Research- and Health Promotion Report

"Eet gesond, die heel jaar rond"

University for Applied Science/Theewaterskloof project/Emil Weder High School

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Anne Faassen & Ellen Swinkels
Eet gesond, die heel jaar rond!

Research- and Health Promotion Report

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Preface

This research- and health promotion report that has been written within the framework of our graduation project for the study Nutrition & Dietetics at the University for Applied Science, Nijmegen. The project has been conducted at the Emil Weder High School in Genadendal, South Africa, and is intended for the principal, teachers and staff of the Emil Weder High School. Also other readers that are interested in the subject overweight and obesity in South Africa are more than welcome to read this report. It will be published in the HBO knowledge base.

This graduation project would not have been established without the help of the following mentioned people. First of all we would like to thank our supervisor from the University for Applied Science in the Netherlands, Annemarie Nijhof. During our Skype meetings we would discuss the progress of the project and always feel relieved and less stressed afterwards. The feedback sent us in the right direction again and made us often realize we were thinking too difficult.

Secondly we would like to thank our supervisor Elsabé Nel from the University of the Western Cape, South Africa for her advice, feedback, inspiring ideas, kindness and major contribution to our graduation project. Her knowledge and many years of experience in the nutrition field have helped us through this project.

Furthermore, our thanks goes to the principal, staff and teachers of the Emil Weder High School for letting us do our research and health promotion at the High School and for providing us information about the school and the area of the school. Also Lizelle Duminy and Karin Benjamin from the Theewaterskloof project cannot be left out. Thank you so much for the South African experience and for sponsoring the health promotion day. Last but not least, thanks to all our family and friends for supporting us and giving us the opportunity to go to South Africa.

Genadendal, December 2013
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Glossary

FAO  Food and Agriculture Organization. The FAO leads international efforts to defeat hunger in both developed and developing countries. FAO is also a source of knowledge and information. They help developing countries and countries in transition modernize and improve agriculture, forestry and fisheries practices and ensure good nutrition for all (United Nations Brussels, no date).

FBDGs  Food Based Dietary Guidelines. The goal of the FBDGs is to help South Africans older than 6 years to choose an adequate but prudent diet. The guidelines are based on locally consumed foods and aimed to address existing nutrient deficiencies and excesses that are related to public health problems (NICUS, no date).

Food security  Sustainable access to safe food of sufficient quality and quantity to ensure adequate intake and a healthy life (UNICEF, no date)

Food poverty line  R305 per person per month. The food poverty line refers to the amount of money that an individual will need to consume for the required energy intake (Statistics South Africa, 2009).

GVO-model  The abbreviation stands for Health Education. The model contains six steps that should be completed to develop an intervention. The intervention should motivate people to behave healthier so health problems can be prevented or detected as early as possible (Brug, Assema & Lechner, 2008).

HIV/AIDS  HIV stands for Human Immunodeficiency Virus and targets the immune system and weakens people's surveillance and defence systems against infections and some types of cancer. As the virus destroys and impairs the function of immune cells, infected individuals gradually become immune deficient. Immune function is typically measured by CD4 cell count. Immunodeficiency results in increased susceptibility to a wide range of infections and diseases that people with healthy immune systems can fight off. The most advanced stage of HIV infection is Acquired Immunodeficiency Syndrome (AIDS), which can take from 2 to 15 years to develop depending on the individual. AIDS is defined by the development of certain cancers, infections, or other severe clinical manifestations (WHO, 2013).

NFCS 1999  National Food Consumption Survey. The aim of this survey in South Africa was to determine the nutrient intake and anthropometric status of children aged 1-9 year, as well as factors that influence their dietary intake. It was a cross-sectional survey of a nationally representative sample of all children aged 1-9 years (n=2894) in South Africa (Labadarios et al, 2005).

NFCS:FB-I 2005  National Food Consumption Survey Fortification Baseline – I. One of the recommendations of the NFCS 1999 was to set up a program of food fortification to do something about the micronutrient deficiencies in South Africa. “The NFCS:FB-I 2005 provides an overview of trends of the data analyses on the nutritional status of children and women of child bearing age, food procurement and inventory, knowledge, attitudes and practices of women with regard to food fortification, biochemical evaluation of selected micronutrients as well as on the prevalence of the presence at the point of consumption of vitamin A in fortified maize meal” (Labadarios et al, 2005).

SANHANES-1  South African National Health and Nutrition Examination Survey. “The SANHANES was established as a continuous population health survey in order to address the changing health needs in the country and provide a
broader and more comprehensive platform to study the health status of the nation on a regular basis. The primary objectives of the SANHANES-1 were to assess defined aspects of the health and nutritional status of South Africans with respect to the prevalence of non-communicable diseases (specifically cardiovascular disease, diabetes and hypertension) and their risk factors (diet, physical activity and tobacco use).” (Shisana et al, 2013).

**SASAS**

South African Social Attitudes Survey. “Tracking societal values in changing times the SASAS is a nationally representative, repeated cross-sectional survey that has been conducted annually by the Human Sciences Research Council (HSRC) since 2003. The survey series charts and explains the interaction between the country’s changing institutions, its political and economic structures, and the attitudes, beliefs and behaviour patterns of its diverse populations.” (Human Sciences Research Council, 2013).

**WHO**

World Health Organization. “WHO is the directing and coordinating authority for health within the United Nations system. It is responsible for providing leadership on global health matters, shaping the health research agenda, setting norms and standards, articulating evidence-based policy options, providing technical support to countries and monitoring and assessing health trends.” (WHO, 2013).

*The cursive words in the report will be explained in this glossary*
Summary

Most people will be surprised when you tell that more than half of the adult population in South Africa is overweight or obese. Shockingly 25% of the females and 19.6% of the males is overweight and 40.1% of the females and 11.6% of the males is obese. A reason for this is the upcoming economy in South Africa which has led to more western habits where traditional high-fibre diets are replaced by diets high in fat and sugar.

Overweight and obesity are defined as excessive or abnormal fat accumulation that presents a risk to health. To draw attention to this problem and make people aware of the risks of overweight and obesity, a research and health promotion has been conducted at the Emil Weder High School in Genadendal, Western Cape. Of the total 580 learners, 310 learners have been measured for weight and height to calculate the BMI, and find out what the prevalence of overweight and obesity is at the High School.

Before conducting the research at the high school, a desk research has been carried out to find out if there are associations between certain eating and lifestyle habits and overweight and obesity. Also different methods have been analysed to see what is the best measurement for overweight and obesity among adolescents. After comparing the BMI, skinfold measurements and waist circumference, it shows that the BMI is the easiest, fastest and most common used method for children and adolescents.

A distinction is made between immediate causes, underlying causes and basic causes. Several studies found an association between stunting and the risks of developing overweight at a later stage. This project will be focused on behaviour, which are the immediate causes, namely dietary intake and physical inactivity. The most important behaviours that were associated with overweight were the high consumption of sweet cool drinks and unhealthy snacking. This behaviour is stimulated by the environment such as the many fast food restaurants and Tuck Shops at school.

Overweight can lead to both physical and psychological problems. The most common physical problems as a result of overweight are chronic diseases such as diabetes, cardiovascular diseases and cancer.

The outcomes of the anthropometric research is comparable with desk research (19% - 19.7%). They also both confirm that there is a higher prevalence among females than males. When looking at the relation between overweight and purchasing unhealthy snacks from the Tuck Shop, 18.2% from all the learners that bought something from the Tuck Shop, is overweight or obese (15% female and 3.4% male). All the girls with obesity purchased something from the Tuck Shop the day before.

Based on the behaviours that were found in desk- and field research, an intervention is developed with the goal to prevent overweight and obesity by promoting healthy nutrition, improving the knowledge about healthy nutrition and creating awareness of the learners current lifestyle. The intervention consisted of two parts, where in the first part a poster competition was organized and in the second part a healthy lifestyle was promoted by selling healthy snacks and drinks. A lot of positive feedback was given by teachers, staff and supervisors about the healthy snacks and the factsheets. Unfortunately, an effect evaluation needs yet to occur. This is an important thing for in the future to see what improvements can be made to the intervention.

The questions that have been asked during the research were based on 24h-recall, which means that there is only information obtained from the day before the research. These questions have been asked to give an idea in which direction on can look to determine the actual behaviour of the learners. More research is needed to get more insight in the behaviours that is causing overweight and obesity and how to prevent this health problem.
1. Introduction

1.1. Background
As two students being in their final year, studying Nutrition & Dietetics at the HAN University for Applied Science (UAS), the Netherlands, a thesis has to be written in order to graduate. For this thesis, doing research and working on changing behaviour is required. To gain experience about a not western culture and to use our knowledge and experience in a place where it really can make a big difference, and where people are really grateful for the help, there has been chosen to do this project in a foreign country, namely in the Western Cape of South Africa. The HAN University for Applied Science has been working for several years now with the University of Western Cape (UWC) in the Theewaterskloof municipality to build a better and stronger society, focused on the economic and social development, in the villages of the municipality.

South Africa has a complex mix of developed and developing areas in terms of its population and its economy (Steyn, 2006). Using international poverty lines, the proportion of the population living below $1.25 a day is estimated to be 10.7%, while the proportion of those living below $2.50 a day is estimated at 36.4%. Approximately 26.3% of the population is living below the food poverty line of R305 per person per month. The food poverty line refers to the amount of money that an individual will need to consume for the required energy intake (Statistics South Africa, 2009). According to the 1999 National Food Consumption Survey (NFCS), the 2005 NFCS Fortification Baseline – I (NFCS:FB-I) and the 2008 South African Social Attitudes Survey (SASAS), the prevalence of food insecurity has reduced from 52.3% to 25.9% between 1999 and 2008, both in urban and rural areas. The food insecurity in urban areas decreased from 42.0% to 20.5%, and in rural areas from 62.0% to 33.1% (WHO, 2013). These numbers show that South Africa is in transition from poverty to economic development.

These economic growth also comes with risks. While South Africa continues to deal with the problems of infectious diseases (such as HIV/AIDS, tuberculosis), undernutrition and stunting they are also experiencing a rapid increase of non-communicable diseases such as overweight and obesity (WHO, 2013). This is due to the more western habits where traditional high-fibre diets are replaced by diets high in fat and sugar (Swinburn, Caterson, Seidell & James, 2004). This leads to the ‘double burden of disease’, where you can find both over- and undernutrition and stunting within the same country, the same community and the same household (Friedman, 2003)(Kimani-Murage, 2013).

To do research to the increasing prevalence of overweight and obesity, a project will be performed at the Emil Weder High School in Genadendal. Genadendal is a rural area with mostly coloured people, located in the Theewaterskloof region. Theewaterskloof covers 7 communities, with an unemployment rate of 42%, and 31% of the households having no income (TWK municipality, 2013). These data show that Theewaterskloof is a municipality that is still developing. This is the reason that the UAS is sending students to this specific region, to contribute to the development of the area.

The research at the Emil Weder High School will not be the first research at this school. At the beginning of 2013, two nutrition students from the UAS started a project at this high school to find out what the reasons are for the low consumption of the school meals by the learners. They researched the breakfast consumption, school meal consumption, amount of homemade lunchboxes, purchases from the Tuck Shop and the determinants of the behaviour of the school meal consumption. The outcomes of their research will also be used in this research- and health promotion report.

1.2. Problem description
As mentioned in the background, the upcoming economy has led to a higher prevalence of overweight and obesity. The prevalence of overweight and obesity is now even higher than the prevalence of underweight in this country. Therefore, this research will be mainly aimed at overweight and obesity.

South Africa has a total population of over 50 million people, with a wide variety of languages, cultures and religious beliefs. The majority of the total population are Africans, nearly 80%. Coloured and white people each make up almost 9% of the total population and a small percentage of 2.5 is Indian/Asian (Statistics South Africa, 2011). Of the total population (adults >15 year) 25% of the females is
overweight, against 19.6% of the males. Obesity affects 40.1% of the females, against 11.6% of the males (Shisana et al, 2013).

In 2008, the National Youth Risk Behaviour Survey has done research to overweight and obesity amongst South African adolescents between the age of 13-19 year. The study shows that 19.7% of the adolescents is overweight and 5.3% has obesity. A significantly greater proportion of females than males were overweight and obese. When comparing the national average with the Western Cape, the prevalence of overweight and obesity is comparable (Reddy et al, 2008).

An energy-dense diet is considered the main cause of overweight and obesity, while other causes such as physical inactivity, early life experience, level of education, cultural factors, stress levels and genetics are also associated to this health problem (Friedman, 2003). Also, several studies have shown that there is an association between stunting and the risk of developing overweight or obesity at a higher age (Black et al, 2013)(Walker et al, 2002).

Overweight and obesity are major risk factors for a number of chronic diseases, such as diabetes, cardiovascular diseases and cancer. Each year, at least 2.8 million adults worldwide die as a result of the consequences of being overweight or obese. More than 40% of the deaths are related to diabetes, 23% to ischaemic heart diseases and between the 7 and 41% is related to cancer (WHO, 2013). Obesity during childhood and adolescence has been associated with higher rates of sickness and death in adulthood, even when adult weight is considered. Meaning, being overweight or obese in early childhood and adolescence can lead to lifelong health problems. Adult overweight and obesity are more difficult to treat successfully over the long term (World Cancer Research Fund & American Institute for Cancer Research, 2007), therefore preventing overweight and obesity on a young age is very important. Making children aware of their eating behaviour and the risks of being overweight or obese should therefore be promoted (Goedecke, Jennings & Lambert, 2005).

1.3. Assignment
In consultation with the principal of the Emil Weder High School and the supervisor from the University of the Western Cape, Elsabé Nel, a research will be done to the anthropometric status of the learners of the High School in Genadendal. The learners are adolescence in the age of 13-20 years. The outcomes of the anthropometric research will give an overview of the learners that are overweight or obese. During the research, also a few questions about healthy nutrition and eating behaviour will be asked to the learner. This information can lead to associations between eating behaviour and overweight and obesity, where the health promotion part will be based on.

To work in a methodical way, the GVO-model will be used as a tool. This abbreviation stands for ‘Health Education’ and contains several steps that must be completed to set up a suitable intervention (Brug, Assema & Lechner, 2008).

1.4. Research- and sub questions
A research question and sub question are defined to give direction to the research and set boundaries so that there is not strayed from the subject. The following questions are defined:

Research question
What is the prevalence of overweight and obesity among the learners aged 13-20 year at the Emil Weder High School in Genadendal, and what is the behaviour among the learners that can be associated with overweight and obesity?

Sub questions
- What is the definition of overweight and obesity and how can this be measured?
- What is the prevalence of overweight and obesity among South African adolescents?
- What are the causes of overweight and obesity among South African adolescents?
- What are the risks of overweight and obesity among South African adolescents?
- What is the anthropometric status of the Emil Weder High School learners?

The first four questions will be answered by literature search, the last question will be answered by doing field research. This information will be compared with each other to give an answer on the main question of the research.
1.5. Bookmark
This first chapter gives an description of the background, problem and assignment of the report. It also includes the research- and sub questions that will give direction to the rest of the report. In the second chapter a desk research has been performed, followed by the field research in chapter 3. Chapter 4 gives a conclusion of the desk- and field research. In the following chapter, a suitable intervention is developed to change behaviour of the learners. Chapter 6 is a conclusion of chapter 5. In the final two chapters a discussion, conclusion and recommendations are made.
2. Desk Research

2.1. Method
To gain information about the health problem and nutrition in South Africa, a literature study has been performed. There has been searched in several databases, such as PubMed, Cochrane and Google Scholar. Also websites from institutions such as the World Health Organisation (WHO), Department of Health (DOH) in South Africa and the Food and Agriculture Organization (FAO) have been consulted to gain information about the subject. Keywords such as overweight, obesity, food consumption, nutrition, adolescents, anthropometry, etc. have been used. An overview of the search strategy can be found in appendix 1.

2.2. Results
This paragraph will give an answer on the sub questions that have been set up to give an answer on the research question.

2.2.1. What is the definition of overweight and how can this be measured?
Overweight and obesity are seen as an unhealthy body weight. But what do these terms mean? “Overweight and obesity are defined as excessive or abnormal fat accumulation that presents a risk to health” (WHO, 2013). This means that the fat- and muscle mass are out of balance. Overweight and obesity are caused by a positive energy balance; more energy is consumed than there is burned with for instance physical activity (Government of South Africa, Department of Health, 2006).

There are several methods to determine the body composition, for instance BMI, skinfold measurements and waist circumference. There has been searched to the most applicable measurement for adolescents. Also the advantages and disadvantages of each method have been summarized and compared.

A) Body Mass Index (BMI)
The most used method to determine the body composition is the BMI. The BMI is the person’s weight in kilograms divided by the square of the height in metres. This only requires the measurement of height and weight of an individual. This can be done relatively quick because it is simple and requires only limited training (Ulijaszek & Kerr, 1999). Interpreting the BMI should be done carefully because the weight is not only determined by fat mass, but also by muscle mass. An individual with a lot of muscle mass can reach a high BMI, while not being too thick. The same applies for people with oedema (Sorkin, Muller, Andres, 1999). To prevent errors, it is important to measure height and weight according to a protocol (Onis, Onyango, Broeck, Chumlea, & Martorell, 2004).

For adults (>19 year) there are international references for the BMI. A BMI between the 18,5 and 24,9 kg/m$^2$ is defined as a healthy weight, a BMI between the 25 and 29.9 kg/m$^2$ is considered overweight, a BMI above the 30 kg/m$^2$ defines obesity (WHO, 2013).

However, for adolescents there are different references for male and female and age in months, because the BMI in childhood changes substantially with age due to growth and puberty. Therefore, several studies have been done to set up clearly cut off points related to age to define the body composition of adolescents. Cole et al used six large national cross sectional growth studies from Brazil, Great Britain, Hong Kong, the Netherlands, Singapore and the United States to develop specific cut off points for different ages and gender to define child overweight and obesity, for international use (Cole, Bellizzi, Flegal, Dietz, 2000). Also the WHO did research to growth references for children and adolescents to reconstruct the 1977 National Centre for Health Statistics (NCHS)/WHO, which were published in 2007. These growth references have been developed by merging the old growth references from 1977 (which was only for under-fives) with recent studies to reconstruct new growth references for screening school aged children and adolescents on their body composition. Eventually, 34 data sets from 22 countries were analysed with a total sample size of 22,917 children. This resulted in BMI references for the age of 5-19 years for each month and both genders in standard deviation scores (Onis, Onyango, Borghi, Siyam, Nishidaa & Siekmanna, 2007). The maximum age of adolescence is 19 years according to the definition of the WHO. From the age of 19, the references for adults are applicable (WHO, 2000). The BMI references can be found on the website of the WHO, which is also mentioned in the literature list.
B) Waist circumference
The method waist circumference can be used to diagnose overweight and obesity in adults, but it is more and more used to also diagnose it in children and adolescents. Usually, the waist circumference is used in combination with the BMI. The BMI is an indicator of the total fat, the waist circumference however is an indicator for the amount of abdominal fat and identifies the increased risk of obesity-related morbidity on individuals (WHO, 2000). There has been suggested that the waist circumference is an prediction on cardiovascular risks. An increased visceral adipose tissue is associated with a range of metabolic abnormalities, including decreased glucose tolerance, reduced insulin sensitivity and adverse lipid profiles, which are risk factors for type 2 diabetes and cardiovascular diseases (Huxley, Mendis & Zheleznyakov, 2010).

This method requires well trained persons and should be, when possible, carried out by one person. Measuring should take place just above the uppermost border of the right ilium at the end of normal expiration. To get a reliable outcome, the measurement should be repeated twice. If there is more than 1 cm difference, the two measurements should be repeated, which is very time consuming (WHO, 2008).

The waist circumference references for adults (18-64 year) are between the 79-94 cm for males and between the 68-80 cm for females for a healthy weight. A waist circumference between the 94-102 cm for males and >88 cm for females indicates overweight and an increased risk for CVD (Lean et al. 1995)(WHO, 2006). There has been searched to waist circumference references for adolescents. Unfortunately, there are no international or national references known.

C) Skinfolds
Another method is measuring skinfolds to determine the amount of body fat. The skinfolds needs to be measured on four different places using skinfold calipers, namely: biceps, triceps, subscapular fold and supra-iliac fold (Becker-Woudstra, Havinga, Kuijeren & Linden-Wouters, 2008). Like the waist circumference, this method also requires well trained persons and reliable material. The degree of error is bigger than when measuring height and weight. This makes the method less reliable. The measurements should also be repeated twice to get a reliable outcome, which consumes time. Besides, there are no skinfold references available for each age group (Veen-Roelofs, 2004).

Comparison of the three measurements
There has been searched to what method has the preference to determine overweight in adolescents. Reilly et al concluded out of ten studies that the diagnostic accuracy of BMI and waist for age was similar. There was no evidence that using waist circumference for age improved the diagnosis of excessive fatness or adverse cardiovascular risk factors in children instead of the BMI (Reilly & Kelly, 2010). Freedman et al says that waist circumference should not be used in preference to BMI to diagnose obesity in children and adolescents (Freedman, Ogden, Berenson & Horlick, 2005). Himes carried out a research to different indicators for measuring obesity in children. He concludes that “BMI is an important indicator of overweight and obesity in childhood and adolescence”, and that skinfold measurements, waist circumference, or bioelectrical impedance are not recommended for clinical, school and community settings. This because there is little evidence that these indicators provide extra information when identifying overweight and obesity in children and adolescents (Himes, 2009).

Conclusion
After comparing the different methods to determine the body composition of children and adolescents, it shows that the BMI is the easiest, fastest and most common used method. Besides, no evidence is found that using waist circumference or skinfolds for age improved the diagnosis of excessive fatness or adverse cardiovascular risk factors in children instead of the BMI. From now on, the research report will be aimed at the BMI to draw a conclusion on the status of the body weight.

2.2.2. Prevalence of overweight and obesity among South African adolescents
In 2008, the second National Youth Risk Behaviour Survey (NYRBS) has been performed under 10.270 South Africans learners. This cross sectional national prevalence study includes a research to the nutritional and anthropometric status and dietary behaviours of high school learners from grade eight till grade eleven, which is related to chronic diseases. The data was obtained through self-
administered questionnaires, including a food consumption questionnaire of seven days. Also the height and weight of each learner has been measured. With the height and weight, the BMI of the learners has been calculated (Reddy et al, 2008).

The study shows that nationally 19.7% of the adolescents is overweight, with significantly more female (27.8%) than male learners (11.2%). Remarkably is that overweight significantly affects more 14 year olds (22.2%) and 15 year olds (21.9%) than 19 year olds and older learners (14.9%). The nationally prevalence of obesity is 5.3%, with also significantly more female (7.2%) than male learners (3.3%). When comparing race, significantly more white learners (9.7%) than coloured learners (4.9%) were classified as obese. And significantly more African black and coloured female learners have obesity than African black and coloured males (Reddy et al, 2008). Comparing the NYRBS 2008 with the NYRBS 2002, the prevalence of overweight (17.2%) and obesity (4%) has increased. (Reddy et al, 2002).

The South African National Health and Nutrition Examination Survey has done a health survey under males and females, including a anthropometric study. Looking at the prevalence of the anthropometric data, it also shows that overweight and obesity is much more common in women than in men. See table 1. The survey also shows that there are higher rates of overweight and obesity in urban areas than in rural areas (Shisana et al, 2013).

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<td></td>
<td>15-17 year</td>
<td>18-24 year</td>
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<tr>
<td>Overweight</td>
<td>8%</td>
<td>6%</td>
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<tr>
<td>Obesity</td>
<td>1%</td>
<td>4%</td>
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Table 1. Anthropometric status per age group, SANHANES 2013.

Perception of body weight
Besides knowing the anthropometric status of an individual, it is also interesting to know the perception of the body weight of an individual. This is an important factor. The own perception of body weight and the awareness of the risks of overweight have an influence on the motivation to change behaviour (Wammes, Oenema & Brug, 2007). When someone is not aware of their risk behaviour, it will be hard to change their behaviour (Brug, Assema & Lechner, 2008). The NYRBS 2008 shows that nationally 12,1% of the learners considered themselves to be overweight, with significantly more female (15,5%) than male (8,7%) learners. More white learners (23,3%) than African black (10,8%) and coloured (15,2%) learners considered themselves being overweight (Reddy et al, 2008).

There are differences when comparing the perception of body weight with the measured anthropometric status. Nationally, 12,1% has the perception of being overweight, while actually 19% is overweight. This difference is remarkably high under females. 15,5% has the perception of being overweight while 27,8% is overweight. A percentage of 31,4 of the learners wants to stay the same weight, 23% wants to lose weight, and 22,8% is trying to gain weight. The remaining 22,8% does not want to do anything with their weight (Reddy et al, 2008). It is not known how many learners with overweight want to lose or gain weight.

The differences between the perception of body weight and the actual body weight can be related to cultural influences. Namely, in some African cultures, overweight and/or obesity is not seen as a problem. It indicates wealth and happiness and can be seen as an indication that the person does not have HIV or AIDS. This in contrast with the western beauty ideal, where white people want to be thin and shun fatness (Myo, Dick, Steyn, 1999)(Armstrong, Lambert, Sharwood, Lambert, 2006).

2.2.3. Causes of overweight and obesity
When you want to prevent and/or treat overweight, it is important to get more insight in the causes of this health problem. Therefore it is important to look at behaviour and how this behaviour arises (Brug, Assema & Lechner, 2008). UNICEF developed the ‘Model of Malnutrition’ (see figure 1) which makes a distinction between three different categories of causes, namely: immediate causes, underlying causes and basic causes. Note that malnutrition includes both undernutrition and overnutrition. This paragraph describes the behaviour that causes overweight and the environment that has influence on this behaviour.
A. Underlying and basic causes

The underlying causes are about insufficient household food security, poverty, lack of education, inadequate maternal/child care, unhealthy environment and insufficient health services. For instance, if a family does not earn enough income through consistent and sufficient work to buy healthy food and other needs for a family, it can lead to inadequate food security and inability to access health care services. This can also be related to overweight. Households do not have enough money to buy healthy foods, which are overall more expensive than the unhealthy foods. For instance, fruit is replaced by crisps (Temple & Steyn, 2011).

One of the underlying causes in the Model of Malnutrition by UNICEF is poverty. A well-known concept in South Africa is the Cycle of Poverty; families become trapped in poverty for several generations. The cycle of poverty is also related to the double burden of disease. There is an economical decline, which leads to a low personal income. Households have less access to healthy food and safe water. Malnutrition and poor sanitation is the result, which can lead to diseases and eventually death. There will be depleted workforce and thus an economic decline.

The level of education is also an important factor to promote good nutrition, development and health. Because of the poverty, the education level is low, which makes it hard to escape from the vicious cycle (Vorster, 2009).

Another underlying cause of overweight is stunting. According to the NFCS of 1999, just more than one out of five children was stunted and one in ten children was overweight (Labadarios et al, 2007). Several studies have shown an association between stunting and the risk of developing overweight at a later stage (Black et al, 2013)(Walker, Gaskin, Powell & Bennet, 2002)(Florencio, Ferreira, Da Franca, Cavalcante & Sawaya, 2001). Hoffman et al identified the underlying mechanism of this. Nutritionally stunted children have an impaired fat oxidation compared with non-stunted children. Impaired fat oxidation will accelerate fat deposition particularly quickly when a high-fat diet is consumed, because the excess fat intake will be deposited. The study concluded that stunted children are at increased risk of obesity and may gain weight over time when food supplies become sufficient (Hoffman, Sawaya, Verreschi, Tucker & Roberts, 2000). A national study of Labadarios et al showed...
that 26.5% of South African children in rural areas were stunted compared to 16.7% in urban areas (Labadarios, Steyn, Maunfer, Maclntyre, Swart & Gericke, 2000). Remarkably is that according to the NFCS 1999, more than one out of five children was stunted (Labadarios et al, 2007)(Kimani-Murage et al, 2010). This number is the same as the percentage of overweight adolescents (19.7%) in 2008 (Reddy et al, 2008).

The basic causes “refer to what resources are available (human, structural, financial) and how they are used (the political, legal and cultural factors).” (UNICEF, no date). The globalization led to a nutritional transition. Since the increase in exposure to the global market economy, a shift from traditional foods (which are low in fat and high in fibre) towards a diet high in fat and sugar took place. The globalization created an environment that promotes the consumption of food high in fat and sugar, which has led to an increased prevalence of overweight and obesity (Kruger, Puoane, Senekal & Merwe, 2005). Another basic cause is related to the cultural factor. Overweight women are seen as attractive, it is also associated with wealth and it is an indicator that the person does not have HIV/AIDS (Armstrong, Lambert, Sharwood, Lambert, 2006) (Kruger, Puoane, Senekal & Merwe, 2005).

The above mentioned underlying and basic causes are environment determinants. Causes such as political factors, poverty, household food insecurity, etc. have an influence on the behaviour of people. These factors need to be influenced on a higher level. However, this report is aimed at changing the personal behaviour, therefore it is necessary to look at the behaviour that is immediately causing the health problem (Brug, Assema & Lechner, 2008).

B) Immediate causes
An immediate cause of overweight is the dietary intake and physical activity, which have an influence on the energy balance. Below are mentioned behaviours that have influence on the energy balance and are associated with overweight.

**Sweet cool drinks**
One of the most obvious causes of an energy-dense diet is the high consumption of sweet cool drinks. These cool drinks contain a lot of energy, causing easily a positive energy balance. Steyn & Temple carried out a review which included 16 studies undertaken in South Africa, where they did research to several associations with sugar intake, including obesity. They concluded that there is strong evidence that there is a positive association between the intake of sweet cool drinks and in increased risk of obesity (Steyn & Temple, 2012). Sweet cool drinks, as well as energy or sports drinks, sweetened teas, fruit juices and other high-kcal beverages, are energy-yielding beverages that are low in satiety and therefore can easily cause a positive energy balance, which can lead to an increased BMI (Academy of Nutrition and Dietetics, 2012)(McKiernan, Houchins & Mattes, 2008). When looking at the consumption of sweet cool drinks (such as Coca Cola, Fanta, Pepsi, or other fizzy drinks) of adolescents, the NYRBS shows that there is a national average of 50,3% on four or more days during the week of the survey. This is significantly higher among the coloured learners (57,4%) and Indian learners (59,3%) compared with African black learners (49,2%), 53,5% drank at least two glasses each time they drank a sweet cool drink. There was a significantly higher prevalence under the coloured learners (64,4%). The NYRBS did no research to the consumption of sweet cool drinks among the learners that are overweight or obese (Reddy et al, 2008).

Vartianan et al carried out a meta-analyses including 88 studies. They examined the association between the consumption of sweet cool drinks and nutrition and health outcomes. Out of the 88 studies, 15 cross-sectional studies examined the association between the consumption of sweet cool drinks and the intake of milk. Thirteen of these studies showed that the intake of sweet cool drinks was associated with lower intakes of milk and dairy products (Vartianan, Schwartz & Brownell, 2007). This behaviour is also mentioned in ‘Community Nutrition in Action’ (Boyle & Holben, 2013). A decreased intake of milk may also lead to a decreased intake of calcium (The Dairy Council, 2007-2014). And that while during puberty the needs for calcium has its peak. Calcium is one of the key elements for building the skeleton and maintaining bone mass throughout life. It is a mineral element that is essential for the body (International Dairy Federation, 2008)(Miller et al, 2007). In relation to overweight, scientific evidence shows that milk consumption is often associated with a lower body mass (The Dairy Council, 2007-2014).
Unhealthy snacking
Frequent snacking has been associated with a positive energy balance and thus overweight and obesity. Note that the impact of snacking on the energy balance may be influenced by the types of snacks. A lot of unhealthy energy-dense snacks are bought at fast food restaurants, street vendors and Tuck Shops (Lobstein, Baur & Uauy, 2004).

Fast food can be purchased at restaurants such as McDonalds and KFC. These fast food restaurants are generally located in urban areas in a building or structure off the street. The consumption of fast food has been associated with obesity and a higher intake of energy, fat, saturated fat, and lower intakes of vitamins A, C, and fruit and vegetables. (Paeratakul, Fedinand, Champagne & Bray, 2003)(Bowman & Vinyard, 2004)(Bowman, Gortmaker, Ebbeling, Pereira & Ludwig, 2004)

Street food can be bought from stands, carts or kiosks on the street or pavement (also called Tuck Shops) and is usually sold in busy public areas, such as pavements, school premises, beaches, rail-and bus stations (Consumers International, 2011). Street food is consumed by an estimated 2.5 billion people world-wide each day (FAO, 2010). Four categories of street food items are typically sold: whole meals, snacks, beverages, and fruit. The most common products that are purchased are fruit, cold drinks, savoury snacks, biscuits and cooked foods such as pap and fried meat. The purchasing of fruit is nutritionally positive, while the other products are high in sugar, fat and/or salt and cooked foods are frequently fried.

A lot of South African high schools have their own Tuck Shop. The NYRBS 2008 also surveyed the behaviour of purchasing products from the school Tuck Shop. The national prevalence for learners who had often (at least four days a week) bought from the school Tuck Shop was 44.7%. Significantly more coloured learners (53.8%) than white learners (33.4%) and African black learners (44.6%) bought from the Tuck Shop. The Western Cape (54.7%) and the Northern Cape had the highest prevalence. The most commonly purchased products from the Tuck Shop were a packet of chips (34.3%), a sweet or chocolate (20.6%), a sandwich (19.2%) or a hamburger (10.8%). (Reddy et al, 2008). The previous research on the Emil Weder High School showed that more than half of the learners buys food in the Tuck Shop 3-5 times a week. The foods that are mostly bought are sweets, such as candy and chocolate (41.4%) and crisps (26.5%). The research also shows that one out of five learners indicated that they prefer to buy food in the Tuck Shop instead of taking a free school meal (Jeurissen & Totté, 2013).

There is strong evidence that fast food and street food is one of the causes of weight gain, which leads to overweight and obesity by promoting excess energy intake. This is because the food is convenient, readily available and meets the need of immediate hunger (American Institute for Cancer Research, 2007).

Skipping breakfast
Another behaviour that is associated with overweight is skipping breakfast. Skipping breakfast is commonly observed in overweight or obese children and adolescents. However, the actual cause of overweight is not always related to having breakfast or not, but may be related to dieting and disorder eating habits. A consequence of skipping breakfast in the morning is the less availability of energy for physical activity during the day (Cohen, Évers, Manske, Bercovitz & Edward, 2003)(Keski-Rahkonen, Kaprio, Rissanen, Virkkunen & Rose, 2003)(Aarnio, Winter, Kujala & Kaprio, 2002). Besides, several studies have shown that skipping breakfast may lead to unhealthy snacking during the day (Sjöberg, Hallberg, Höglund, & Hultén, 2003). Adolescents who perceived their body weight as too high or who are concerned about their weight may be more likely to skip breakfast. Several studies show that skipping breakfast is a popular method among adolescents to lose weight, especially among females (Shaw, 1998)(Lattimore & Halford, 2003)(Barker, Robinson, Wilman & Barker, 2000)(Brugman et al, 1997)(Nowak, 1998).

There is not much data available about breakfast consumption among South African adolescents. The SANHANES shows that 19% of the children age 10-14 years do not eat breakfast at home in the morning. The main reasons are not being hungry in the morning, no availability of food in the house to eat for breakfast and people at home do not eat breakfast (Shisana et al, 2013). Temple et al did research to the food consumption patterns amongst learners aged 12-16 years in 14 schools in Cape Town. It shows that 22.2% of the 476 learners did not have breakfast before school (Temple, Steyn,
Myburgh & Nel, 2006). The research of Jeurissen & Totté showed that the majority of the learners (59.2%) eats breakfast every day and 9.6% of the learners never eat breakfast in the morning. The other learners eat breakfast a few times per week (Jeurissen & Totté, 2013).

**Physical inactivity**

Overweight is the result of a prolonged positive energy balance, caused by an energy-dense diet or a lack of physical activity. This evidence is substantial and consistent. The NYRBS (2008) shows that 43.2% of the learners reported having participated in sufficient levels of vigorous activity and 29.3% of the learners participated in sufficient moderate activity. Vigorous activity is described as activities that make the learner sweat and breathe hard for at least 20 minutes, on at least three days of the week, such as soccer, rugby, basketball or running. Moderate activity is described as activities that not make the learner sweat or breathe hard for at least 30 minutes, on at least five days of the week, such as walking, slow bicycling, skating or mopping. The increased use of computer and television in South Africa, due to the national electrification, may have resulted in decreased physical activity (Reddy et al., 2002)(Kruger, Kruger & Macintyre, 2006). In terms of sedentary lifestyle, 29.3% watched television or played video or computer games for more than 3 hours per day (Reddy et al., 2008).

Several studies also show an association between television viewing and eating behaviour. Morgan et al and Boyle & Holben showed that increased television viewing by children and adolescents may be associated with increased consumption of unhealthy foods seen in television advertisements (Morgan, Fairchild, Phillips, Stewart, & Hunter, 2009) (Boyle & Holben, 2013). Taveras et al showed that the length of television viewing by children and adolescents is associated with higher consumption of fast foods and other high energy dense food and lower intake of fruits and vegetables (Taveras, Sandora, Shih, Ross-Degnan, Goldmann, & Gillman, 2006).

### 2.2.4. Risks of overweight and obesity

Besides the causes of an unhealthy body weight, it is also important to look at the consequences. The consequences show how important it is to do something about the increasing prevalence of overweight and obesity.

Overweight and obesity can lead to both physical and psychological problems. Not only in adults, but especially when it develops at a young age during childhood and adolescence. Overweight and obesity during childhood and adolescence are associated with a higher risk of the development of type 2 diabetes mellitus, a number of cardiovascular diseases (CVD) and cancer. Other common health risk are biliary diseases, osteoarthritis, respiratory problems, gout, infertility, menstrual disorders and foetal defects. The major risk factors of CVD are hypertension, dyslipidaemia, atherosclerosis and abnormal heart functions. The end points of these CVD are not necessarily seen in childhood or adolescence, but there is high risk during adulthood. As the overweight increases, the risk of these diseases will increase too. (Steyn, 2005)(Kwaliteitsinstituut voor de Gezondheidszorg CBO, 2008). The risk of creating CVD is also affected by other lifestyle behaviours such as smoking, drinking alcohol and physical activity (van Leest & Verschure, 2005).

According to the SANHANES, 5.6% of the people between the age of 15-24 year were diagnosed with prehypertension and 1.0% with hypertension. Prehypertension is defined as a blood pressure between 120-139/80-89 mmHg and hypertensions with a blood pressure > 140/90mmHg. The prevalence of hypertension in the Western Cape was 9.4% (SANHANES,2013). The Centre for Health Systems Research and Development did a study to chronic diseases under 1500 people in three different provinces in South Africa. The results was 41% of the population had hypertension, which was the most frequently seen disease. This number was followed by diabetes; which was diagnosed amongst 14% of the population (Centre for Health Systems Research and Development, 2004). The SANHANES showed that 9.6% of the total population had diabetes (Shisana et al, 2013).

According to Dr Ala Alwan: “Up to 80% of heart diseases, strokes and type 2 diabetes mellitus and over a third of cancers could be prevented by eliminating shared risk factors, mainly tobacco use, unhealthy diet, physical inactivity and the harmful use of alcohol.” (WHO, 2008).
Children with overweight become relatively often adults with overweight. From a certain age during childhood, the risk at overweight during adulthood can be predicted. This is called ‘tracking’. Several studies showed that overweight at age 6-7 years is a reasonable-good predictor for being overweight after puberty (Johannsson, 2006)(Fuentes, 2003)(Magarey, 2003). Adults who were obese during childhood, have a higher risk at morbidity and mortality during adulthood, regardless of their current weight (Must, 1999)(Reilly & Kelly, 2010). Whitaker showed that children aged 15-17 years who were not obese and had no obese parents, 5% was obese as a young adult. Children of the same group who were obese at that age and who had obese parents, 81% were obese as a young adult (Whitaker, 1997).

Besides that overweight is seen as something positives in some cultures, it can also lead to psychological problems in other individuals. Because of the western influences in South Africa, the country also has to deal with the western beauty ideal (Antoinette, 2010). Therefore, overweight and obesity can have a great impact on the self-esteem of an individual, especially during childhood and adolescence. It can give a negative self-perception, give rise to a lack of confidence and lead to depression. Also social rejection, discrimination and stereotyping frequently occurs against children and adolescent with overweight or obesity (Doak, Visscher, Renders & Seidel, 2006). Monyeki et al showed that overweight and obesity can influence scholastic and athletic competency, physical self-concept and social acceptance (Monyeki, Pienaar, Mamabolo & Temane, 2009). Besides the physical problems, the psychological problems may also extend into adulthood.

2.3. Conclusion
Overweight and obesity are defined as excessive or abnormal fat accumulation that presents a risk to health. This can be measured with different methods, namely; BMI, skinfold measurements and waist circumference. After comparing the different methods, it shows that the BMI is the easiest, fastest and most common used method for children and adolescents.

Desk research shows that the prevalence of overweight and obesity is higher among females than males, both in adulthood and adolescence. The NYRBS shows that the prevalence of overweight is 27.8% in females and 11.2% in males. Obesity affects 7.2% of the females and 3.3% of the males. These numbers are increasing when comparing the NYRBS of 2002 with 2008. The numbers of the NYRBS shows that there are differences in the perception of body weight and actual body weight. This may have to do with cultural factors, where overweight and obesity are not seen as a problem but an indication of wealth and happiness.

A distinction is made between immediate causes, underlying causes and basic causes. Several studies found an association between stunting and the risk of developing overweight at a later stage. However, this project will be focused on behaviour, which are the immediate causes. The immediate causes are the dietary intake and physical inactivity. Behaviours of dietary intake that are associated with overweight and obesity are the high consumption of sweet cool drinks and unhealthy snacks and skipping breakfast, where the first two behaviours are the most important behaviours associated with overweight and obesity in adolescents.

The intake of sweet cool drinks was not only associated with overweight, but also with lower intakes of milk and dairy products. This may result in a decreased intake of calcium, which can lead to other health problems. The unhealthy snacking behaviour is stimulated by the many fast food restaurants, street vendors and Tuck Shops at schools. Skipping breakfast is commonly observed in overweight or obese children and adolescents. Several studies have shown that skipping breakfast may lead to unhealthy snacking during the day. This behaviours leads in combination of a lack of physical activity to a positive energy balance, which is causing the high prevalence of overweight and obesity.

Overweight and obesity can lead to both physical and psychological problems. Physical problems are chronic diseases such as diabetes, cardiovascular diseases and cancer. Therefore, it is concerning that the prevalence of overweight and obesity during childhood and adolescence is increasing.
3. Field Research

3.1. Method
To find out what the anthropometric status is of the Emil Weder High School learners, a field research is performed. The method of this field research is based on the results of the desk research. Besides the anthropometric status, a few questions regarding eating behaviour have been asked to find out if there is an association between the outcomes of the desk research and field research.

Design
The design of the study is a descriptive or observational study. This study design provides information about the naturally occurring health status, behaviour, attitudes or other characteristics of a particular group. The goal of the research is to collect information on the anthropometric status, namely height and weight. With the outcomes, the BMI for each learner will be calculated using the person's weight (in kilograms), which will be divided by the square of the height (in meters). The BMI will be compared with the WHO references for BMI, which will define each learner as underweight, normal weight, overweight or obese. Also the BMI of each learner will be compared with the eating behaviour of the learner.

Study population
The study population consists of the learners of the Emil Weder High School in Genadendal. The high school counts 580 learners (41% male, 59% female), divided over grade 8 to grade 12. The learners are in the age between 13 and 20 years and most of the learners are coloured. See appendix 2 for an overview of the class list of the high school.

For the research, a reliable sample size has been chosen. The size of a sample is depending on the size of the population, confidence level, accuracy and margin of error. There has been chosen for a confidence level of 99%, which gives a sample size of 310 learners. The complete calculation can be found in appendix 3. These 310 learners are randomly chosen by class on the day of the research.

In different anthropometric studies, a distinguish is made in race as defined by Apartheid (black, white and coloured) and anthropometric status. In Genadendal and at the Emil Weder High School, most of the people are coloured, therefore no distinction will be made in race. However, there will be made a distinction in gender.

Only healthy learners are included in the research. The learner has not been asked if he/she is healthy or not, but the researchers have looked with a clinical view if the learner looked healthy or not. Besides, learners who do not feel well will not come to school. Thereby, what is the effect of sickness on weight and height? A learner with a cold will not lose 5 kg in a short amount of time, a learner with the flu might however due to a lack of appetite. But this last learner will probably not go to school. There has been chosen not to ask to the health status of the learner because it is difficult to measure someone's health. However, there has been searched for other factors that have influence on the body mass of a person. These can be factors such as teenage pregnancies, chronicle diseases and HIV/AIDS. Unfortunately, numbers of these diseases and pregnancies among adolescents in Genadendal could not be released to us because of private reasons.

Anthropometric research
To announce the research, a flyer has been developed. The flyer introduces the researchers and the project that the researchers are going to do. It also contains information about when and where the project takes place and that all the data will remain anonymous. The flyer can be found in appendix 4.

In the week before the research, the researchers have handed out the flyers and hung up some posters. Also an informed consent was signed by the principal and his assistant to get permission to perform the anthropometric research. See appendix 5 for these forms.

Another preparation for the research day was to come up with a little gift to stimulate the learners to participate in the research and to thank them for their cooperation. Therefore, there has been searched to a sponsor in the area who was willing to sponsor a little gift for each learner. In this case, an applicable gift would be a “healthy snack”. The researchers visited several supermarkets. Eventually the Spar was willing to sponsor the ingredients to bake bran muffin cakes. The bakery in
Genadendal was prepared to help the researchers baking an amount of cakes so that each learner could have a slice of the cake.

The anthropometric research has been performed on Tuesday September 17th to Thursday September 19th, 2013. On the first day, the researchers got help from twelve UWC nutrition students. They were divided over two classrooms. One room for measuring the girls, and one room for measuring the boys. Each room contained two measuring scales and two measuring rods. Also, a table has been set up where the questions could be asked. All the twelve UWC students were trained to do anthropometric measurements according to “Dietistisch Consult” and had the skills to ask the questions about eating behaviour (Becker-Woudstra, Havinga, Kuijeren & Linden-Wouters, 2008).

The measurements have been implemented according to the following procedure, which took approximately 5-10 minutes per learner:

- The researcher had to introduce him/herself first, followed by the explanation of the purpose of the study and ask the learner if he/she is willing to cooperate in the research.
- Questions: based on literature search, the following nine questions have been asked to the learner, which included personal questions and questions about eating behaviour:
  - Gender
    - Boys and girls have a different body compositions. It is also interesting to know if there are differences in eating behaviour between boys and girls.
  - Date of birth
    - The BMI references of the WHO are in months. To determine the anthropometric status of the learner, the exact date of birth is needed.
  - Are you satisfied with your weight?
    - This question gives insight in the perception of body weight. For example, when an individual is overweight but is satisfied with his/her body weight. This gives more information about if the learner sees overweight as a problem.
  - No, do you want to lose or gain weight?
    - This question gives an idea about how many learners want to change their body weight.
  - How important is healthy nutrition for you on a scale of 1 to 5, were 1 is not important at all and 5 is very important.
    - The importance of healthy nutrition indicates how adolescents think about nutrition.
  - Did you consume a school meal yesterday?
    - Based on 24hour-recall. To evaluate the previous project at the Emil Weder High School of Jeurissen & Totté (2013), and to see if there is a relation between the consumption of school meals and overweight.
  - Did you have at least three servings of dairy products yesterday?
    - Based on 24hour-recall. To find out if there is a relation between the consumption of dairy products and overweight. Desk research already confirms that the high consumption of sweet cool drinks is a cause of overweight. It also shows that the intake of sweet cool drinks is associated with lower intakes of milk and dairy products. With this question we want to find out if there is a link between overweight and the consumption of dairy products.
  - Did you buy something from the Tuck Shop yesterday?
    - To find out how much learners visit the Tuck Shop every day and are overweight or obese. The Tuck Shop at school sells a lot of unhealthy snacks. Desk research confirms that this is another cause of overweight and obesity.
  - Have you had breakfast this morning?
    - Desk research shows that skipping breakfast is commonly observed in overweight or obese children and adolescents. This may lead to unhealthy snacking during the day, which can be linked to the previous question and the prevalence of overweight and obesity.
  - Measuring weight: learners were required to remove their shoes, jacket and heavy items. The learner had to stand in the middle of the scale with the feet a little bit spread. The researcher had to pay attention that the learner was not leaning on anything.
  - Measuring height: learners were required to remove their shoes. Also, the learner had to stand straight with the back of their heels, bottom and head against the wall, and the learner had to look in front of him.
  - The level of precision for weight was ±0.1 kg and height was ±0.2 cm.
  - Bran Muffin Cake: after the learner was finished, he/she was thanked for participating and offered a slice of cake.
On Wednesday September 18th and Thursday September 19th there was no help from the UWC students anymore, only the two head researchers remained. Therefore only one classroom has been used, thus only one scale and one measuring rod.

Materials
During the research, four digital scales and four measuring rods have been used. On all the three days of the research, all the materials have been tested by one person to make sure that each different material indicates the same outcome for each weight and height.

The results have been analysed with the computer program SPSS, which stands for Statistical Package for the Social Sciences. SPSS is a software program used for statistical analysis.

3.2. Results
The sample size consisted of 310 learners, of which 45.5% were males and 54.5% females. The high school counts a total of 580 learners, of which 41% males and 59% females. This makes the sample representative for the whole population. The age varied between the 13 and 20 years, with a median of 16 years and a standard deviation of ±1.56.

For deciding the anthropometric status of each learner, learners with underweight or normal weight will be included in this part because they cannot be left out. Otherwise, the data of the research would be incomplete and it would not give a clear overview of the anthropometric status of all the learners.

Anthropometric status
From the total sample size, 13.2% of the learners is overweight. In figure 2, the differences in gender is shown. Overweight affects 18.9% of the females and 6.4% of the males. Obesity affects 5.8% of the total learners, of which the prevalence is higher among females (9.5%) than males (1.4%).

In table 2 a distinction is made between overweight and obesity per age group. When comparing the age groups, there is a higher prevalence of overweight and obesity among the 13-14 year and 15-17 year females than the 18-20 year females. For the male, there is also a higher prevalence of obesity among the 13-14 years and 15-17 years, but a higher prevalence of overweight among the 18-20 year males. In total, overweight affects more 18-20 years than the other age groups, and obesity affects more 13-14 years than the other age groups. Note that the number of learners in each age group is not the same, therefore this observation cannot be said with certainty.

![Figure 2. Anthropometric status and gender.](image-url)
Satisfied with body weight
From the 310 learners, almost 65% is satisfied with his/her body weight. The other 35,5% is not satisfied, of which 22,9% are female and 12,6% male. Of these 35,5%, 43,6% wants to gain weight (16,4% female and 27,3% male), and 56,4% wants to lose weight (48,2% female and 8,2% male).

When comparing the satisfaction of body weight with the anthropometric status of the learner, it shows that of the total learners that are satisfied with his/her body weight, 14% is overweight or obese (12% female and 2% male). From the total learners that is not satisfied with his/her body weight, 28,2% is overweight or obese (21,8% female and 6,4% male). From all the learners that want to lose weight, 43,5% is overweight or obese (38,7% female and 4,8% male). From all the learners that want to gain weight, 8,3% is overweight (0% female and 8,3% male).

Importance of healthy nutrition
For this question, the learners could choose on a scale from 1 to 5 how important healthy nutrition for him/her is, where 1 is not important at all, 2 is not important, 3 is a little bit important, 4 is important and 5 is very important. Of all the learners, 74,5% find healthy nutrition important or very important. From all the learners that find healthy nutrition important or very important, 36,7% is overweight or obese.

Consumption of school meal
From the 310 learners, only 26,1% consumed a school meal the day before (8,4% female and 17,7% male). The other 73,9% did not consume a school meal (46,1% female and 27,7% male). From the learners that consumed a school meal, 16% is overweight or obese (7,4% female and 8,6% male). From the learners that not consumed a school meal, 20% is overweight or obese (18,3% female and 1,7% male).

Tuck Shop
From the total sample size, 66,5% bought something from the Tuck Shop the day before (38,7% female and 27,7% male). From all the learners that bought something from the Tuck Shop, 18,2% is...
overweight or obese (15% female and 3.4% male). All the girls with obesity purchased something from the Tuck Shop the day before.

From the learners that bought something from the Tuck Shop, 73.3% did not consume a school meal. 26.7% of the learners had both a school meal and bought something from the Tuck Shop. From all the learners that are overweight or obese, half of the learners did not have a school meal and bought something from the Tuck Shop. See table 3.

<table>
<thead>
<tr>
<th>Anthropometric status</th>
<th>Did you consume a school meal yesterday?</th>
<th>Count</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Normal weight</td>
<td>44</td>
<td>19</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>110</td>
<td>61</td>
<td>177</td>
</tr>
<tr>
<td>Total</td>
<td>160</td>
<td>80</td>
<td>240</td>
</tr>
<tr>
<td>Overweight</td>
<td>5</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>12</td>
<td>33</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>15</td>
<td>41</td>
</tr>
<tr>
<td>Obese</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>206</td>
<td>104</td>
<td>310</td>
</tr>
</tbody>
</table>

Table 3. Cross tabulation school meal and Tuck Shop and anthropometric status

Breakfast
Almost 85% of the sample size had breakfast on the day of the research, with more females (44.5%) than males (40%) having breakfast. The other 15.5% did not have a breakfast (10% female and 5.5% male). Of all the learners that did not have breakfast, 14.6% was overweight or obese (12.5% female and 2.1% male). From all the learners that did have breakfast, 19.9% was overweight or obese (16% female and 3.9% male).

From all the learners that bought something from the Tuck Shop, 15% had no breakfast. From all the learners that had breakfast, 84% did not buy anything from the Tuck Shop.

Dairy products
More than two-third (70.6%) of all the learners did not have at least three servings of dairy products the day before the research (44.8% female and 25.8% male). The other 29.4% did have at least three dairy products on the day before (9.7% female and 19.7% male). Of all the learners that did not have at least three servings of dairy products, 21% was overweight or obese (18.2% female and 2.8% male). Of the learners that did have at least three servings of dairy products on the day before, only 14.3% was overweight or obese (8.8% female and 5.5% male).

3.3. Conclusion
Field research shows that 19% of the total learners at the Emil Weder High School is overweight or obese, with more females (27.4) affected than males (7.8%). When looking at the behaviours that have been researched, several associations can be made. There might be an association between overweight and obesity and purchasing products from the Tuck Shop. From all the learners that bought something from the Tuck Shop, almost one out of five is overweight or obese. Another association can be made between the health problem and satisfaction of body weight. Of the total learners that is satisfied with his/her body weight, 14% is overweight or obese. The last remarkable association is between the consumption of a school meal and overweight and obesity. From the learners that not consumed a school meal, one out of five is overweight or obese, with mainly the females affected.
4. Conclusion desk- and field research

This research has been carried out to find out what the prevalence is of overweight and obesity and what behaviours can be associated with this health problem among the learners of the Emil Weder High School.

When comparing field research with desk research, the prevalence of overweight and obesity (19% - 19.7%) is comparable with each other. They also both confirm that there is a higher prevalence among females than males. Desk research shows that overweight affects 27.8% of the females and 11.2% of the males. Obesity affects 7.2% of the females and 3.3% of the males. The field research shows that 18.9% of the females and 6.4% of the males is overweight. And 9.5% of the females and 1.4% of the males have obesity.

When looking at the satisfaction of body weight, the majority is satisfied with his/her weight. This is shown in both field- and desk research. From the learners that are not satisfied, more than half wants to lose weight, especially females (48.2% female and 8.2% male). From all the learners that want to lose weight, 43.5% is overweight or obese. As desk research shows, the cultural factor may play a role here. Some cultures have a different perception of body weight where overweight is seen as an indicator of wealth and happiness, and not having HIV/AIDS.

Desk research shows that a high consumption of sweet cool drinks is strongly associated with overweight and obesity. There is also evidence that the intake of sweet cool drinks is associated with lower intakes of milk and dairy products. This replacement is associated with a higher body mass. Field research shows that 21% of the learners with overweight or obesity did not have at least three dairy products per day. When looking at the total sample size, the consumption of at least three dairy products per day is only 29.4%.

The percentage of learners that had breakfast on the day of the research was 84.5%, while the previous study on the Emil Weder High School showed that 59.2% of the learners eats breakfast every day (Jeurissen & Totté, 2013). These numbers may be different due to that the research was based on a 24hour-recall and the previous research on a whole week. Field research shows that there is no remarkable relation between the learners that have no breakfast and are overweight or obese.

The prevalence of purchasing products from the Tuck Shop is comparable with the previous research on the high school; more than half of the learners buys food from the Tuck Shop. Remarkable is that all the obese girls purchased something from the Tuck Shop the day before the research. Another remarkable outcome is that from all the learners that bought something from the Tuck Shop, 73.3% did not consume a school meal.

The majority of the learners (74.5%) find healthy nutrition important or very important, of which 36.7% of these learners are overweight or obese. This could mean that there is a positive attitude about healthy nutrition, but that the learners do not know how to apply it in their lives.

Besides the immediate causes of overweight and obesity there are also the underlying causes that are important to take in account such as poverty and stunting. It is remarkable that one out of five children, shown in the NFCS of 1999, is stunted. This is almost the same as the prevalence of overweight and obesity in adolescents in the NYRBS 2008 (19.7%), but also in our field research (19%). This comparison could confirm the association of stunting in childhood and developing overweight at a later stage. However, no research has been done to the prevalence of stunting during childhood of the learners at the Emil Weder High School.

This research has led to the behaviours that are associated with overweight and obesity. To change this behaviour, this report will continue with a health promotion part.
5. Health Promotion

As a result of the high prevalence of overweight and obesity at the Emil Weder High School, there will be searched to an intervention that is focused on changing behaviour of the learners and the health problem overweight and obesity. The behaviours that are causing overweight and obesity that came forward out of desk- and field research will give a direction to set up an intervention. The most important causes were the high consumption of sweet cool drinks. Also unhealthy snacking, stimulated by the Tuck Shop at school, is an important cause. Besides the dietary intake, physical inactivity is also an important factor. Another important factor to take in account is the cultural difference in perception of body weight. Overweight and obesity is not always seen as a problem, it indicates wealth and happiness and can be seen as an indication that the person does not have HIV or AIDS.

To set up an intervention in a methodical way, the protocol Intervention Mapping is used. The protocol describes the developing of education programs in six steps. When you want to change a certain behaviour, it is important to find out what is causing this behaviour, also called the determinants (Bartholomew, Parcel, Kok & Gottlieb, 2006). The determinants will be traced by doing desk research. After that, existing interventions will be assessed and compared to eventually choose one suitable intervention to work on changing the behaviour of the learners.

5.1. Determinants

The behaviours that are causing the health problem have been mentioned above, namely; high consumption of sweet cool drinks and unhealthy snacking. The behaviour physical activity will not be included because this report is aimed at the dietary intake. The determinants that are possibly causing this behaviour according to desk research will be mentioned in this paragraph. Also the importance of the determinants and the degree of how they can be influenced will be described.

The previous research on the Emil Weder High School showed that social influence and knowledge are important determinants that play a role in the choices that learners have to make regarding healthy nutrition. More than one third of the learners states to be influenced by friends when making the choice to take a school meal or not. This has to do with the stigma on the school meals. Learners get laughed or mocked at when taking a school meal. This can probably also be linked to the high amount of learners that purchase products from the Tuck Shop. It is ‘cooler’ when buying a snack than getting a school meal (Jeurissen & Totté, 2013). Nowadays, the influence of the mass media and advertising also play an important role in making food choices. Brands like Coca Cola and Lays are attractively presented on television and billboards, which leads to a positive image of the product among people (Boyle & Holben, 2013).

Also knowledge plays an important role when making healthy food choices. The research of Jeurissen & Totté shows that more than half of the learners thinks vetkoek (fried dough) is a healthy snack. Also, more than one third of the learners does not see soda as an unhealthy beverage (Jeurissen & Totté, 2013). Both the determinants knowledge and social environment are confirmed by several studies that Dr Nelia Steyn included in her research to the influence of dietary knowledge on eating behaviour of adolescents (Steyn, 2010).

Field research shows that more than 70% of the learners find healthy nutrition important of very important. This should mean that the learners have a positive attitude about healthy nutrition. However, when comparing this number with the prevalence of overweight and obesity at the high school, it shows that more than one third of the 70% that find healthy nutrition important of very important is overweight. There might be an association between the positive attitude about healthy nutrition and being overweight, namely that they are not aware of their behaviour or do not have the knowledge about the risks of their behaviour. Also a cultural factor could play a role in this. Some cultures have a different perception of body weight where overweight is seen as an indicator of wealth and happiness, and not having HIV/AIDS (Armstrong, Lambert, Sharwood, Lambert, 2006).

Field research confirms that almost 65% of the total learners is satisfied with his weight. This while 19% of the total learners is overweight or obese.

Besides the determinants knowledge and social influence there are other factors that have influence on behaviour. For example the economic environment: poverty. Poverty restrains people from buying...
healthy food such as fruit, vegetables and wholegrain, because these are often more expensive. When comparing a typical south African diet with a healthy diet, the healthy diet costs 69% more. But this also has to do with the food choices people make. For instance; foods such as oats, beans, carrots and apples are healthy and not really pricy, but instead of buying these products people choose for cookies, jam and chocolate because they are more desired than the previous mentioned products. This shows that improving knowledge about the importance of a healthy diet is important, but also explaining how to make a healthy diet affordable (Temple & Steyn, 2011). Thereby, in rural areas is less accessibility to big supermarkets. With many people in rural areas having no (access to) transport, the people have to go to the little shops with a limited offer of products (Dibsdall, Lambert, Bobbin & Frewer, 2003).

**Important and influenceable determinants**
A first essential step in the process of changing behaviour is creating awareness of the risk behaviour. When someone is aware of their risk behaviour, they will consider changing their behaviour. Awareness is when one has sufficient knowledge and insight of their own unhealthy behaviour. Knowledge about healthy nutrition and risks of overweight and obesity is therefore an important determinant of health behaviour (Brug, Assema & Lechner, 2008). Therefore, creating awareness and improving knowledge among the learners will be the aim of the intervention. It is also important to take into account the rural environment the learners are living in. As mentioned above, people may not have the tools and money to have a healthy lifestyle. In the next paragraph, the main- and sub goals for the intervention will be defined.

**5.2. Main- and sub goals**
This paragraph describes the main goal, which is divided into different sub goals. These sub goals are aimed at the determinants awareness and knowledge and have been set up to evaluate the effect of the intervention.

**Main goal**
The goal of the intervention is to prevent overweight and obesity at the Emil Weder High School in Genadendal by promoting healthy nutrition, improving the knowledge about healthy nutrition and creating awareness of the learners current lifestyle.

**Sub goals of the determinant awareness for the Emil Weder High School**
- After the intervention, at least 60% of the learners has thought about a healthy lifestyle by creating a poster about this subject.

**Sub goals of the determinant knowledge for the Emil Weder High School**
- After the intervention, at least 60% of the learners can name at least three examples of healthy snacks and at least three examples of unhealthy snacks.
- After the intervention, at least 60% of the learners knows how many sugar packs there are in a glass of coke.
- After the intervention, at least 60% of the learners can name three healthy choices to replace sweet cool drinks.

**5.3. Existing interventions**
This paragraph describes different and already existing interventions to find out if there are (parts of) interventions that can be used for our intervention. These interventions have to comply with the health problem, the behaviours that are associated with the health problem and the target group.

**Dutch Obesity Intervention in Teenagers (DOIT)**
This intervention is aimed at learners in the age of 13 to 16 years with the goal to prevent overweight by changing behaviour regarding nutrition and physical activity. The behaviours where DOIT is aimed at are the energy intake by decreasing the consumption of unhealthy snacks and sweet cool drinks and the energy expenditure by increasing physical activity and decreasing sedentary lifestyle. The intervention contains twelve information lessons and four gym lessons, which are spread over two school years. During these lessons, the learners are taught about the four risk behaviours, and the relationship with the energy balance.

DOIT defined for the behaviour of unhealthy snacking and sweet cool drinks the most important determinants that can be influenced to change behaviour, namely: knowledge, individual
awareness/attitude and skills. To involve the learners in the program, DOiT created assignment where the learners need to be active and at the same time need to think about the subjects that are in issue. (Nederlands Jeugd Instituut, 2010)

**Eat well & keep moving**

Eat well & keep moving is a learning program that helps academic, physical education and health education teachers to guide students in learning about a healthy lifestyle and how to change behaviour to prevent overweight and obesity among children and adolescents. This program has been reviewed because it includes a lesson about sugar drinks. The lesson will take 1 hour and 15 minutes and includes the following items:

- “Students will measure the amount of sugar consumed from soft drinks and evaluate the results.
- Students will identify the different forms of sugar added to beverages.
- Students will demonstrate how the body responds to sugary drinks.
- Students will learn to replace soft drinks and other sugar-sweetened beverages with healthy drinks.” (Eat well & keep moving, no date).

The goal of these points is to make the learners aware of the amount of sugar in soft drinks and how they contribute to a positive energy balance.

**Nutrition Week South Africa 2013**

Annually, a national nutrition week is held in South Africa. Nutrition Week 2013 was aimed at the increasing prevalence of overweight and obesity. The overall message was “eat less – choose your portion with caution”. The aim is to educate the South African populations about portion size and food choices, and changing attitudes and habits so that health risks of overweight and obesity can be reduced. Besides the overall message, there are three supplementary messages:

- “Choose a variety of foods from different food groups and eat recommended amounts.
- Make portion control a daily way of life.
- Use salt and foods high in salt sparingly.” (Nutrition Week, 2013).

Based on these messages, an intervention at the UWC has been organized. Different messages and slogans were hung up in the school. Also nice factsheets were developed to hand out to the students at UWC. The goal of the intervention was to draw attention to overweight and obesity by the message “eat less – choose your portion with caution”.

**“Gezonde Schoolkantine”**

The translation of this Dutch intervention is the “healthy school canteen”. The program supports schools by using practical information and a plan which includes six steps to turn the school canteen into a healthy school canteen. A healthy school canteen offers at least 75% of healthy basic food (fruit, sandwiches and salads) en a maximum of 25% not-basic food (candy and snacks). The thought behind this is to make adolescents aware of healthy food and stimulate them to make healthy choices to prevent overweight. Several studies have shown that changing the ratio of unhealthy products and healthy products in school canteens lead to a desired effect (Loket Gezond Leven, 2010).

Products can be made attractive by putting them on a nice plate or in a nice bowl, by giving them a tasty name such as ‘fresh apples’ or ‘delicious smoothie’ and promote new products by letting the learners taste a sample for free. A variety and enough choice of healthy products is also important. Besides that it is important to create a nice atmosphere, for example by using music, hanging up big photos of healthy products and having a nice seating area (De Gezonde Schoolkantine, no date).

This intervention has been reviewed because it shows how healthy eating behaviour can be made attractive and stimulated.

**5.4. Developed intervention**

The above mentioned interventions have led to ideas for a new intervention, which will be aimed at creating awareness of the high prevalence of overweight and obesity and improving the knowledge about healthy nutrition among the learners of the Emil Weder High School. The intervention consists of two parts.
Part I – creating a poster
The first part is aimed at involving the learners in the intervention. The learners get the assignment to create a poster with a slogan about healthy lifestyle. The question towards the learners is what a healthy lifestyle is. The poster can contain images, drawing and/or text. It is to the learners to come up with a creative poster. To stimulate and motive the learners to think about healthy lifestyle, the three best posters will be awarded with a nice price. Also the teachers and staff of the Emil Weder High School have been involved. The assignment for the teachers and staff was to announce this competition. But also to make time for the learners to create the poster during class.

The goal of this part is to create awareness among the learners of their own lifestyle. By giving this assignment, the learners are forced to think about a healthy lifestyle, which is a way to create awareness. (Nederlands Jeugd Instituut, 2010)

Part II – “healthy lifestyle day”
The second part is aimed at promoting a healthy lifestyle. The intervention takes place at the Emil Weder High School in front of the Tuck Shop where the learners normally buy their unhealthy snacks. A stand is placed where the learners can buy healthy snacks such as fruit, vegetables, yoghurt and sandwiches. An overview of these products is listed in table 4. The Tuck Shop will be closed for that day so no unhealthy snacks can be bought. Furthermore, a display of unhealthy snacks and beverages is shown at the stand. For example, the learners can see how much sugar packs a glass of coke contains.

<table>
<thead>
<tr>
<th>Product</th>
<th>Price in ZAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Juicy apple</td>
<td>1,50</td>
</tr>
<tr>
<td>Delicious Piesang</td>
<td>1,50</td>
</tr>
<tr>
<td>Toebroodjie Gesond</td>
<td></td>
</tr>
<tr>
<td>Fresh sandwich with cheese</td>
<td>3,00</td>
</tr>
<tr>
<td>Peanut butter sandwich</td>
<td></td>
</tr>
<tr>
<td>Toebroodjie met grondboontjebotte</td>
<td>3,00</td>
</tr>
<tr>
<td>Mixed veggies in a cup</td>
<td>2,50</td>
</tr>
<tr>
<td>Mini tamaties, komkommer en baby carrots</td>
<td>2,50</td>
</tr>
<tr>
<td>Yoghurt with a crunch</td>
<td></td>
</tr>
<tr>
<td>Tasty low fat yoghurt with muesli</td>
<td>2,50</td>
</tr>
<tr>
<td>Flavoured milk</td>
<td></td>
</tr>
<tr>
<td>Strawberry or peach</td>
<td>2,00</td>
</tr>
<tr>
<td>Popcorn</td>
<td>1,00</td>
</tr>
</tbody>
</table>

Table 4. Healthy snacks sold at the school.

The stand and products have been made attractive by using the tips of the intervention ‘The Healthy School Canteen’, for example: all the products were given tasty names such as ‘delicious piesang’ and ‘fresh sandwich’. Slogans and messages about a healthy lifestyle were displayed at the stand. Examples of slogans are: “drink water uit die kraan, laat die suikerdrankies staan”, “eat healthy snacks instead of Nik Naks”, etc. The other slogans and messages can be found in appendix 6. They are processed in a nice factsheet to hand out to the learners and to the community.

To get more attention from the learners about the intervention and poster competition, a poster has been developed which can be found in appendix 7.

Pre test
All the above mentioned ideas have first been discussed with a teacher and the personal assistant of the principle of the Emil Weder High School before implementing the intervention. Also our supervisor from UWC gave feedback about the idea for the intervention. Several adaptions have been made to the healthy snacks. The cottage cheese of the healthy sandwich is replaced by medium fat cheese. The reason for this was that the learners are not familiar with cottage cheese and it is an expensive product. The teacher and staff of the high school advised to sell also peanut butter sandwiches. In the previous intervention at the high school they were very popular among the learners. Furthermore, the amount of the veggie cups went from 60 cups to 30 cups. The reason for this was that the teachers expected that it would not be popular among the learners because it is not a common snack. The other healthy snacks were positively rated.
5.5. Implementation
The intervention took place on the 20\textsuperscript{th} of November at the Emil Weder High School in Genadendal. The day before the intervention, all the needed materials have been laid out, the board with the messages and slogans was made and the factsheets were printed. On the day of the intervention, sandwiches were made, vegetables were cut and the popcorn was prepared before the intervention started. The other healthy snacks were prepared at the stand. To put up the stand, tables and change for the selling products were arranged. Also a cooling box for the yoghurt and yoghurt drinks was arranged to keep the products cool and fresh. The fruit was displayed in nice baskets and plates to make them attractive. The big board with the slogans and messages was put in a clear sight of the learners. Also the display of the unhealthy snacks were set up. A glass of coke was compared with a glass of milk, with each the nutrients and benefits and disadvantages of these products.

At 09.30 am the first interval started. Four persons were ready to sell and promote the healthy snacks. This interval was 15 minutes long. After the end of the interval, products were replenished for the next interval at 10.30 am. On the day of the intervention there has been decided to extend the poster competition for two days. This because there were less posters handed in than expected. After selling the healthy snacks, all the factsheets have been handed out to each class. Also a reminder for the poster competition was made while handing out the factsheets.

On the 22\textsuperscript{nd} of November, learners could hand in their posters during the first interval. The best three posters were rewarded with nice prices.

Another part of the intervention was to involve the community to reach a larger audience and to draw more attention to the health problem overweight and obesity. The factsheets with the slogans and messages that were handed out to the learners have also been spread in the community by putting stacks of these factsheets in the clinic, municipality and all the little shops in Genadendal.

5.6. The costs
To organize the healthy lifestyle day, products were purchased in Caledon at the supermarkets Pick \textsuperscript{'}n Pay, SPAR and a Chinese shop. Table 5 gives an overview of the products that were bought, the cost price and the selling price. Note that profit is not a goal in this intervention. The target group does not have a lot of money to spend. To make the products attractive the prices need to be similar with products that are normally bought at the Tuck Shop. In order to implement the intervention there has been searched for sponsors. The TWK-project was willing to donate a certain amount of money.

<table>
<thead>
<tr>
<th>Product</th>
<th>Price/ prod.</th>
<th>Amount</th>
<th>Cost price in ZAR</th>
<th>Price per selling product in ZAR</th>
<th>Selling price in ZAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apples gold/del</td>
<td>16,99</td>
<td>2</td>
<td>33,98</td>
<td>1,50</td>
<td>1,50</td>
</tr>
<tr>
<td>Apples starking 1,5 kg</td>
<td>18,99</td>
<td>2</td>
<td>37,98</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bananas bulk pack</td>
<td>19,99</td>
<td>4</td>
<td>79,96</td>
<td>1,67</td>
<td>1,50</td>
</tr>
<tr>
<td>30x healthy sandwich</td>
<td>10,49</td>
<td>3,5</td>
<td>36,72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>w/w brown bread low GI</td>
<td>44,99</td>
<td>1</td>
<td>44,99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gouda cheese 500gr</td>
<td>6,66</td>
<td>1</td>
<td>6,66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cucumber</td>
<td>16,99</td>
<td>1</td>
<td>16,99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baby leaf salad mix 120gr</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30x peanut butter sandwich</td>
<td>10,49</td>
<td>3,5</td>
<td>36,72</td>
<td>2,42</td>
<td>3,00</td>
</tr>
<tr>
<td>w/w brown bread low GI</td>
<td>18,00</td>
<td>2</td>
<td>36,00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peanut butter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 cups of mixed veggies</td>
<td>10,99</td>
<td>3</td>
<td>32,97</td>
<td>1,74</td>
<td>2,50</td>
</tr>
<tr>
<td>Mini Italian tomatoes (250 gram)</td>
<td>12,49</td>
<td>1</td>
<td>12,49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peeled baby carrots (400 gram)</td>
<td>6,66</td>
<td>1</td>
<td>6,66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cucumber</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 cups of yoghurt with muesli</td>
<td>19,99</td>
<td>4</td>
<td>79,96</td>
<td>1,99</td>
<td>2,50</td>
</tr>
<tr>
<td>Low fat yoghurt muesli</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 cups of flavoured milk (2 litre)</td>
<td>25,99</td>
<td>3</td>
<td>77,97</td>
<td>1,95</td>
<td>2,00</td>
</tr>
</tbody>
</table>
Table 5. Costs intervention.

<table>
<thead>
<tr>
<th>Product Description</th>
<th>Price 1</th>
<th>Quantity</th>
<th>Subtotal</th>
<th>Price 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Popcorn salt 3x100gr</td>
<td>24.99</td>
<td>1</td>
<td>24.99</td>
<td>1.00</td>
</tr>
<tr>
<td>Plastic cups (125)</td>
<td>12.20</td>
<td>5</td>
<td>60.99</td>
<td>0.49</td>
</tr>
<tr>
<td>Price 1</td>
<td>96.74</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price 2</td>
<td>24.99</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Printing costs</td>
<td>233.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAAL</td>
<td>980.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales 20th of November 2013</td>
<td>345.40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss</td>
<td>635.35</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.7. Evaluation

Evaluation is an important part when working in a methodological way for health education. By evaluating, there can be learned what is effective and what not. For the organisation around the intervention and the process of the intervention it is important to evaluate what went well and what can be improved. All these points are important to learn from for in the future (Brug, Assema & Lechner, 2008).

Because of the ending of the school year it is unfortunately not possible to evaluate if the main goals and sub goals have been reached. Therefore, the evaluation is based on observation on the day of the intervention. How did the learners react and how did the selling of the healthy snacks go? Which products were popular and which were not popular? Also the feedback of the teachers and supervisors that came by to see the intervention have been included in the evaluation. The evaluation will be divided in a process evaluation and effect evaluation.

Process evaluation

There has been observed how the learners reacted on the stand, the healthy snacks and which products sold well and which products did not sell very well. The stand stood in front of the Tuck Shop. The Tuck Shop was closed for the day. This was a good idea so that the learners who normally go to the Tuck Shop would now see the stand, and buy something healthy. Some learners asked for Nik Naks, which is sold at the Tuck Shop, but when they noticed that the Tuck Shop was closed and they only could buy healthy snacks from the stand, they bought a healthy snack.

Positive feedback was given by teachers and staff, our supervisor and coordinator about the board with the slogans and messages. They found the slogans very catchy and clear. The messages contained understandable and practical tips about a healthy lifestyle.

Organisational, more preparation time was needed to set up the healthy snacks like the yoghurts with muesli, the yoghurt drink and the popcorn. There was a wrong estimation about the popcorn. The popcorn was very popular among the learners, unfortunately there was not enough. Other points were that the selling of the products was very hectic during the first interval. One of the reasons was that there were not enough price lists with the result that both the learners and the sales women were not sure about the prices of the products.

Looking at the sale of the different products, both the peanut butter sandwiches and the healthy cheese sandwiches were not as popular as expected. The mixed veggies were also not very wanted. Possible causes of this can be that the price was too high or that other products were more popular.

The popcorn, the yoghurt with muesli and the flavoured yoghurt were very popular among the learners. All these products were sold out. The selling of the fruit went well, whereby the bananas were more in favour than the apples.

Remarkable was that the choice of the learners went out to the sweetest snacks and the ‘crispy’ snacks (popcorn) instead of the fruit, veggies and sandwiches.

For the other part of the intervention, the poster competition, announcements were made to both the teachers and the learners. The announcement for the learners was in the form of a poster, which has
been hung up a week before the competition ended so the learners had time to create an own poster about healthy lifestyle. Seen the amount of posters that have been turned in by the learners, more attention should have been paid to announce the competition and to motivate the learners to participate in the competition. Another reason for the low participation might be due to the exams that were going on in the week of the intervention and the week before. Learners might have been busy with studying for the exams and having no time to create a poster.

The teachers have been involved by announcing the competition during a meeting were all teachers and staff were present. Their assignment was to motivate and stimulate the learners to make a poster and to give them time during class to work on it. However, because of the exams there was no extra time available to work on the poster during class.

Effect evaluation
Due to school exams, it has not been possible to evaluate if the main- and sub goals have been reached. However, the effect of the poster competition has been evaluated. After extending the due date for the poster, eventually three learners turned in a poster. As mentioned above, this might be due to the exams and the way of announcing the competition. The real reason can be identified by doing a survey among the learners. Also the other main- and sub goals can be evaluated in the future with help of a survey. A survey has been established which can be found in appendix 8.

To implement this intervention in the future again it is important to evaluate the current intervention first. The reason for this is to see if it is effective and what can be improved to implement the intervention again and possibly to implement it on other high schools.
6. Conclusion Health Promotion

The goal of the intervention was to prevent overweight and obesity at the high school in Genadendal by promoting healthy nutrition, improving the knowledge about healthy nutrition and creating awareness of the learners current lifestyle. After some pre research, an intervention has been developed which consisted of two different parts. In the first part the learners were involved in the intervention by letting them create a poster about a healthy lifestyle. The goal of this was to create awareness among the learners of their current lifestyle. The second part was aimed at promoting a healthy lifestyle by selling healthy snacks and drinks for one day. Also improving knowledge by handing out factsheets and making the stand attractive with slogans and messages was a part of the healthy lifestyle day.

Unfortunately, an effect evaluation could not be performed because of exams and the ending of the school year. However, based on our observation and the feedback of professionals, a process evaluation could be performed. When looking at the sale of the healthy snacks, the popcorn, yoghurts and fruit were very popular among the learners and teachers. To improve the intervention in the future, more announcements should be made for the poster competition and the intervention should not take place during exams. Overall, the healthy lifestyle stand looked very attractive and the factsheets looked professional and were aimed at the target group. Also the learners and teachers were very curious and enthusiastic about the stand.
7. Discussion

This report has been carried out because of the high prevalence of overweight and obesity in South Africa. To look back at the implementation and outcomes of the research- and health promotion part in a critical way, a discussion will be written.

7.1. Research

When looking at the prevalence of overweight and obesity in desk- and field research, it shows that the outcome is lower in field research than desk research. This may have to do with the voluntary participation of the research. Learners with overweight or obesity might be ashamed of their body weight and therefore not willing to participate in the research. Besides, Genadendal is a rural area. Different studies have shown that there are higher rates of overweight and obesity in urban areas than in rural areas.

For the anthropometric research, the learners have been measured while wearing clothes and being in a not fasted state. This may influence the outcome of their real weight. However, all learners were in the same state so the influence on the outcomes will be limited. The reason for doing it this way is that it is ethical not responsible to demand the learners to be in a fasted state and to remove all their clothes.

The goal of the research was to find out the prevalence of overweight and obesity at the Emil Weder High School. Besides the anthropometric research, some questions have been asked that give an idea in which direction one can look to determine the actual behaviour of the learners. These questions were based on 24-hour recall, which means that there is only information obtained from the day before the research. For instance, there has been asked if the learner purchased something from the Tuck Shop the day before the research, but there has not been asked further to what product there was purchased from the Tuck Shop and how often. Another example is the consumption of the school meal. From the learners that not consumed a school, it is not clear what they had instead of. Because of the 24-hour recall, it is not clear how often the behaviour occurs.

There has been chosen to do research to the milk and dairy consumption instead of the sweet cool drinks consumption because lots of evidence supports the association between high consumption of sweet cool drinks and overweight and obesity. There also has been found evidence that the consumption of milk and dairy products is associated with a lower body mass. But fewer data about milk and dairy consumption and the prevalence of overweight and obesity is known. Therefore this research has include this subject. Field research shows that more than one out of five learners with overweight or obesity did not have at least dairy products per day. However, it is still not clear if these dairy products are replaced by sweet cool drinks as desk research confirms. Further research is needed to the relation between milk and dairy consumption, sweet cool drinks and overweight and obesity.

The research shows that there is a high prevalence of overweight and obesity at the Emil Weder High School, especially among the females. A few possible associations between overweight and different behaviours have been identified. However, further research to the energy intake, energy expenditure and determinants that have influence on this behaviour is needed to get a better insight in the causes of overweight and obesity.

7.2. Health promotion

An important factor that had influence on the effect of the intervention were the school exams. Because of this, fewer learners were at school with the result that there was less attention to the “Healthy Lifestyle Day” and the poster competition. Possibly, also the announcement of the poster competition could have been better. Instead of announcing it with a poster, other ways of announcements such as approaching the learners personal would be better. Also, announcing it earlier and involving the teachers and staff could have improved the amount of posters that eventually were turned in.

A pre-test has been performed by discussing the intervention with the teacher and staff from the Emil Weder High School, but also with the supervisor from UWC. It would have been better if a pre-test was
performed among some learners of the high school because that will give an opinion about the intervention of someone from the target group. This could have improved the amount of posters that were turned in and the selling of the healthy snacks.

To make the intervention possible, it was sponsored by the TWK-project. Costs of the intervention could have been limited by negotiating with shop owners about their selling price of the products that were needed for the intervention. Also local farmers could have been involved because their products are often cheaper than products from supermarkets.
8. Recommendation

This report shows that there is a high prevalence of overweight and obesity among the learners of the Emil Weder High School. In order to prevent or treat this health problem and to get more insight in the causes, the following recommendations can be made.

It is important to get more information about the total energy intake and physical activity to identify the causes of overweight and obesity. This could be outdated with a food- and physical activity diary of three week days and one weekend day. The associations between overweight and behaviour that have been made in this report are important to take in account when identifying the causes. However, further research is needed to behaviours such as what products the learners buy at the Tuck Shop, and how often. If learners take a lunch to school, and what for lunch. Also the behaviour of the learners when they are not at school is important to identify. For example, what do they have for dinner and what do they eat besides the main meals.

Research to the determinants of behaviour will give more information about the development of the behaviour. For example, an outcome of desk research was the cultural factor, namely that overweight is not seen as a problem. A questionnaire among the learners can be held to establish how they think about overweight. Other important determinants that can play a role when developing overweight are social influence, knowledge, attitude and barriers such as poverty and accessibility to food. The following questions can be the subject of a following research. What is the level of knowledge about healthy lifestyle, and how can this be improved? How big is the influence of the barrier poverty, and how can this be changed? What is the impact of the environment on a healthy lifestyle?

Another recommendation that can be made is changing the offer of the Tuck Shop. At this moment, the learners have no option for choosing a healthy product because only unhealthy products are sold. Examples of healthy products are the products that were sold on the healthy lifestyle day, like fruit, yoghurts, popcorn and healthy sandwiches. Products can be purchased for a cheaper price at local farmers or negotiate with shop owners from big supermarkets. Another idea is to stimulate the little shop owners in Genadendal to sell more healthy products, for instance whole wheat bread instead of white bread, more fruit and vegetables and less crisps and chocolates.

A lot of people do not realise that overweight and obesity is such a serious problem with a lot of health risks. Therefore it is important to create awareness about the health problem and improve the knowledge about a healthy lifestyle. The following students could do research to the current knowledge level of the learners and their awareness of the health problem and how this can be improved. It is important to start prevent overweight and obesity at a young age because at a younger age, changing behaviour is easier than during adolescents and adulthood.

Another recommendation to improve the knowledge of the learners about healthy lifestyle is to introduce classes once a week about healthy lifestyle. These classes will be given by teachers. Therefore teaching material can be developed for the teachers. For this, there can be searched to already existing teaching material which is in line with the health problem and the target group.

It is also important to involve the community of the high school because overweight affects a huge amount of people. To create awareness and improve the knowledge about this health problem in the community, it would be a good idea to involve the learners in this. With this you achieve two goals with one effort because the learners have to think about a healthy lifestyle and how to teach the community about this. The other advantage is that the community will learn from the learners. For instance, the learners could organize the same intervention as mentioned in this report, but then for the whole community. This to draw attention to the health problem overweight in the community and how to implement a healthy lifestyle.
9. Our experiences

As two Dutch students it was a challenge and experience to do research and health promotion in a different country. We have learned about the eating pattern in South Africa and which cultural factors play a role in these eating patterns. We experienced that it is difficult for people in Genadendal to buy healthy products in their own village. This because most of the little shops in Genadendal only sell white bread and hardly any fruits or vegetables. This in contrast with sweet cool drinks, crisps, savoury pies and cakes that are in abundance. To find a decent supermarket a thirty minute drive is necessary, and even in a decent supermarket, you will be overwhelmed and tempted by all the sweets and snacks. All these factors contribute to unhealthy behaviour. Unfortunately, we also experienced this and gained some weight. This made us realize that it is hard to resist all these sweets and snacks.

During the intervention we experienced how hard it is to change behaviour of adolescents. This target group is busy exploring themselves and therefore have less attention to more serious things. Therefore it is important to start preventing overweight and obesity at a young age. We think this health problem overweight and obesity needs attention because it is clearly visible in South Africa and it has many health risks.
References

Books

Internet sources

Reports
• Centre for Health Systems Research and Development (2004). The rapid assessment on compliant behaviour of people (18 years and older) with diagnosed non-communicable chronic diseases. Pretoria: Department of Health.


Articles


Appendix 1 – Search Report

This search report provides an overview of the search strategies during desk research. For each sub question, there has been searched to relevant literature in several databases to give an answer on the sub question. The table shows which key words have been used, which database, the amount of hits and the results. Another strategy was to look at the references of the used literature, which led to more relevant articles that could be used for the research. Also our supervisor from UWC, Elsabé Nel, recommended the following important national studies: SANHANES and the National Food Consumption Survey 2005 and the science journal The Lancet. She also lend us two books: “Community Nutrition in Action: an Entrepreneurial Approach” and “Community Nutrition Textbook for South Africa: a rights-based approach” and two journals (The South African Journal of Clinical Nutrition). Also the website of the World Health Organisation has often been consulted to search for international protocols and references regarding overweight and obesity.

The most important subjects in the desk research were: population of South Africa (and Theewaterskloof), prevalence of overweight and obesity of adolescents in South Africa, methods to measure the anthropometric status of adolescents, perception of body weight, causes of overweight and obesity (sweet cool drinks/soft drinks/soda, breakfast, snacking, Tuck Shop, fast food, physical inactivity) and risks of overweight and obesity.

<table>
<thead>
<tr>
<th>Key words</th>
<th>Database</th>
<th>Limits</th>
<th>Hits</th>
<th>Date</th>
<th>Product</th>
</tr>
</thead>
</table>
  • Exploring the paradox: double burden of malnutrition in rural South Africa (2013).  
  • The prevalence of stunting, overweight and obesity, and metabolic disease risk in rural South African children (2010).  
  Other titles are not related to subject. They include a different target group and/or country and/or disease.  |
  • Body mass index and body fatness in childhood (2005)  |
<table>
<thead>
<tr>
<th>measurement</th>
<th>Pubmed</th>
<th>Publication dates:</th>
<th>date</th>
<th>title</th>
</tr>
</thead>
<tbody>
<tr>
<td>overweight AND obesity AND adolescence AND body mass index AND waist circumference AND preference</td>
<td>Pubmed</td>
<td></td>
<td>4</td>
<td>Sept. 2013 Accuracy of simple clinical and epidemiological definitions of childhood obesity: systematic review and evidence appraisal (2010). Other three titles are not related to subject. First study is about mental health care, second study is about obese women, fourth study is about weight loss and vegetarian diet.</td>
</tr>
<tr>
<td>Prevalence stunting AND south Africa AND overweight</td>
<td>Pubmed</td>
<td>Publication dates: 5 years Reviews</td>
<td>Oct. 2013 Maternal and child undernutrition and overweight in low-income and middle-income countries (2013). Other study is about malnutrition in relation with HIV/AIDS.</td>
<td></td>
</tr>
<tr>
<td>Determinants AND overweight AND obesity AND high school AND south Africa</td>
<td>Pubmed</td>
<td>No limits</td>
<td>Oct. 2013 The determinants of overweight and obesity among 10- to 15-year-old schoolchildren in the North West Province, South Africa – the THUSA BANA (Transition and Health during Urbanisation of South Africans; BANA, children) study (2006). Other study is about the plasminogen activator inhibitor-1 activity, fibrinogen and thrombin-antithrombin complex.</td>
<td></td>
</tr>
<tr>
<td>Sweet cool drinks AND high energy AND overweight OR obesity AND south Africa AND adolescent</td>
<td>Pubmed</td>
<td>Publication dates: 5 years Reviews</td>
<td>Oct. 2013 Article: Evidence to support a food-based dietary guideline on sugar consumption in South Africa (2012). Other three titles not related to subject because of the words ‘undernutrition’, ‘asthma’ and resveratrol (a supplement for preventing obesity).</td>
<td></td>
</tr>
</tbody>
</table>
## Appendix 2 - Class list Emil Weder High School

<table>
<thead>
<tr>
<th>Class</th>
<th>Male</th>
<th>Female</th>
<th>Total learners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percentage</td>
<td>Number</td>
</tr>
<tr>
<td>GR8A</td>
<td>17</td>
<td>2.9</td>
<td>29</td>
</tr>
<tr>
<td>GR8B</td>
<td>18</td>
<td>3.1</td>
<td>29</td>
</tr>
<tr>
<td>GR8C</td>
<td>18</td>
<td>3.1</td>
<td>26</td>
</tr>
<tr>
<td>GR8 TOTAL</td>
<td>53</td>
<td></td>
<td>84</td>
</tr>
<tr>
<td>GR9A</td>
<td>16</td>
<td>2.8</td>
<td>20</td>
</tr>
<tr>
<td>GR9B</td>
<td>15</td>
<td>2.6</td>
<td>20</td>
</tr>
<tr>
<td>GR9C</td>
<td>18</td>
<td>3.1</td>
<td>17</td>
</tr>
<tr>
<td>GR9D</td>
<td>17</td>
<td>2.9</td>
<td>16</td>
</tr>
<tr>
<td>GR9 TOTAL</td>
<td>66</td>
<td></td>
<td>73</td>
</tr>
<tr>
<td>GR10A</td>
<td>19</td>
<td>3.3</td>
<td>16</td>
</tr>
<tr>
<td>GR10B</td>
<td>11</td>
<td>1.9</td>
<td>23</td>
</tr>
<tr>
<td>GR10C</td>
<td>10</td>
<td>1.7</td>
<td>27</td>
</tr>
<tr>
<td>GR10D</td>
<td>8</td>
<td>1.4</td>
<td>28</td>
</tr>
<tr>
<td>GR10 TOTAL</td>
<td>48</td>
<td></td>
<td>94</td>
</tr>
<tr>
<td>GR11A</td>
<td>19</td>
<td>3.3</td>
<td>26</td>
</tr>
<tr>
<td>GR11B</td>
<td>17</td>
<td>2.9</td>
<td>14</td>
</tr>
<tr>
<td>GR11 TOTAL</td>
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<td>40</td>
</tr>
<tr>
<td>GR12A</td>
<td>22</td>
<td>3.8</td>
<td>18</td>
</tr>
<tr>
<td>GR12B</td>
<td>12</td>
<td>2.1</td>
<td>34</td>
</tr>
<tr>
<td>GR12 TOTAL</td>
<td>34</td>
<td></td>
<td>52</td>
</tr>
<tr>
<td>TOTAL LEARNERS</td>
<td>237</td>
<td></td>
<td>343</td>
</tr>
</tbody>
</table>
Appendix 3 – Calculation Sample Size

The size of a sample is depending on the size of the population, confidence level, accuracy and margin of error. With these numbers, statements can be made that give a good image of the reality.

Formula to calculate the sample size:

\[
n\geq \frac{N \times z^2 \times p(1-p)}{z^2 \times p(1-p) + (N-1) \times F^2}
\]

n  Stand for the number of the amount of learners that are required for the research
N  Size of the total population (580)
Z  Provides for a normal distribution the number of standard deviation that a particular variable is away from the expected value. Thus 2.5758 at 99% confidence level.
P  The probability that a person gives a specific response, which is usually 50%.
F  The margin of error is the number of acceptable errors in an experiment. Often used percentages are 3%, 5% and 7%. In this case 5%.

\[
\frac{580 \times 2.5758^2 \times 0.25}{2.5758^2 \times 0.25 + 579 \times 0.05^2}
\]

= 309.7 learners
Hello Learners,

We are Ellen and Anne and we are nutrition students from Holland.

We want to do a new research project at your school that gives us more information about your nutritional status. Therefore we would like to come 17 September to the school to measure your weight, height, and waist circumference. We don’t need your names, it stays anonymous!

Moenie skaam wees nie, this information will help to guide you to a good health!

Date: 17/09/2013

When you do not want to cooperate, please let it know before 13 September to your teacher!
Appendix 5 – Informed Consents

Informed Consent

Anthropometric research
On the 17th of September 2013, an anthropometric research will be organized under the learners of the Emil Weder High School. The goal of this research is to determine the anthropometric status of the learners, namely, underweight, normal weight, overweight or obese. With the outcomes of the anthropometric data of all learners, the prevalence of overweight and obesity at the Emil Weder High School can be identified. A suitable intervention will be developed to make the learner aware of their eating behaviour and of the consequences of being overweight or obese.

The anthropometric research will include measuring the weight and length of the learner. The learner has to take off their shoes for measuring height and also take off their jacket and heavy items (belt, jewellery, etc.) for measuring weight. Also a few questions will be asked about age, gender, weight and eating pattern. This all will take approximately 5-10 minutes per learner. The learners will be picked up in the classroom and brought back afterwards.

For a reliable outcome of the research, at least 310 learners need to be measured. One class of grade 8 will be picked, two classes of grade 9, two classes of grade 10, and both classes of grade 11 and 12. The classes that will be picked from each grade will be determined on the morning of the research to guarantee the reliability of the research.

In order to process the research as smoothly and quickly as possible, eleven nutrition students from University of Western Cape will help us. We will be divided in two groups to measure the boys and girls separately. The anthropometric data of each learner will remain anonymous. The learner is not required to participate in the research, but it is much appreciated.

Participation
By signing this informed consent, you agree on letting the learners participate in the anthropometric research on September 17th, 2013.

Name
Rodney Andrew Cupido

Date
19/09/2013

Place
Genadeal

Signature

To be signed by the researchers
By signing this informed consent, we declare that we have given all the important information for the anthropometric research on September 17th, 2013.

Names
Ellen Swinkels & Anne Faassen

Date
19/09/2013

Place
Genadendal

Signatures
Ellen Swinkels Anne Faassen
Informed Consent

Anthropometric research
On the 17th of September 2013, an anthropometric research will be organized under the learners of the Emil Weder High School. The goal of this research is to determine the anthropometric status of the learners, namely: underweight, normal weight, overweight or obese. With the outcomes of the anthropometric data of all learners, the prevalence of overweight and obesity at the Emil Weder High School can be identified. A suitable intervention will be developed to make the learner aware of their eating behaviour and of the consequences of being overweight or obese.

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Participation
By signing this informed consent, you agree on letting the learners participate in the anthropometric research on September 17th, 2013.

Name: Harriet Milcomb
Date: 12/09/2013
Place: Emil Weder Hoërskool Genadendal
Signature: [Signature]

To be signed by the researchers
By signing this informed consent, we declare that we have given all the important information for the anthropometric research on September 17th, 2013.

Names: Ellen Swinkels & Anne Faassen
Date: 12/09/2013
Place: Genadendal
Signatures: [Signature]
**The Daily News**

**Eet Gesond Die Heel Jaar Rond!**

Anne Faassen & Ellen Swinkels

20 November 2013

---

**Overweight and obesity is increasing in South Africa, also at your high school!**

*Maisies: 27,4% Seuns: 7,8%*

---

**Want to look like a beauty, eat healthy food!**

*Eat healthy snacks instead of Nik Naks!*

- Nik Naks contain lots of saturated fat and salt.
- Saturated fat is dangerous. It is closely linked to heart disease.
- Salt contributes to high blood pressure and other illnesses.
- Don’t eat large quantities of food which contain fats, saturated fats and cholesterol.
- Most of us eat too much fat!
- Examples of healthy snacks are: fruits, veggies, low fat yoghurt, whole wheat sandwich, raisins, dried fruit, rice cakes, popcorn.
- Before grabbing a snack, ask yourself if you’re truly hungry.

---

**Drink water uit die kraan, laat die suikerdrankies staan!**

- Suikerdrankies weakens bones and rots teeth.
- Suikerdrankies are very high in calories and can lead to excess weight gain.
- Drinking water is a healthy way to provide your body with fluid.
- This is necessary for the transport of nutrients and waste products in your body.
- Drink as much water as possible, preferably 6-8 glasses per day.

---

**Sé dikwils nie vir PC en TV!**

- No more than 2 hours per day of television, videogames and computer.
- Watching more television means watching more ads about unhealthy foods.
- Evidence suggests that this leads to eating extra calories.
- This can lead to excess weight gain.
- Watching TV displaces physical activity.

---

**Keep moving!**

- It makes you strong and fit.
- Brightens your mood and build a positive self-image.
- Helps you maintain a healthy weight.
- Are important for smart thinking.
- Have at least 1 hour of moderate to intense exercise per day.
- Exercise with a friend. It keeps you motivated and adds to the fun!

---

**5 portions of fruit and veggies per day keeps the doctor away!**

- Contain a lot of vitamins, minerals, water and fibers.
- They help to strengthen the body’s immune system to fight diseases.
- Reduces the risk of overweight and heart diseases.
- Keeps your mind alert.
- Veggies are generally low in energy.
- Eat fruit and veggies as a healthy snack in between meals.
- Add raw vegetables such as carrots, cucumber or tomatoes to your lunchbox.

---

**Take caution with your portion!**

Increased portion size is a major contributor to weight problems whether people eat at home or out.

**Eat whole wheat bread instead of white bread.**

- Whole wheat products are high in fiber and vitamins.
- Fiber helps to move food through our intestines.
- Fibers give you a full feeling.

---

**Melk is goed vir elke!**

- Milk and milk products strengthens bones and teeth.
- Other good milk products are yoghurt and cheese.
- Have at least three milk products per day.
- Gives you a full feeling.
- Can help prevent overweight and obesity.
- Choose the skim or low fat products instead of full cream.

---

**Risks of overweight and obesity**

Belangrik om ‘n gesonde gewig te hê. Oorgewig het baie risiko’s vir die gesondheid:

- Diabetes, hartziektes, depressie, hoë bloed cholesterol, berouerte, hoë bloeddruk, asma, kanker.

---

DIE MAAG

400 calories of oil
400 calories of chicken
400 calories of vegetables

---

50
Appendix 7 - Poster

What is a healthy lifestyle according to you?

Overweight and obesity is increasing in South Africa, but also at your high school!

Risks of overweight and obesity: diabetes, heart diseases, depression, high blood cholesterol, stroke, high blood pressure, asthma, cancer, etc.

A healthy lifestyle can prevent or treat overweight and obesity!

Create a poster and a nice slogan of what a healthy lifestyle is.

Take it to school at the 20th of November.

A 1st, 2nd and 3rd winner will be chosen and receives a price!

20th of November will be all about a healthy lifestyle!

Eet gesond die heel jaar rond!
Appendix 8 – Effect evaluation

Dear learner,

On the 20th November 2013 we organized a “Healthy Snack Day” where we sold healthy snacks in front of the Tuck Shop and handed out factsheets about how to implement a healthy lifestyle. Also a poster competition was arranged to let you think about a healthy lifestyle. To find out if the intervention was successful, we would like to ask you to answer the following questions. This will take about 5 minutes of your time. It will help us to improve the intervention in the future, therefore your help is much appreciated. Baie dankie!

1. Name at least three healthy snacks:
   -
   -
   -

2. Name at least three unhealthy snacks:
   -
   -
   -

3. How many sugar packs are there in a glass of coke (250 ml)?
   -

4. Name at least three healthy choices to replace sweet cool drinks:
   -
   -
   -

5. In which way did the intervention influence your behaviour?
   -
   -

6. Did you buy something from the healthy snack stand? And what did you buy?
   -
   -

7. Did you create a poster? Motivate your answer:
   -
   -

8. If you would rate the intervention, what number would you give from scale 1-10? 
   (1 = very bad and 10= very good)
   -

9. Comments and suggestions about the intervention:
   Healthy snack stand -
   Poster competition -
   In general -
Appendix 9 – Photos