0700, Private Bag X9489, POLOKWANE, 0700
Tel: 015 290 7600, Fax: 015 297 6920/4220/4494

The heartland of southern Africa - development is about people!

3.6 Upon completion of research study, the researcher shall share the final product of the research with the Department.

4 Furthermore, you are expected to produce this letter at Schools/ Offices where you intend conducting your research as an evidence that you are permitted to conduct the research.

5 The department appreciates the contribution that you wish to make and wishes you success in your investigation.

Best wishes.

Ms NB Mutheiwana
Head of Department

18/10/17
Date

REQUEST FOR PERMISSION TO CONDUCT RESEARCH: MBANGANI R

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Appendix 3: Request for permission to conduct research in schools

UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-9592309 Fax: 27 21-9592309

E-mail:chs-deansoffice@uwc.ac.za

House No 112

Lossmycherry

GaKgapane

0838

South Africa

Contact: rosstigere@gmail.com

Phone: +27781919850

Date----------

Attention: The Director of Education Services

Limpopo Department of Education

Polokwane

0700

Dear Sir/Madam

REF: REQUEST FOR PERMISSION TO CONDUCT RESEARCH IN SCHOOLS

My name is Roselyn Mbangani, studying MSc in Nutrition with the University Of the Western Cape (UWC). I am hereby requesting for permission to conduct face to face interviews and focus group discussions with teachers in primary and secondary

schools. The purpose of this study is to investigate the knowledge, attitudes, perceptions and practices of teachers around obesity and nutrition related non-communicable diseases. The interviews will be conducted in teachers in all the public schools in Rakwadu Circuit.

All ethical clearance issues will be followed by the researcher. Participation will be voluntary. The researcher will obtain both verbal and written informed consent from the participants. The participants will also be asked to sign individual consent forms.

The participants will be ensured of confidentiality and be informed that they have the right to withdraw from the study at any time. All the questionnaires will be kept under lock and key.

I would be glad to share the research findings in the form of a final report with you upon completion of the study.

Ethical clearance will be provided by University of Western Cape. Should you have any queries please do not hesitate to contact my supervisor Professor EC Swart at 0219592309 email: rswart@uwc.ac.za

Yours faithfully

Mbangani Roselyn

University of the Western Cape

Appendix 4: Participant's questionnaire

UNIVERSITY OF THE WESTERN CAPE

KNOWLEDGE, ATTITUDES, PRACTICES AND PERCEPTIONS OF TEACHERS AROUND OBESITY AND NUTRITION RELATED NON-COMMUNICABLE DISEASES

(RAKWADU CIRCUIT - LIMPOPO PROVINCE)

2017

RESPONDENT'S QUESTIONNAIRE

Name of interviewer:……. **INTERVIEW DATE**	**D**	**D**	**M**	**M**	**Y**	**Y**

School CODE				**PARTICIPANT CODE**			

Thank you for taking the time to speak with me. I'm going ask you some questions in the general area of eating physical activity/exercise and health. I am going to be writing down all your responses on this questionnaire. With some of the questions I will read you several options and you can choose the most appropriate option. I am also going to measure your weight, height and waist circumference.

Do you have any questions for me before we begin?

SECTION 1 **Socio-demographic information**			
		Question	Answers
1.	Sex	What is your sex	Male ……..1 Female……2
2.	Age	How old are you *(ENTER AGE IN YEARS)*	…….. years

3.	Pop	How do you choose to describe your ethnicity *(MARK ONLY ONE ANSWER)*	Black……....1 White ……..…..2 Coloured……..3 Indian ……..4
4.	Mar	What is your marital status? *(MARK ONLY ONE ANSWER)*	Single……1 Married ……....2 Cohabiting ……...3 Widowed ……4
5.	Child	How many children do you have? *(MARK ONLY ONE ANSWER)*	None……1 One ……..2 Two ……..3 Three ……4 Four or more ……....5
6.	Residential zone	Where do you live? *(MARK ONLY ONE ANSWER)*	Town (Informal housing ….1 Town (formal housing)..…2 Rural(informal housing) ....3 Rural (formal housing) ….……4
7.	School level	Are you teaching primary or secondary level	Primary School……...1 Secondary School……..…2
8.	Experience	How many years of teaching experience do you have?	……..years
9.	Professional level	On which professional level are you?	CS1……..1 HOD……....2 Deputy Principal……..…3 Principal……..……4
10.	Subjects	Which subjects are you currently teaching?	…… …… …… …….. ……...

Now let us talk about your family and your health history

11. Has any health worker or doctor ever told you that you had or currently have any of the following? (*PLEASE ANSWER AS YES, NO AND UNSURE)*

	Yes	No	Unsure
High blood pressure	1	2	3
Heart attack	1	2	3
Stroke	1	2	3
High blood cholesterol	1	2	3
Diabetes /Sugar	1	2	3
Cancer	1	2	3

12. Does or did your mother or father have any of the following?
(PLEASE ANSWER AS YES, NO AND UNSURE)

		Yes	No	Unsure
	High blood pressure	1	2	3
	Heart attack	1	2	3
	Stroke	1	2	3
	High blood cholesterol	1	2	3
	Diabetes /Sugar	1	2	3
	Cancer	1	2	3

13. Were you overweight when you were in your primary school years?
(PLEASE ANSWER AS YES OR NO)

Yes1	No 2

14. Regarding your body weight, do you feel you are: *(READ ALL)? (TICK ONE OPTION ONLY*)

My weight is normal	I am underweight	I am overweight	I am obese
1	2	3	4

15. Have you tried to lose weight in the past year?

Yes1	No 2

16. How important is having a normal body weight to you?
(PLEASE RATE AS NOT IMPORTANT, MODERATELY IMPORTANT, IMPORTANT OR VERY IMPORTANT)

Not at all	Moderately important	Important	Very Important
1	2	3	4

Anthropometric Measurements
I am going to measure your weight, height and waist circumference and record them

17.

	Body weight (kg)	**Height/Length (cm)**	**Waist Circumference (cm)**
1			

2				
Average				

SECTION 2
Knowledge, attitude and perception
I am going to ask you some questions which requires your knowledge and understanding of obesity, diabetes and heart disease

18. Which one of the following do you think is the most important reason why people gain weight?
(MARK ONE OPTION ONLY)

It runs in the family	1
They eat too much	2
They eat too much unhealthy foods	3
How much exercise they do	4
Lack of knowledge	5

19. Eating starchy foods at most meals may:
(MARK ONE OPTION ONLY)

Be unhealthy	1
Cause weight gain	2
Cause diseases	3
Be important for a balanced diet	4

20. From which group of foods should you eat the most every day?
(MARK ONE OPTION ONLY)

Bread, samp, rice, porridge	1
Apples, bananas, spinach, carrots	2
Milk, yoghurt, cheese	3
Chicken, fish, beans, eggs	4

21. How many fruits and vegetables should be eaten?
(MARK ONE OPTION ONLY)

1 fruit and/or vegetable a day	1
3-4 fruits and/or vegetables a day	2
5 or more fruits and/or vegetables a day	3
There is no need to eat fruits and vegetables daily	4

22. How much water should you drink a day?
(MARK ONE OPTION ONLY)

You don't have to drink water every day	1
1 to 3 glasses	2
4 to 6 glasses	3
6 to 8 glasses	4

DIET

Please tell me if you strongly *DISAGREE, DISAGREE, AGREE OR AGREE STRONGLY with the following sentences:*

23. You should eat a lot of sugar to give you enough energy

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

24. If you are eating a healthy diet there is no need for you to be physically active

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

25. Starchy foods should not be eaten when one is trying to lose weight

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

26.	Your body only needs a little bit of salt to be healthy

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

27.	Drinking a lot of wine, beer, and cider can cause weight gain

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

28.	Salt should be added to all foods except fruits

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

29.	You can eat as much meat as you want every day

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

30.	Eating high energy foods, fatty foods or sugary foods is a risk factor of obesity

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

31.	Eating less or smaller portions of food reduces the risk of overweight and obesity

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

32.	Fast foods are convenient healthy foods good for teachers when they are at work.

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

DIABETES/CVD DISEASES

I would like to ask you some questions about health, focusing on a group of diseases called non-communicable diseases or NCDs.

33. A non-communicable disease is one that cannot be spread between people?
(PLEASE TELL ME IF THE FOLLOWING IS TRUE, FALSE OR YOU DON'T KNOW)

True	False	I don't know
1	2	3

34. Non-communicable diseases are a group of diseases that include heart disease, diabetes and cancers. These are diseases that you cannot catch, but that develop from a number of factors, usually over a long time.

(PLEASE TELL ME IF YOU STRONGLY DISAGREE, DISAGREE, AGREE OR AGREE STRONGLY WITH THE FOLLOWING SENTENCES)

35. Non communicable diseases are less dangerous than infectious diseases

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

36. Non communicable diseases are common among teachers

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

Are you concerned about developing the following diseases yourself?
(PLEASE ANSWER EITHER NO, YES MODERATELY OR YES VERY.)

37. Diabetes

		Not at all	Yes, moderately	Yes, Very
		1	2	3
38.	CVD or Stroke or heart disease			
		Not at all	Yes, moderately	Yes, Very
		1	2	3

DIABETES

Now I am going to ask you questions about diabetes

PLEASE TELL ME IF YOU STRONGLY DISAGREE, DISAGREE, AGREE OR AGREE STRONGLY WITH THE FOLLOWING SENTENCES ABOUT DIABETES

Do the following contribute to the development of diabetes?

39.	Drinking sugar sweetened cold drinks	Strongly disagree	Disagree	Agree	Strongly agree
		1	2	3	4
40.	Supernatural forces (spirits, higher powers, ancestors)	Strongly disagree	Disagree	Agree	Strongly agree
		1	2	3	4
41.	Being obese/overweight	Strongly disagree	Disagree	Agree	Strongly agree
		1	2	3	4
42.	Eating fatty foods				

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

43. Drinking too much alcohol

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

44. Which of the following signs of diabetes have you heard of?
(PLEASE ANSWER EITHER YES OR NO)

	Yes	No
Being very thirsty	1	2
Urinating all the time	1	2
Weight loss	1	2
Constant hunger	1	2
Slow healing wounds	1	2
Blurred vision	1	2
Repeated infections	1	2

45. Which of the following dangers of diabetes have you heard of?

	Yes	No
Poor vision or blindness	1	2
Lung problems	1	2
Kidney problems	1	2
Foot problems or gangrene	1	2
Heart disease	1	2
Stroke	1	2

46. What do you think is the BEST way to treat diabetes? *(MARK ONE OPTION ONLY)*

Medication only	1
Traditional medicine only	2
Proper diet only	3
Weight loss only	4

		Exercise only	5
		Proper diet and weight loss	6
		Proper diet and exercise	7
		Proper diet, weight loss and exercise	8
		Proper diet, weight loss, exercise and medication	8
		Do not really know	10
47.	How would you reduce your chances of getting diabetes? *(CHOOSE ONLY THE ONE THAT YOU THINK IS MOST IMPORTANT)*		
		Eating little or no sugar and sweets	1
		Prevent weight gain	2
		Follow a healthy diet, manage weight	3

CVD/Heart disease

Now I am going to ask you questions about CVD/heart disease

48.	Have you had your blood pressure measured in the past 12 months?	Yes 1	No 2
49.	Do you know the range of your blood pressure? Is it any of the following *(MARK ONE OPTION ONLY)*		
		High	1
		Normal	2
		Low	3
		Or don't you know	4

(PLEASE TELL ME IF YOU STRONGLY DISAGREE, DISAGREE, AGREE OR AGREE STRONGLY WITH THE FOLLOWING FACTORS)

Do you think the following are risk factors if CVD/heart disease

50. Smoking

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

51. High blood pressure

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

52.	Low physical activity

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

53.	Overweight or obesity

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

54.	Family history

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

55.	Unhealthy diet

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

SECTION 3
Practices

In this section I am going to be asking you about your eating habits, smoking, alcohol consumption and physical activity

Dietary Habits/Practices

I will ask you questions on your dietary habits

56.	Which pattern best describes your USUAL eating pattern?

3 meals per day (no eating between meals)	1
3 meals per day (with eating between meals)	2
1-2 meals per day (no eating between meals)	3
1-2 meals per day (with eating between meals)	4
Nibble the whole day, no specific meals	5

57.	On how many weekdays do you usually eat breakfast?

Never	1
1-2 days	2
3-4 days	3
Every weekday (5)	4

58.	How often do you usually eat breakfast on a weekend? Never 1 Saturdays only 2 Sundays only 3 Saturdays and Sundays 4
59.	How many times do you eat snacks in a day? Mark one only Never 1 Just once a day 2 Twice a day 3 3 or more times a day 4
60.	How do you usually cook chicken for your family? Fry it 1 Cook it in an oven 2 Boil it 3 Other 4 Don't know/no answer 5
61.	During working hours, where do you normally get your lunch/break from? From a fast food restaurant e.g. KFC 1 Tuckshop 2 I carry food from home 3 I don't eat lunch 4
62.	If you carry food to work, which types of food do you carry? Rice/Pap and Meat 1 Bread and juice/tea 2 Fruit 3 Juice 4
63.	How often do you eat vegetables in a typical week? Never 1 1-2 times 2 3-4 times 3

	5-6 times	4
	More than 6 times	5

64. How many portions of vegetables, excluding potatoes, do you eat on a typical day spinach, morowo, rape,wiki, kunde, cabbage, tomatoes, carrots etc (A portion of vegetables is approximately one handful or 3 heaped tablespoons of vegetables.)

1portion	1
2portions	2
3portions	3
4portions	4
5portions	5

65. On a typical week, how many times do you eat foods rich in fat e.g. samosa, Mangwinya, fried potatoes/chips, fried fish/chicken, etc

Never	1
1-2 times	2
3-4 times	3
5-6 times	4
More than 6 times	5

66. How many fruits, of any sort, do you eat on a typical day e.g. banana, mango, pear etc.?

Never	1
1-2 times	2
3-4 times	3
5-6 times	4
More than 6 times	5

67. How often do you drink or eat foods with high sugar content per week? For example tea with more than 2 teaspoons of sugar, soft drinks (soda), cake, biscuits etc

Never	1
1-2 times	2
3-4 times	3
5-6 times	4
More than 6 times	5

68.	What type of oil or fat is most often used for meal preparation in your household?

Vegetable oil/sunflower	1
Olive oil	2
Butter or ghee	3
Margarine	4
Other	5
None in particular	6
None used	7
Don't know	8

69.	On average, how many meals per week do you eat that were not prepared at a home? By meal, I mean breakfast, lunch and dinner.

Never	1
1-2 times	2
3-4 times	3
5-6 times	4
More than 6 times	5

70.	Do you usually add salt to your food when eating or before eating?

Yes 1	No 2

71.	How often do you eat processed food high in salt? By processed food high in salt, I mean foods that have been altered from their natural state, such as packaged salty snacks, canned salty food including pickles and preserves, salty food prepared at a fast food restaurant, cheese, bacon and processed meat.

Always	1
Often	2
Sometimes	3
Rarely	4
Never	5

In the past week, did you buy anything to eat from:
(PLEASE ANSWER AS YES OR NO)

72.	A Tuck-shop

Yes 1	No 2

73.	Vendors Yes 1 | No 2
74.	A Take-away Yes 1 | No 2
75.	Others (specify) Yes 1 | No 2
76.	What is your most important source of nutrition information? (*MARK ONE OPTION ONLY)* Family member(s) 1 Newspaper/Magazines 2 Radio Station 3 Television 4 Internet 5 Pharmacy or clinics or day hospital 6 Others (specify) 7 Not applicable, not interested in nutrition information 8

QUANTIFIED FOOD FREQUENCY QUESTIONNAIRE

Please go through the list of food items on the next two pages and mark those that you eat more often than once a month. If you do eat a food item (marked YES), fill in how many times per week OR how many times per month you usually eat it. Please note that you must fill in ONE of the columns, not both. If you eat an item every day, you fill in "7" in the times per week column.

77.

Food Item	**No**	**Yes**	Times per week OR	Times per month
Red meat				
Processed meats				
Tinned meat				
Chicken, with skin				
Fish, tinned or smoked				
Fish, fresh				
Eggs				

Milk/sour milk, yoghurt					
Yellow cheese					
Legumes (kidney beans, lentils)					
Bread, white					
Bread, brown					
Breakfast cereals (All Bran, muesli, Weetbix)					
Breakfast cereals, oats					
Rice, pap, pasta, samp, potato (mash/ boiled)					
Oranges and naartjies					
Apples, bananas, pears					
Rice, pap, pasta, samp, potato (mash/ boiled)					
Oranges and naartjies					
Apples, bananas, pears					
Orange or yellow vegetables (sweet potato, pumpkin, butternut, carrots)					
Green veg (spinach, peas, beans broccoli)					
Mixed vegetables					
Cabbage, cauliflower, lettuce					
Tomato (raw, cooked)					
Margarine/Butter					
Peanut butter/ Peanuts					
Fried foods (chips)					
Fried foods, other (fat cakes, fish, chicken)					
Pies, sausage rolls, samoosas					
Organ meats e.g liver, kidneys					
Sugar					
Chocolate					
Sweets e.g. boiled, lollipops, jelly					
Cake, biscuits, doughnuts					
Juice, fruit					
Juice (mixed, carbonated, bunny licks, Oros)					
Crisps (papas, pretzels)					
Take outs (KFC, McDonalds)					
Jam, syrup, honey					

Tobacco use

Now I am going to ask you some questions about tobacco use or smoking

78.	Do you currently smoke any tobacco products, such as cigarettes, cigars or pipes? (if no go to 82) Yes 1 | No 2
79.	Do you currently smoke tobacco products daily?

	Yes 1	No 2

80. How many cigarettes do you smoke per day?

1-5	1
6-10	2
11-15	3
A whole pack [20 cigarettes]	4
More than 20	5

81. In the past, did you ever smoke any tobacco products

Yes 1	No 2

82. During the past three years, has a doctor or other health worker advised you to quit smoking

Yes 1	No 2

83. Have you stopped smoking due to health advice of your doctor or other health worker?

Yes 1	No 2

Alcohol consumption

The next questions I will be asking about your consumption of alcohol

84. Have you ever consumed any alcohol such as beer, wine, spirits or home (Traditional) brewed beer [add other local examples]? *[if no skip to next section]*

Yes 1	No 2

85. Have you consumed any alcohol within the past 30 days?

Yes 1	No 2

86. During the past 30 days, how frequently have you had at least one standard alcoholic drink?

Daily	1
5-6 days per week	2
3-4 days per week	3
1-2 days per week	4
1-3 days per month	5

87. During the past 30 days, when you drank alcohol, how many standard drinks on average did

	you have during one drinking occasion? Number:	Don't know 0
88.	During the past three years, has a doctor or other health worker advised you to quit /stop drinking Yes 1 | No 2
89.	Have you stopped drinking due to health advice of your doctor or other health worker? Yes 1 | No 2

PHYSICAL ACTIVITY

The following questions are about your usual physical activity and exercise over the past 7 days. This includes walking and sports. Circle the answer that best applies to you

90.	During the last 7 days, on how many days did you do vigorous (for more than 10 minutes without sleeping) physical activities like heavy lifting, digging, aerobics, or fast bicycling

Rarely or never (Skip to question 3)	1
1-3 times each month	2
1 time each week	3
4-6 times each week	4
7 or more times each week	5

91.	How much time did you usually spend doing vigorous physical activities on one of those days?

Don't know/Not sure	1
Less than 10 minutes	2
20-39 minutes	3
40-59 minutes	4
1 hour or more	5

Think about all the moderate activities that you did in the last 7 days. Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

92.	During the last 7 days, on how many days did you do moderate physical activities like

	carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking

Rarely or Never (skip to question 5)	1
1 day each week	2
2 days each week	3
3 days a week	4
5-7 days a week	5

93.	How much time did you usually spend doing moderate physical activities on one of those days

Don't know/Not sure	1
Less than 20 minutes	2
20-39 minutes	3
40-59 minutes	4
1 hour or more	5

Think about the time you spent walking in the last 7 days. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

94.	During the last 7 days, on how many days did you walk for at least 10 without stopping minutes at a time?

Rarely or Never (skip to question 41.7)	1
1 day each week	2
2 days each week	3
3 days a week	4
5-7 days a week	5

95.	How much time did you usually spend walking on one of those days?

No walking	1
Less than 20 minutes	2
20-39 minutes	3
40-59 minutes	4
1 hour or more	5

The last question is about the time you spent sitting on weekdays during the last 7 days. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television

96.	During the last 7 days, how much time did you spend sitting on a week day?

No walking	1
Less than 20 minutes	2

		20-39 minutes	3
		40-59 minutes	4
		1 hour or more	5
97.	During the last 7 days, on how many days did you travel in a motor vehicle like a train, bus, and car?		
		No traveling in a motor vehicle (Skip to 9)	1
		1 day each week	2
		2 days each week	3
		3 days a week	4
		5-7 days a week	5
98.	How much time did you usually spend on one of those days traveling in a train, bus, car, train, or other kind of motor vehicle?		
		No walking	1
		Less than 20 minutes	2
		20-39 minutes	3
		40-59 minutes	4
		1 hour or more	5

Appendix 5: Focus Group Discussion

UNIVERSITY OF THE WESTERN CAPE

KNOWLEDGE, ATTITUDES, PRACTICES AND PERCEPTIONS OF TEACHERS AROUND OBESITY AND NUTRITION RELATED NON-COMMUNICABLE DISEASES

(RAKWADU CIRCUIT - LIMPOPO PROVINCE)

2017

FOCUS GROUP DISCUSSION

Name of Moderator:……	**Focus Group Date (dd/mm/yy)**	**D**	**D**	**M**	**M**	**Y**	**Y**

School CODE					

A. Introduction

Welcome. Thanks for coming. My name is Roselyn Mbangani and I am a University of Western Cape

Master of Science student, studying Nutrition. I will be the moderator/facilitator of our discussion today and I will also be taking notes.

B. Purpose

Today we will be discussing some issues related to your health and non-communicable diseases such as diabetes and cardiovascular disease. I'm interested in all of your ideas, comments, and suggestions. There are no right or wrong answers. All comments are welcome. Please feel free to disagree with one another. We would like to have many points of view.

C. Procedure

There is a tape recorder to record all responses. All comments are confidential and will be used for research purposes only. You do not have to wait on me to call you to speak if you want to speak. This is a group discussion. Please do not speak at the same time, give each other a chance to speak so that the tape recorder can get everything.

Warm-up

Before we get started, I would like everyone to introduce themselves to the group. Please tell us your first name and your favourite food

Thank you. It seems that all of us have a variety of foods that we love.

Introduction:

1. **What do you understand by a healthy diet?**

Dietary Practices

Which foods do you consider healthy / and unhealthy

Sometimes we do not always eat the way we would like to. Let's talk about some difficulties you experience with eating healthy.

Probe: How accessible is the healthy food to you as teachers/

Probe: What influences what you eat as teachers?

Probe: Weight management, health conditions

Probe: barriers to healthy foods

Probe: What influences vegetable and fruit consumption

If someone asked you to suggest how to eat healthier foods while you are at work/school, what would you suggest?

Probe: What types of healthy foods are in the vending machines?

What influence can what you eat have on what learners eat or desire to eat

Exercise/Physical activity

Many people think they can improve their health with diet or exercise/physical activity changes. Let's talk about exercise:

We often hear that we need to increase the amount of exercise

2. **When you hear the word exercise what comes to mind?**

Probe: What sort of physical activities do you enjoy doing?

Probe: What types of barriers have you experienced to exercising?

What are some things that could help you add more physical activity into your daily life?

Probes: Can you think of any ways to add exercise into your workday or at work?

If a program was being put in place to help you increase the exercise that you get what would be most helpful to you?

Weight management

Many of us have difficulty managing our weight. Let's talk about your experience in weight management.

3. **How do you feel about your body weight?**

Probe: What are some ways you have tried to influence your weight?

Probe: Do you feel that your body weight could be related to developing diabetes, CVD, cancer?

Probe: Do you feel that diabetes and CVD is of concern among teachers?

Probe: What are some things that you feel would help you achieve or maintain a healthy body weight?

Probe: How important is it for you to be at a healthy weight?

4. **Many people believe that teachers are role models to learners. Do you feel that your eating behaviour or physical activity or weight could affect what the learners think/perceive as healthy diet or lifestyle**?

Think about the things we have talked about today – healthy eating and exercise habits. Which do you think is the most important topic for you to learn more about to prevent diabetes and CVD?

Tell us about the things you tried to do but were unsuccessful.

Exercising more? Eating less? Losing Weight

Probes: We realize it is hard to stay motivated to prevent a disease you may or may not get, but what would help you to stay motivated to follow a lifestyle that would help you prevent diseases?

Appendix 6: Participant's information sheet

UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa
Tel: +27 21-959 2309 Fax: 27 21-959 3686

E-mail: rswart@uwc.co.za

INFORMATION SHEET

Project Title: Exploring the knowledge, attitudes, practices and perceptions of teachers around obesity and nutrition related non-communicable diseases.

What is this study about?
You are invited to take part in a research project being conducted by Mbangani Roselyn at the University of the Western Cape. The purpose of this research project is to gain understanding of the knowledge, attitudes, practices and perceptions of teachers in regarding nutrition-related non communicable diseases. This research project is focused on public school teachers Rakwadu circuit and you have been chosen as one of the participants.

Before you decide to part in this study it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and then you can make a decision on whether to participate or not. A member of the team can be contacted if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

What will I be asked to do if I agree to participate?
If you decide to participate
You will be asked to participate in either group discussion and or face-to face interview at your school. The group discussion and interview will take place during break or after school on a day that is suitable to all. The interview will be conducted by the researcher while completing the questionnaire. This will take approximately 45 minutes the while the focus group discussion will take 35-45 minutes.

The following information will be asked in the group discussion:

i) Knowledge, attitude, practices and perceptions regarding overweight/obesity and NCDs;
ii) barriers/challenges experienced at school regarding weight management;
iii) how to address/overcome barriers at school regarding weight management

The following information will be asked on the face to face interview

iv) Perception regarding own current body weight; ii) personal barriers/challenges

experienced regarding weight management; iii) personal motivating factors experienced

for weight management; iv) the influence of colleagues/family/friends on weight management.

You will also be asked to measure your body weight (using a scale) and measuring your height (using a measuring stick); the measuring session may take place on the same day as the group discussion or interview or on a different day, depending on the time available. It should not take

longer than 5 minutes per person

Would my participation in this study be kept confidential?

Your personal information will be kept confidential. Your names will not be included on the questionnaire. Your confidentiality will be protected by making sure that any recording or completed questionnaires used relevant to the study will be stored under lock and key. In addition, all computer files or documents will be protected by a password, only accessible by the researcher. In order to respect each participant's right to privacy, the face to face questionnaire will be completed only with researcher and participant present in a private room. On the other hand, only those participating in the group discussion will be allowed in the session and all participants will be requested not to discuss it outside of the focus group setting

A digital recorder will be used to record the group discussion will be recorded using a digital recorder, for transcription purposes only. Your identity or school name on the transcription of the recordings or other documents and all information shared will also remain confidential. Even if we write a report or article about this research project, your identity will be protected

What are the risks of this research?

There are no known risks associated with participating in this research. In addition, there are no costs involved.

What are the benefits of this research?

This research is not designed to help you personally, but the results may help the investigator learn more about the knowledge, attitudes, dietary and physical practices and perceptions of teachers around obesity and nutrition related non-communicable diseases. We hope that, in the future, other people might benefit from this study through improved understanding of risk factors associated with obesity and nutrition related non-communicable disease.

Do I have to be in this research and may I stop participating at any time?

Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify.

Is any assistance available if I am negatively affected by participating in this study?

If you feel that you are negatively affected by your participation in this study, you may be referred for counselling to assist you with the issue encountered**.**

What if I have questions?

This research is being conducted by MBANGANI ROSELYN Department OF Dietetics and Nutrition at the University of the Western Cape. If you have any questions about the research study itself, please contact Mbangani Roselyn at: RSB Motsinoni Secondary School**,** on 078 1919850 and email: rosstigere@gmail.com

Should you have any questions regarding this study and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please contact:

Prof José Frantz
Dean of the Faculty of Community and Health Sciences
University of the Western Cape
Private Bag X17
Bellville 7535
chs-deansoffice@uwc.ac.za

This research has been approved by the University of the Western Cape's Senate Research Committee. (REFERENCE NUMBER:)

Appendix 7 : Consent form

UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2309 Fax: 27 21-959 3686

E-mail: rswart@uwc.co.za

Informed Consent

I _____ have been informed about the study entitled "Exploring the knowledge, attitudes, perceptions and practices of teachers around obesity and nutrition related non-communicable diseases.

I understand the purpose and procedures of the study.

I declare that my participation in this study is entirely voluntary and that I may withdraw at any time without penalty. I also understand that my identity will not be disclosed and that I may withdraw from the study without giving a reason at any time and this will not negatively affect me in any way.

Participant's name……
Participant's signature……
Witness…….
Date……

Should you have any questions regarding this study or wish to report any problems you have
experienced related to the study, please contact the study supervisor :

Prof. Rina Swart
Department: Faculty of Community and Health Sciences
Faculty: Faculty of Community and Health
Tel: 021 959 2852
Fax: 021 959 2755
Email: chs-deansoffice@uwc.ac.za

Appendix 8: Focus group confidentiality binding form

UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa
Tel: +27 21-959 2309 Fax: 27 21-959 3686

E-mail: rswart@uwc.co.za

FOCUS GROUP CONFIDENTIALITY BINDING FORM

Title of Research Project: ***Exploring the knowledge, attitudes, perceptions and practices of teachers around obesity and nutrition related non-communicable diseases.***

The study has been described to me in language that I understand. My questions about the study have been answered. I understand what my participation will involve and I agree to participate of my own choice and free will. I understand that my identity will not be disclosed to anyone by the researchers. I understand that I may withdraw from the study at any time without giving a reason and without fear of negative consequences or loss of benefits. I understand that confidentiality is dependent on participants' in the Focus Group maintaining confidentiality.

I hereby agree to uphold the confidentiality of the discussions in the focus group by not disclosing the identity of other participants or any aspects of their contributions to members outside of the group.

Participant's name……..

Participant's signature……..

Date……

Appendix 9: Questionnaire addendum

Coding for Practices, Knowledge and attitude questions:

CODING KEY: 0 Wrong 1 Correct

SECTION 2 **Knowledge, attitude and perception** **I am going to ask you some questions which requires your knowledge and understanding of obesity, diabetes and heart disease**		
	CODING KEY: 0 Wrong 1 Correct	
	Which one of the following do you think is the most important reason why people gain weight? *(MARK ONE OPTION ONLY)*	code
	It runs in the family	1 **0**
	They eat too much	2 **1**
	They eat too much unhealthy foods	3 **1**
	How much exercise they do	4 **0**
	Lack of knowledge	5 **0**
	Eating starchy foods at most meals may: *(MARK ONE OPTION ONLY)*	
	Be unhealthy	1 **0**
	Cause weight gain	2 **1**
	Cause diseases	3 **0**
	Be important for a balanced diet	4 **0**
	From which group of foods should you eat the most every day? *(MARK ONE OPTION ONLY)*	
	Bread, samp, rice, porridge	1 **0**
	Apples, bananas, spinach, carrots	2 **1**
	Milk, yoghurt, cheese	3 **0**
	Chicken, fish, beans, eggs	4 **0**

How many fruits and vegetables should be eaten?
(MARK ONE OPTION ONLY)

1 fruit and/or vegetable a day	1	**0**
3-4 fruits and/or vegetables a day	2	**0**
5 or more fruits and/or vegetables a day	3	**1**
There is no need to eat fruits and vegetables daily	4	**0**

How much water should you drink a day?
(MARK ONE OPTION ONLY)

You don't have to drink water every day	1	**0**
1 to 3 glasses	2	**0**
4 to 6 glasses	3	**0**
6 to 8 glasses	4	**1**

DIET

Please tell me if you strongly *DISAGREE, DISAGREE, AGREE OR AGREE STRONGLY with the following sentences:*

You should eat a lot of sugar to give you enough energy

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4
1	**1**	**0**	**0**

If you are eating a healthy diet there is no need for you to be physically active

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4
1	**1**	**0**	**0**

	Starchy foods should not be eaten when one is trying to lose weight

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4
1	**1**	**0**	**0**

	Your body only needs a little bit of salt to be healthy

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4
0	**0**	**1**	**1**

	Drinking a lot of wine, beer, and cider can cause weight gain

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4
0	**0**	**1**	**1**

	Salt should be added to all foods except fruits

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4
1	**1**	**0**	**0**

	You can eat as much meat as you want every day

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4
1	**1**	**0**	**0**

	Eating high energy foods, fatty foods or sugary foods is a risk factor of obesity

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4
0	**0**	**1**	**1**

	Eating less or smaller portions of food reduces the risk of overweight and obesity

Strongly	Disagree	Agree	Strongly

disagree			agree
1	2	3	4
0	**0**	**1**	**1**

Fast foods are convenient healthy foods good for teachers when they are at work.

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4
1	**1**	**0**	**0**

DIABETES/CVD DISEASES

I would like to ask you some questions about health, focusing on a group of diseases called non-communicable diseases or NCDs.

A non-communicable disease is one that cannot be spread between people?
(PLEASE TELL ME IF THE FOLLOWING IS TRUE, FALSE OR YOU DON'T KNOW)

True	False	I don't know
1	2	3
1	**0**	**0**

Non-communicable diseases are a group of diseases that include heart disease, diabetes and cancers. These are diseases that you cannot catch, but that develop from a number of factors, usually over a long time.

(PLEASE TELL ME IF YOU STRONGLY DISAGREE, DISAGREE, AGREE OR AGREE STRONGLY WITH THE FOLLOWING SENTENCES)

Non communicable diseases are less dangerous than infectious diseases

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4
1	**1**	**0**	**0**

Non communicable diseases are common among teachers

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4
0	**0**	**1**	**1**

DIABETES

Now I am going to ask you questions about diabetes

PLEASE TELL ME IF YOU STRONGLY DISAGREE, DISAGREE, AGREE OR AGREE STRONGLY WITH THE FOLLOWING SENTENCES ABOUT DIABETES

Do the following contribute to the development of diabetes?

Drinking sugar sweetened cold drinks

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4
0	**0**	**1**	**1**

Supernatural forces (spirits, higher powers, ancestors)

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4
1	**1**	**0**	**0**

Being obese/overweight

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4
0	**0**	**1**	**1**

Eating fatty foods

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4
0	**0**	**1**	**1**

Drinking too much alcohol

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4
0	**0**	**1**	**1**

Which of the following signs of diabetes have you heard of?
(PLEASE ANSWER EITHER YES OR NO)

	Yes	No
Being very thirsty	1	2
Urinating all the time	1	2
Weight loss	1	2
Constant hunger	1	2
Slow healing wounds	1	2
Blurred vision	1	2
Repeated infections	1	2
Code	**1**	**0**

Which of the following dangers of diabetes have you heard of?

	Yes	No
Poor vision or blindness	1	2
Lung problems	1	2
Kidney problems	1	2
Foot problems or gangrene	1	2
Heart disease	1	2
Stroke	1	2
	1	**0**

What do you think is the BEST way to treat diabetes? *(MARK ONE OPTION ONLY)*

Medication only	1	**0**
Traditional medicine only	2	**0**
Proper diet only	3	**0**
Weight loss only	4	**0**

	Exercise only	5	**0**	
	Proper diet and weight loss	6	**0**	
	Proper diet and exercise	7	**0**	
	Proper diet, weight loss and exercise	8	**0**	
	Proper diet, weight loss, exercise and medication	9	**1**	
	Do not really know	10	**0**	

How would you reduce your chances of getting diabetes? *(CHOOSE ONLY THE ONE THAT YOU THINK IS MOST IMPORTANT)*

Eating little or no sugar and sweets	1	**0**
Prevent weight gain	2	**0**
Follow a healthy diet, manage weight	3	**1**

CVD/Heart disease

Now I am going to ask you questions about CVD/heart disease

(PLEASE TELL ME IF YOU STRONGLY DISAGREE, DISAGREE, AGREE OR AGREE STRONGLY WITH THE FOLLOWING FACTORS)

Do you think the following are risk factors if CVD/heart disease

Smoking

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4
0	**0**	**1**	**1**

High blood pressure

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4
0	**0**	**1**	**1**

Low physical activity

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4
0	**0**	**1**	**1**

Overweight or obesity

		Strongly disagree	Disagree	Agree	Strongly agree
		1	2	3	4
		0	**0**	**1**	**1**
	Family history				
		Strongly disagree	Disagree	Agree	Strongly agree
		1	2	3	4
		0	**0**	**1**	**1**
	Unhealthy diet				
		Strongly disagree	Disagree	Agree	Strongly agree
		1	2	3	4
		0	**0**	**1**	**1**

SECTION 3
Practices
In this section I am going to be asking you about your eating habits, smoking, alcohol consumption and physical activity

Dietary Habits/Practices
I will ask you questions on your dietary habits

Which pattern best describes your USUAL eating pattern?

3 meals per day (no eating between meals)	1	**0**
3 meals per day (with eating between meals)	2	**1**
1-2 meals per day (no eating between meals)	3	**0**
1-2 meals per day (with eating between meals)	4	**0**
Nibble the whole day, no specific meals	5	**0**

On how many weekdays do you usually eat breakfast?

Never	1	**0**
1-2 days	2	**0**
3-4 days	3	**0**
Every weekday (5)	4	**1**

How often do you usually eat breakfast on a weekend?

Never	1	**0**
Saturdays only	2	**0**
Sundays only	3	**0**

Saturdays and Sundays	4	**1**

How many times do you eat snacks in a day? Mark one only

Never	1	**0**
Just once a day	2	**0**
Twice a day	3	**1**
3 or more times a day	4	**1**

How do you usually cook chicken for your family?

Fry it	1	**0**
Cook it in an oven	2	**1**
Boil it	3	**1**
Other	4	**0**
Don't know/no answer	5	**0**

During working hours, where do you normally get your lunch/break from?

From a fast food restaurant e.g. KFC	1	**0**
Tuckshop	2	**0**
I carry food from home	3	**1**
I don't eat lunch	4	**0**

If you carry food to work, which types of food do you carry?

Rice/Pap and Meat	1	**1**
Bread and juice/tea	2	**0**
Fruit	3	**1**
Juice	4	**0**

How often do you eat vegetables in a typical week?

Never	1	**0**
1-2 times	2	**0**
3-4 times	3	**0**
5-6 times	4	**1**
More than 6 times	5	**1**

How many portions of vegetables, excluding potatoes, do you eat on a typical day spinach,

	morowo, rape,wiki, kunde, cabbage, tomatoes, carrots etc (A portion of vegetables is approximately one handful or 3 heaped tablespoons of vegetables.) 1portion 1 **0** 2portions 2 **0** 3portions 3 **1** 4portions 4 **1** 5portions 5 **1**
	On a typical week, how many times do you eat foods rich in fat e.g. samosa, Mangwinya, fried potatoes/chips, fried fish/chicken, etc Never 1 **1** 1-2 times 2 **1** 3-4 times 3 **0** 5-6 times 4 **0** More than 6 times 5 **0**
	How many fruits, of any sort, do you eat on a typical day e.g. banana, mango, pear etc.? Never 1 **0** 1-2 times 2 **0** 3-4 times 3 **1** 5-6 times 4 **1** More than 6 times 5 **0**
	How often do you drink or eat foods with high sugar content per week? For example tea with more than 2 teaspoons of sugar, soft drinks (soda), cake, biscuits etc Never 1 **1** 1-2 times 2 **1** 3-4 times 3 **0** 5-6 times 4 **0** More than 6 times 5 **0**
	What type of oil or fat is most often used for meal preparation in your household? Vegetable oil/sunflower 1 **1** Olive oil 2 **1**

Butter or ghee	3	**0**
Margarine	4	**0**
Other	5	**0**
None in particular	6	**0**
None used	7	**1**
Don't know	8	**0**

On average, how many meals per week do you eat that were not prepared at a home? By meal, I mean breakfast, lunch and dinner.

Never	1	**1**
1-2 times	2	**1**
3-4 times	3	**0**
5-6 times	4	**0**
More than 6 times	5	**0**

Do you usually add salt to your food when eating or before eating?

Yes	1	No	2
0		1	

How often do you eat processed food high in salt? By processed food high in salt, I mean foods that have been altered from their natural state, such as packaged salty snacks, canned salty food including pickles and preserves, salty food prepared at a fast food restaurant, cheese, bacon and processed meat.

Always	1	**0**
Often	2	**0**
Sometimes	3	**1**
Rarely	4	**1**
Never	5	**1**

In the past week, did you buy anything to eat from:
(PLEASE ANSWER AS YES OR NO)

A Tuck-shop

Yes	1	No	2
0		**1**	

Vendors

Yes	1	No	2

		0	**1**
	A Take-away		
		Yes 1	No 2
		0	**1**
	Others (specify)		
		Yes 1	No 2
		1	**0**