The Overweight Prevalence amongst Grade-One Learners And Parental Perceptions of Childhood Nutrition / Physical Activity In West Rand, Gauteng

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TABLE OF CONTENTS

DECLARATION

I DECLARE THAT THE DISSERTATION:

THE OVERWEIGHT PREVALENCE AMONGST GRADE-ONE LEARNERS AND PARENTAL PERCEPTIONS OF CHILDHOOD NUTRITION/ PHYSICAL ACTIVITY IN WEST RAND, GAUTENG;

IS MY OWN WORK AND THAT ALL SOURCES HAVE BEEN QUOTED AND ACKNOWLEDGED BY COMPLETE REFERENCES.

THE AUTHOR DECLARES NOT PECUNIARY INTERESTS AND NO ETHICAL CONFLICT IN THIS STUDY.

DR. ABDUL HAMEED ISMAIL……

DATE……

DEDICATION

TO MY CHILDREN

UZAIR,

ZARMEEN

& ZIA AHMED ISMAIL

"IF WE COULD GIVE EVERY INDIVIDUAL

THE RIGHT AMOUNT OF NOURISHMENT AND EXERCISE,

NOT TOO LITTLE AND NOT TOO MUCH,

WE WOULD HAVE FOUND THE SAFEST WAY

TO HEALTH"

HIPPOCRATES (460-370 B.C.)

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Abstract

The problem of childhood obesity in South Africa has reached epidemic proportions. It is estimated that one in five South African children are either overweight or obese; with twenty percent of children under the age of six being overweight. This is mainly due to a poor diet and a lack of exercise. The aim of this study is to determine the overweight / obesity prevalence amongst grade-one learners at selected schools in the West Rand, Mogale City.

The weight and height of each subject was to be physically measured by the researcher and compared to norms for that age category. This study further aims to determine their parents knowledge / perceptions regarding childhood nutrition and physical activity. To this end a questionnaire was constructed so that parental knowledge / beliefs could be assessed. This study has found both overweight and underweight within the same population.

The results indicate overweight / obesity in seventeen subjects (3.7%). Eleven girls (4.8%) and six boys (3%) were overweight representing a boy to girl ratio of 1: 1.8 among the overweight group. Among the overweight subjects, girls represented 65% while boys represented 35%. This study has also found underweight / stunting of growth among the eight and nine year old subjects as their weight for height fell below the 25th percentile. Further classification of the study sample according to school-fee structure revealed that all subjects with overweight / obesity were found within low-fee schools, representing 4%. One boy and one girl each were found with obesity among the overweight group having a body mass index (BMI) of 23.8 and 24.8 respectively. Therefore obesity was found in 12% among the overweight group and within low-fee structure schools.

LIST OF TABLES

LIST OF FIGURES

Chapter One

1.1 Introduction

This introduction begins with a global look at malnutrition, overweight and obesity trends in childhood. This is followed by a review of overweight trends within developed and low to middle income countries. The term "Nutrition Transition", currently observed within these countries, is defined and explained. The introduction concludes with a discussion on childhood overweight prevalence in South Africa (SA), where uniquely both underweight and obesity occur together.

Worldwide, the prevalence and concurrent health and psychosocial consequences of childhood obesity are a major research concern. The prevalence of childhood obesity has been rapidly increasing over the last decade in both developed and developing countries (Food and Agricultural Organisation: United Nations, 2006) (FAO: UN). A 2006 review of secular trends in childhood overweight / obesity concluded that its prevalence had increased over the last two to three decades in most industrialized countries except for Russia and Poland and in several lower income countries, particularly in urban areas (Wang, 2006). The prevalence doubled or trebled between the early 1970's and late 1990's in Australia, Brazil, Canada, Chile, Finland, France, Germany, Greece, Japan, the United Kingdom and the United States (Wang, 2006). It was predicted that by 2010, over 40% of children in the North American and Eastern Mediterranean World Health Organisation (WHO) regions, 38% in the European region, 27% in the Western Pacific region and 22% in the South-East Asian region would be overweight / obese. Population groups in North America who have preserved traditional lifestyles with significant embedded physical activity show considerably lower prevalence of obesity (Basset, 2008). Likewise, in low- and middle-income countries the obesity epidemic is largely occurring in urbanized areas with easy access

to energy dense, cheap foods and less energy requirements in daily life (Wang, 2006). However, this review predates most recent data, which although it is too soon to be certain, suggests that the increase in childhood obesity in the United States, United Kingdom and Sweden may be abating (Ogden, 2008; Kipping, 2008; Sundblom, 2008).

Nutrition transition, being experienced in low and middle- income countries undergoing rapid economic transition and urbanisation, is a major driving force behind the increase in levels of obesity, despite persistence of under- nutrition (Popkin, 2003, 2012). Therefore, both under- nutrition and obesity-related diseases contribute substantially to the burden of disease in these societies (World Health Organisation report 2002). The problem of obesity is not only experienced among adults but also in children (Karnik, 2012). Childhood obesity is the driving force behind Pediatric Metabolic Syndrome Risk that has become a growing public health concern in low and middle- income countries (Kelishadi, 2007). Childhood obesity is associated with short- term health problems including heightened risk of psychosocial morbidity, cardiovascular complications and diabetes. It is also associated with long term problems including obesity and cardio- metabolic diseases and impaired social and economic productivity in adulthood (Reilly, 2003).

South Africa has undergone major social, epidemiological and economic transitions since its political transformation in 1994 and currently consists of a hugely diverse population of more than 9 ethnic groups. To combat the increasing prevalence of childhood overweight and obesity in this developing country, it is essential to understand the extent and intrinsic patterns of the epidemic among SA children. Due to its historical background, characterised by nearly half a century of Apartheid, high

levels of Acquired Immune Deficiency Syndrome (AIDS) over the past few decades (Department of Health, 2011) and the recent rapid economic and social transition and urbanisation (Faulkner, 2008; Kok, 2006), SA has undergone a complex health transition (Kahn, 2011, SA Demographic Health Survey, 2010). It is characterised by high levels of persisting under-nutrition among the black population (SA Demographic Health Survey, 2003), potentially due to high levels of food insecurity reported at the household level (Human Science Research Council, 2004). On the other hand, a rapid nutrition transition has been experienced in the country with a marked shift from staple foods towards an energy-dense diet occurring alongside urbanisation (Steyn, 2012; Vorster, 2012). High levels of physical inactivity and sedentary lifestyles have also been associated with the nutrition transition in several studies in SA (Vorster, 2005; Joubert, 2007). This has resulted in a high prevalence of overweight and obesity among adults, particularly women; for example, 55% of adult women are either overweight or obese, with a consequent high disease burden of non-communicable diseases (Kahn, 2011; SA Demographic Survey, 2003). Evidence of obesity among children and adolescents is emerging though still limited and little is known about the co- existence of under- nutrition with obesity among children in the same geographical setting (Department of Health, 2007; National Food Consumption Survey, 2005; SA Youth Risk Behaviour Survey, 2002).

1.2 Rationale for the study

Worldwide, the history of childhood overweight and obesity is associated with the development of morbidity and chronic disease (Burke, 2006). Low to moderate-income countries are particularly at risk due to rapid socioeconomic change. Nutrition transition, being experienced in low and middle- income countries like SA, is a major

driving force behind the increase in levels of obesity despite the persistence of under-nutrition. This study contends that childhood overweight and under- nutrition are a public health concern in West Rand Gauteng schools, Mogale City. It also contends that a parental questionnaire would shed valuable light on the thoughts, knowledge and beliefs of their parents.

1.3 Study Aims

This study aims to determine the overweight prevalence amongst grade-one learners by doing anthropometric measurements at selected primary schools. It further aims to elicit parental perceptions about learner nutrition and activity levels with the administration of a questionnaire.

1.4 Study Objective

1.4.1 To determine the overweight prevalence in a population of grade-one learners by physical measure of height and weight and

1.4.2 To determine parental knowledge and perceptions about childhood nutrition / activity levels through a questionnaire.

1.5 Hypothesis

Overweight is prevalent in grade-one learners at Mogale City Schools.

1.6 Null hypothesis

Overweight is not prevalent in grade-one learners at Mogale City Schools.

1.7 Definition of Terms and Abbreviations

- **Body mass index (BMI):** weight (kg) / height $(m)^2$
- **Overweight:** excessive weight for height relative to age and gender $\geq$ 25kg/m^2
- **Obesity:** excessive weight for height relative to age and gender $\geq$ 30kg/m^2; these include a total group of children that are overweight and obese.
- **Physical activity** is defined as: any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure.
- **Sedentary lifestyle:** is a type of lifestyle with no or irregular physical activity; commonly found in both the developed and developing world. Sedentary activities include sitting, reading, watching television, playing video games and computer use for much of the day with little or no vigorous physical exercise.
- **Screen time** is the amount of time a person spends watching a screen e.g. television, computer monitor, or mobile device.
- **Epidemic:** occurs when new cases of a certain disease, in a given population and during a given period, substantially exceed what is expected based on recent experience.
- **A Developed Country:** one that allows all its citizens to enjoy a free and healthy life in a safe environment. The term "developed" is intended for statistical reference and does not express a judgement about the stage reached by a particular country.
- **Low income countries** have a Gross National Income (GNI) per capita of US$1,026 or less; Lower-middle-income countries had GNI per capita between US$1,026 and US$4,036; Upper-middle-income countries had GNI per capita between US$4,036 and US$12,476; and high-income countries had GNI above US$12,476. [Report 2011 GNI Income per capita]

- **A Non-Communicable Disease (NCD):** is a medical condition that is non-infectious and non-transmissible among people; it may be of long duration and slow progression e.g. heart disease or stroke.
- **Dyslipidaemia** is an abnormal amount of lipids (cholesterol / fat) in the blood. In developed countries, most dyslipidaemias are an elevation of lipids in the blood and is often due to diet and lifestyle.
- **Fatty Liver Disease (FLD):** is a reversible condition where large vacuoles of fat accumulate in liver cells via the process of steatosis [abnormal retention of lipids within a cell]. Despite having multiple causes, fatty liver can be considered a single disease that occurs worldwide in those with excessive alcohol intake and those who are obese.
- **Obstructive sleep apnoea (OSA)** is the most common category of sleep-disordered breathing. The risk of obstructive sleep apnoea rises with increasing body weight, active smoking and age. Common symptoms include loud snoring, restless sleep and sleepiness during the daytime.
- **Reactive Airways Disease (RADS)** is an asthma-like syndrome developing after a single exposure to high levels of an irritating vapour, fume, or smoke. It involves coughing, wheezing and short breath.
- **Hypo-vitaminosis D** is a deficiency of vitamin D that can result from inadequate nutritional intake or inadequate sunlight exposure. Conditions that impair absorption or impair conversion to active metabolites may cause Vitamin D deficiency. This may result in impaired bone mineralization and bone softening diseases like rickets in children and osteomalacia in adults

- **Thelarche** is the onset of secondary breast development, usually occurring at the beginning of puberty in girls. Thelarche is also referred to as a "breast bud" and occurs in about 60% of girls, usually after eight years.
- **Menarche** is the first menstrual bleed in female humans. The timing of menarche is influenced by female biology, as well as genetic and environmental factors, especially nutritional factors. Various estimates have placed it at about thirteen years of age.
- **The hypothalamic–pituitary–gonadal axis** (reproductive axis) refers to the endocrine glands as they are a critical part in the development and regulation of a number of the body's systems, such as the reproductive and immune systems. The anterior portion of the pituitary gland produces luteinizing hormone (LH) and follicle-stimulating hormone (FSH) and the gonads produce oestrogen and testosterone.
- **Blount's Disease** is a deformity in the legs, mostly from the knees to the ankles. The affected bone curves in or out and forms the usual "archers bow" which can also be called bow-legs.
- **Slipped capital femoral epiphysis (SCFE)** is a medical term referring to a fracture through the growth plate, which results in slippage of the overlying epiphysis. The head of the femur, called the capital, should sit squarely on the femoral neck. Often this condition will be present in obese adolescent males; with an insidious onset of thigh or knee pain with a painful limp. It is a common cause of hip and knee pain in children between the ages of seven to eleven caused usually during a growth spurt. It is the most common hip disorder in adolescence.

- **Metabolic Syndrome** is a combination of medical disorders that when occurring together increases the risk of developing cardiovascular disease and diabetes. Metabolic syndrome is also known as Syndrome X. The World Health Organisation (1999) requires the presence of any one of diabetes mellitus / impaired glucose tolerance, and two of the following: Blood pressure: $\geq$ 140/90 mmHg; dyslipidemia; central obesity / BMI > 30 kg/m2; and urinary albumin excretion ratio $\geq$ 20 µg/min.
- **Anthropometry** refers to the measurement of the human individual. Anthropometric measurements are used to determine the relationship between various body measurements (height, weight, percentage body fat, etc.) and medical outcomes. Anthropometric measurements are frequently used to diagnose malnutrition in resource-poor clinical settings.

Chapter Two

2.1 Literature Review

This review cites global studies in which authors have explored the topic of childhood overweight / obesity. The review expounds the definition and historical foundations of childhood obesity and the complications of being an overweight child. The review then examines studies conducted in both developed and developing countries, worldwide. This review concludes with studies conducted in the South African context and findings of the Healthy Active Kids Survey Report card in 2010.

According to the World Health Organization (WHO), 1.6 billion people are overweight and 400 million of them are obese. Moreover, the WHO estimates that by 2015 there will be 2.3 billion adult people with overweight and more than 700 million with obesity (Cerrillo, 2012; WHO, 2006). Overweight and obesity are considered a serious health problem worldwide and obesity has been recognized as a public health problem in developed countries, because it is associated with increased risk for several pathologies, such as cardiovascular disease (Freedman, 1999), type II diabetes (Schwartz, 2008), arthrosis (Grotle, 2008) and some types of cancer (Murthy, 2009), among others. In particular, obesity in childhood and adolescence is a major health concern (Lobstein, 2003; Janssen, 2005). Health consequences of weight excess for children are not as evident as for adults, however childhood obesity has been associated with pathologies, such as the metabolic syndrome (Weiss, 2004) and cardiovascular disease (Wabitsch, 2000). Moreover, longitudinal studies focused on children after three years of age suggest that obesity is associated with a greater risk of obesity in adolescence and adulthood (Lobstein, 2004; Dura Trave, 2011).

2.2 Definition of childhood obesity

There are internationally agreed thresholds of BMI for defining underweight, normal weight, overweight and obesity in adults, but in children the marked effects of age, gender, pubertal status and race/ ethnicity on growth make classification difficult. There are two challenges in defining (i) a standard age-related growth chart; (ii) cut-points for overweight and obesity that are clinically meaningful. The International Obesity Taskforce (IOTF) has developed an international standard growth chart, which enables comparison of prevalence globally (Cole, 2000). However, many countries continue to use their own country-specific charts, including the United States, whose standards are based on a national survey from the early 1960's, before the current epidemic (Troiano, 1995). Commonly used cut points for childhood overweight and obesity include: 110% or 120% of ideal weight for height; weight-for-height Z-scores of >1 and >2; and BMI at the 85th, 90th, 95th and 97th percentiles (International / country-specific reference populations) (Wang, 2006).

The IOTF recommends using their international growth charts and age and gender specific cut points that, on average, correspond to adult thresholds. The IOTF classification has been shown to have high specificity but low sensitivity (Neovius, 2004).

It is a historical convergence of forces, biological and technological, that has produced the obesity epidemic seen today. Over millennia of frequent food scarcities, natural selection likely favoured those with more parsimonious energy metabolism, known as the "thrifty gene" hypothesis (Neel, 1962). Although the advent of agriculture about 14 000 years ago ensured a stable food supply, activities of daily living still required considerable energy expenditure until about 50 years ago, when

radical changes occurred in food availability and required energy expenditures. The current obesity epidemic is then likely the result of our evolutionary legacy interacting with today's technologically- advanced, consumerist society.

In evaluation of the pediatric patient with obesity, the possibility of endocrine diseases, congenital and acquired hypothalamic defects, genetic syndromes and usage of medications affecting appetite should be considered. The vast majority of patients, however, will not have any of these identifiable conditions. Regardless of aetiology, all patients should be considered for modifiable lifestyle risk factors and screened for the complications of obesity.

2.3 Complications of childhood obesity

Obesity in childhood is associated with a range of adverse health and psychosocial consequences in childhood and adult life, ranging from hypertension, dyslipidaemia, chronic inflammation, type 2 diabetes, orthopaedic problems, low self- esteem and behavioural problems (Burke, 2006). Obese children are further exposed to a significantly increased risk of becoming obese adults (Somers et al, 2006). Childhood obesity can adversely affect nearly every organ system and often causes serious consequences, including hypertension, dyslipidaemia, insulin resistance / diabetes, fatty liver disease and psychosocial complications (Daniels, 2009). One study showed that being overweight or obese between the ages of fourteen to nineteen was associated with increased adult mortality (from age thirty) from a wide variety of systemic diseases (Bjorge, 2008). The atherosclerotic process (Freedman, 2008) appears to be accelerated in the obese child and almost half of children with a BMI greater than or equal to the 97th percentile have one or more of the conditions which comprise the metabolic syndrome (Calcaterra, 2008). Childhood and adolescent BMI is associated

with an increased risk of cardiovascular disease in adulthood (Owen, 2009). Pulmonary disorders, including obstructive sleep apnoea and reactive airway disease (Gilliland, 2003) are seen more frequently among obese children. Asthma severity, however, does not seem to be altered by obesity (Santamaria, 2007), leaving open the possibility that weight-related but non-asthmatic airflow limitations are being misdiagnosed as asthma in some obese children (Sutherland, 2008).

Certain nutritional deficiencies often accompany childhood obesity. A higher BMI and greater adiposity have been associated with lower vitamin D levels in children (Alemzadeh, 2008). The mechanism underlying hypo-vitaminosis D in obesity is unclear, but has been proposed to be a greater storage of vitamin D in adipose tissue (Yanoff, 2006). Overweight / obese children are also at least twofold more likely to be iron-deficient than normal weight children (Nead, 2004). Obesity leads to increased production of pro-inflammatory cytokines that in turn promote the release of hepcidin, a peptide hormone produced by the liver and adipocytes, which decreases iron absorption from the gut (McClung, 2009).

Complications of childhood obesity include acceleration in the timing of thelarche and menarche in girls (Rosenfield, 2009, Bau, 2009); pubertal advancement in boys (Mamun, 2009) and adverse effects on maturation (Denzer, 2007) and alignment (Taylor, 2006) of developing bones in both. Advanced skeletal maturation has been attributed to increased adipose tissue aromatization of weak androgens into more potent oestrogens. Obesity may also impact pubertal timing through nutritionally related signals (e.g., insulin and leptin) on the reproductive axis (Divall, 2009). Orthopaedic complaints, including fractures, musculoskeletal discomfort, impaired mobility and lower limb mal-alignment may be more common in obese compared to

non-overweight children (Taylor, 2006). Serious orthopaedic complications of childhood obesity include tibia vara (Blount's disease) (Gordon, 2006) and slipped capital femoral epiphyses (Murray, 2008). By contrast, however, obesity may provide some beneficial effect with regards to bone mineral density. A recent study, using variation in the FTO gene as an instrumental variable, suggests that greater fat mass in children is causally associated with greater total, spinal and limb bone mineral content (Timpson, 2009).

2.4 Obesity patterns in developed countries

According to Kosti and Panagiotakos (2006), the prevalence of childhood overweight and obesity in the Americas is estimated to be 27.7%; in Europe 25.5%, while in Australia, 19-23% of children under the age of fifteen are considered to be overweight and obese (Zuo, Norberg, Wen & Rissel., 2006; Sanigorski, Bell, Kremer & Swinborn 2007). Obesity is most prevalent in Native American children, followed by African Americans, Hispanic and white Americans (Eichner et al., 2008; Hellmich, 2008), similar to trends with regard to minority ethnic groups in Great Britain, where people of black Carribean descent, Indians, Pakistani and Irish showed the highest prevalence of obesity (Rennie & Jebb, 2005; Taylor et al, 2005). Sakomoto et al. (2001) point out that the relationship between childhood obesity and socioeconomic status (SES) differs in developed and developing countries. In general, a higher SES status correlates with childhood obesity in developing countries, while a lower SES status correlates with childhood obesity in developed countries. Studies in Great Britain and Australia show a significantly higher prevalence of overweight and obesity among girls than boys (Viner et al, 2005; Sanigorski et al, 2007), while in other

developed countries the difference is either not significant, or reversed (Al- Haddad et al, 2005).

Spain and Europe

In Spain, the prevalence of childhood overweight and obesity has increased in the last decade. Regarding the rates of childhood overweight and obesity, they are increasing dramatically, ranking this country among the highest with respect to the European rates of these pathologies (Lobstein, 2004; Moreno, 2005; Serra Majem, 2006). There are some recent cross-sectional studies aimed to determine the prevalence of overweight and obesity in Spanish children, the most important finding being that both overweight and obesity prevalence are alarmingly high in all studied regions (Martinez Vizcaino, 2006; Larranaga, 2007; Vazquez, 2010). In some of the European countries, the percentage of children diagnosed as overweight and obese is high. However, this tendency is different depending on the country. The highest rates of obesity are observed in eastern and southern European countries (Livingston, 2000). In Malta and southern Italy overweight or obesity are diagnosed in 35% of children, whereas the same conditions are observed in 15% of cases in Scandinavia and in 12% in the Netherlands (Lobstein, 2004). In the year 2000, a research that was carried out in Cracow, the third largest city in Poland, revealed that overweight and obesity were identified in 15% of boys and 11% of girls. During the 1971– 2000 period, a gradual increase in overweight and obesity in children aged seven to eighteen years (n = 3733) was observed. The most remarkable increase was registered in boys aged seven to twelve (n = 859) and in girls aged seven to ten (n = 483) [Chrzanowska, 2007].

2.5 Obesity trends in developing countries

In a national study in the United Arab Emirates, Al-Haddad, Little and Ghafoor (2005) found an overweight and obesity prevalence of between 16- 29% among ten to eighteen year old children; while in China between 14-27% of urban children are overweight (Iwata et al, 2003). Developing countries also show high frequencies of overweight and obesity, as shown by reports of prevalence between 6-17% in India (Ramachandran et al, 2002; Raj et al, 2007), 22% in urban Thailand (Sakamoto et al 2001) and 24% in Iran (Hamidi et al, 2006).

China and Far East

The prevalence of childhood obesity has increased dramatically in Chinese children. Ji et al. reported that the prevalence of obesity increased from 0.13% in 1985 to 3.82% in 2005 in China (Ji C-Y, 2009; Ma J, 2012). Although the obesity prevalence in either males or females has markedly increased in different areas of the world, there is a gender difference. Generally, the prevalence of adult obesity in women is higher than that in men in most countries (Mahfouz, 2011; Lovejoy, 2009; Borders, 2006; Asia Pacific Studies, 2007). However, the gender disparity in childhood obesity obviously differed from that of adult obesity in many Asian countries, such as the mainland of China, India and Turkey, where the prevalence of obesity in boys is higher than that in girls (Ji C-Y, 2008; Goyal, 2010; Unnithan, 2008; Koc. oglu, 2003; National Obesity Observatory, 2011). Previous studies showed the gender difference in secular trends of obesity varied in different regions, ethnicities and populations (Borders, 2006; Wang, 2007; Gupta, 2011). However, there are no reports on how gender disparities in obesity change over time in Chinese children. Ji et al. reported there were gender differences in prevalence of childhood overweight and

obesity in China, from 14.0% and 7.4% in 1985 to 34.2% and 30.3% in 2005 for males and females, respectively, but did not analyse the change of gender difference over time (Ji C-Y, 2009). An increasing rate of overweight and obesity among children is documented in a comprehensive paper on malnutrition in six developing countries (China, Egypt, India, Mexico, Philippines and South Africa) by the Food and Agriculture Organization of the United Nations (2006). Although obesity shows similar trends in both developed and developing countries, different patterns are reported when gender, race and socio-economic background are distinguished.

India and Thailand

In a national study on school children in India, boys showed a higher prevalence of obesity than girls (Ramachandran et al. 2002). This is similar to the findings of Iwata et al. (2003) in an investigation of body fat ratios in urban Chinese children. The BMI values of female children between the ages of five and fourteen were found to be slightly higher than those of males in Ethiopia, SA and Zimbabwe, in the Global Burden of Disease Analysis of the International Obesity Taskforce in 2002 (Medical Research Council, 2006).

In India, differences in adiposity were found between children of ancestral origin in South Asia and white Caucasian children (Bhardwaj et al, 2008) and children of different ethnic groups in Mexico showed different prevalence of obesity (Rivera et al, 2002). This has been the case in several studies in developing countries like Thailand (Sakomoto et al., 2001), India (Ramachandran et al., 2002) and China (Jiang et al, 2006) and developed countries like the United States of America (Mahoney, Lord & Carryl, 2005), Scotland (Cecil et al, 2005) and Australia (Sanigorski et al., 2007). From these patterns it is clear that factors associated with childhood obesity

are complex. According to Green et al (2003), multiple factors interplay in forming obesity patterns, including adverse life conditions, family demographics, cultural backgrounds, beliefs and practices, food habits and physical activity. Grounded knowledge on obesity patterns and associated factors is essential for health professionals and teachers working with diverse groups of children.

South Africa

South Africa is a developing country with large developed cities as well as developing rural areas and a population consisting of different races and ethnic groups. South Africa faces many current and future challenges, not least is the growing burden of non-communicable or lifestyle diseases affecting more than two in every five South African adults [Coopoo et al, Healthy Active Kids South Africa Report Card (HAKSAR) 2010]. The global community recognizes three major lifestyle risk factors (i) smoking, (ii) inactivity, (iii) obesity & unhealthy eating, which predict four major diseases (cardiovascular disease, diabetes, lung disease and cancer) and account for over half of adult deaths, worldwide. South Africa is home to nearly sixteen million children and youth between the ages of five and twenty (Coopoo et al, 2010). Healthy lifestyle behaviours begin in childhood and track across the lifespan. Early life experiences lay the foundations for adult health and quality of life. By preventing or reducing the prevalence of childhood obesity, for example, we may reduce the prevalence in adult obesity between seven and thirteen percent (Coopoo et al, 2010). If active children in SA remain active into adulthood, thereby reducing the prevalence of sedentary, or inactive lifestyles, it is likely to impact on the prevalence of lifestyle diseases, such as heart disease or diabetes, in at least a portion of South African adults (Coopoo et al, 2010).

Building from the first *Healthy Active Kids South Africa Report Card* in 2007 by Discovery Vitality, the 2010 report card serves to highlight the current health status of South African children and youth, with particular reference to physical activity, healthy eating, maintaining a healthy weight, tobacco use and alcohol intake. These health behaviours and indices are considered, along with those factors which influence or shape the behaviours, within the family and home, amongst friends and peers, in school and community settings and as a result of the built environment, policy or legislation (Coopoo et al, 2010)

The summary of changes from the Healthy Active Kids South Africa Report Card 2010 are as follows:

- there are concerning trends for a decline in physical activity, physical education and increased sedentary time from the 2007 report card
- there are trends for increased prevalence of overweight and obesity, with the accompanying concern for increased prevalence of stunting
- there is a wealth of new evidence, suggesting that health and social scientists recognise the importance of primordial prevention of obesity, inactivity and smoking in children and youth (Coopoo et al, 2010).

A South African study conducted by Richardson (1978) found a prevalence of overweight / obesity of 12-18% among white children, and 13-18% among black children aged one- six years. A study conducted by Armstrong et al (2006) determined the prevalence of obesity / overweight among primary school children. These authors found that the prevalence of obesity within the sample was three percent for boys and five percent for girls. In a study conducted by Monyeki et al (1999) on the

prevalence of obesity among pre-school black children in Ellisras, found that boys between the ages of three-four years showed the highest prevalence of obesity (15%). The National Food Consumption Survey of 1999 (National Food Consumption Survey, 2000), the average prevalence of overweight in SA children aged one- nine years is currently 7.6%. However, the figure is much higher for children living in urban areas (12.5%), including four- six year old children (12%).

Chapter Three

3.1 Methods

It was conceptualized to begin a study about childhood nutrition and physical activity in Mogale City, as a number of overweight and sedentary adults were observed. The researcher had pondered about the problem and wondered if a study and intervention was possible. Since the parents are the strongest influence and agents for change in a child, the researcher realized it would be paramount to obtain their input. Local schools expressed concern and the Department of Health expressed interest in the outcome of this study. Thus, the topic came to fruition in a dissertation in the field of sports and exercise medicine.

Ethical clearance was sought and obtained from the Wits Human Ethics and Research Committee. Approval was obtained through the Gauteng Education Department (GED) and various primary schools in the Mogale City area. A total of forty five primary schools were identified and eligible for inclusion in the study. The height (stature in cm) and weight (mass in kg) of all subjects, were personally recorded by the researcher over a three day sampling period allocated to each school. A total of five thousand and forty eight subjects were registered with the Gauteng Education Department in Mogale City primary schools. Five clusters, containing nine primary schools each, were created. By random sampling one school was selected from each region and requested to participate. All the selected schools accepted nomination and the majority of parents agreed to the questionnaire and to having their child participate in the survey. The parental questionnaire and data collection stage did not exceed three days per school.

The collected data was compared with standardization charts for subjects in the appropriate age category. The height and weight was recorded with a Beuer© Precision Scale and Height measuring device after calibration. These recordings were done individually, behind a privacy screen. According to the Oxford Pediatric Handbook (1992), "the height of a child is measured while standing, without shoes, the heels and back in contact with an upright surface. The child's head is held so that the child looks straight and forward with the lower border of the eye sockets in the same horizontal plane as the external meatus (ear hole). A block is moved down until it touches the child's head. During the measurement the child should hold his breath, relax the shoulders and stretch as tall as possible. The examiner aids this process by applying gentle upward pressure under the mastoid processes (behind the ear). The stretching minimizes the variation in height which occurs from morning to evening, which can be otherwise as much as 2cm."

Parents of the subjects consented (appendix one) to completing the Parental Questionnaire (appendix two) and to having their child's measurements taken by the researcher at school. A sample size was calculated using the confidence interval, power of the test and the variance of the study. This study aimed to have a sample size equal to the population of parents and learners. All data was treated with the strictest of confidence and information was collected for research purposes only. Questionnaire forms were coded per school and names omitted to prevent identification and stigmatization of individuals. It is intended to keep all data for a minimum of five years after the research has been completed. A group analysis of the data was undertaken when analysing the measurements and responses from parents. The outcome of the study was communicated to the Gauteng Education Department and a summary was forwarded to participant schools.

3.2 Site of Study

This study was conducted in selected West Rand Gauteng schools, Mogale City. Anthropometric measurements of subjects were done at each school's convenience and as arranged with the school's principal. This study did not interfere with the academic day and teaching time of the subjects. Parents consented to participation in both the questionnaire and measurement of their child by the researcher. The measurement stage commenced with an explanation of the process to all subjects present on the day of the study. The researcher then excused himself from the room and an educator assisted the subjects with completion of the Assent Form (appendix three). Each subject was then measured for height and weight behind a privacy screen. A parental questionnaire was handed to each subject in a sealed envelope marked "For Parent / Guardians Attention". These were then completed by the parents and returned to the teacher within the data collection period.

3.3 Study Population

All enrolled grade-one learners for 2012 at a sampled school were eligible for inclusion in the study. All parents / guardians were invited to complete one "Parental Questionnaire", irrespective of the number of learners enrolled. Parents / guardians were requested to consent to both the questionnaire and to having their child's measurements recorded. Forty five primary schools with five thousand and forty eight grade-one learners were identified by the Gauteng Education Department in Mogale City primary schools. Thus five clusters were created with nine schools each, based on their location, and one school sampled per cluster. With an average of a hundred grade-one learners per school, the sample size did not exceed five hundred learners.

3.4 Sampling

The sampling stage commenced with parental consent to participate in both the questionnaire and physical measurement of their child. Subjects who had not given assent were excluded from the study. All completed responses collected during the sampling period were eligible for inclusion in the study. All subjects had their height and weight measurements documented behind a privacy screen on a "Data Record Sheet" (appendix four) using a Beuer© Precision Scale and Height measuring device. The sampling stage, did not exceed three days per school.

3.5 Inclusion Criteria

- A parent / guardian with a registered grade-one learner, consented to participation, completed the questionnaire and returned it to the researcher within the prescribed time;
- A registered grade-one learner who assented to participation, did not refuse measurement on the day of the study and who was present on the day of the survey

3.6 Exclusion Criteria

- A parent / guardian without a registered grade-one learner, did not consent to the questionnaire, or failed to return the questionnaire during the sampling stage;
- A grade-one learner whose parent refused participation, was not present on the day of the study, or after giving assent declined to have his measurements taken.

3.7 Measurement Tool

Survey research is a commonly used method of collecting information about a population of interest. There are many different types of surveys, several ways to administer them and many methods of sampling. There are two key features of survey research:

- Questionnaires -- a predefined series of questions used to collect information from subjects.
- Sampling -- a technique in which a subgroup of the population is selected to answer the survey questions.

Questionnaire Design: The two most common types of survey questions are closed-ended questions and open-ended questions.

- Closed-Ended Questions: The respondents are given a list of predetermined responses from which to choose their answer; the list of responses should include every possible response and the meaning of the responses should not overlap
- Open-Ended Questions: Survey respondents are asked to answer each question in their own words and responses are usually categorized into a smaller list of responses that can be counted by the study team for statistical analysis. (Researchconnections.org)

The Parental Questionnaire (appendix two) in this study consists of two sections:

- Section One: Demographic data i.e. age, occupation and education status of the parent / guardian.
- Section Two: Parental knowledge and perceptions regarding childhood nutrition / activity levels. This study uses closed ended questions as well options for respondents to answer in their own words.

3.8 Data Collection

Anthropometric measurements of all subjects were recorded using a Beuer© precision scale and height measuring device on a Data Record Sheet (appendix four). The age, gender, height (in cm), weight (in kg) and BMI of each subject were documented. All data was coded for privacy and to avoid identification of individuals. The data was then stored on a personal computer to be kept for a period not exceeding five years. The measurements were recorded behind an appropriate screen to ensure privacy of the subject. Consenting parents / guardians completed the questionnaire and returned it to the teacher. All compiled data was loaded into an Excel document and analysed for trends. All collected data was kept in a locked cupboard, accessible only by the researcher, to ensure confidentiality.

3.9 Pilot Study

The pilot study was an important step to minimize ambiguity and ensure specificity and sensitivity to beliefs and cultures. Questions were made concise and specific to document responses as accurately as the respondent intended. A pilot study was conducted prior to the actual study within the same area using subjects that were selected at random. Ten randomly selected parents of grade-one learners from the same geographical area were selected to participate in the pilot study. Modifications and improvements were effected and the final questionnaire was drafted.

3.10 Sources of Bias

All forms of bias on behalf of the researcher, the participating parent and the questionnaire were minimized. The research and data analysis process was thoroughly screened for any form of hidden bias. The researcher was vigilant about the

questionnaire being biased towards overweight individuals. To this end, both normal weight and overweight individuals were asked to appraise the questionnaire. Favouritism by parents towards theirs child's school may have caused some to answer the questionnaire less truthfully. When conducting the pilot study, different parents from those used in the actual study were used, so that the respondents were not primed to answering the same questions. When obtaining assent, the researcher explained the process and then left the room so that the subjects assent was obtained without coercion. Furthermore, the parents were given the questionnaire in a sealed unmarked envelope, to be completed at home and returned the following day. The researcher has emphasized to parents that data is for research purposes, and group analysis rather than individual analysis was effected.

3.11 Ethics

The research protocol was submitted to the Wits University Research and Ethics Committee for approval (appendix five). Applications to several participant schools (appendix six) and the Gauteng Provincial Education department were already accepted, after ethics approval. An information sheet for parents (appendix seven) outlined the purpose of this study. Parents / guardians consented to both the questionnaire and their children's measurements being taken during the study. Their right not to participate in the study was emphasized and this was done without penalty. However, after consent (appendix one) was given and the questionnaire (appendix two) completed, participation was accepted. Subjects were explained the study process, and the researcher was excused while the assent form (appendix three) was completed. Before measurements, were taken, each subject was still given the opportunity to decline participation.

Verbal affirmation from each subject again reaffirmed consent: “May I take your measurements?” These measurements were taken behind an appropriate privacy screen and all names were omitted to ensure confidentiality. Confidentiality of the data was paramount and discretion observed where children were concerned.

3.12 Data analysis

Data obtained from subject measurements and parental responses were captured by the researcher to ensure privacy. Responses were recorded and analysed using SPSS software. This study analysed anthropometric measurements of subjects at selected schools looking for an overweight prevalence. The questionnaire was validated by studying the demographic data and the various parental responses. The data captured could reveal misperceptions that parents develop regarding childhood over-nutrition and adult-onset chronic illnesses. The confidence interval for this study was set at the 95% level. Descriptive methods for analysis with a p-value of less than or equal to 0.05 was used to indicate statistical significance. The power of the test was set at eighty percent. The sample size is an important feature of any empirical study in which the goal is to make inferences about a population from a sample. The total number of subjects weighed and measured; and the total number of parents surveyed within the schools was equal to that of the population size. Hence, measured data and surveyed information was collected and processed from the entire population of grade- one subjects and their parents.

Chapter Four

4.1 Results

The quantitative data was first analysed as a group according to subject age and gender. Parental socio-demographic data, perceptions about their family's weight, knowledge regarding childhood nutrition and family history etc., were also extrapolated from the questionnaire. It was then decided to further analyse the data according to school fee structure. This study surveyed four low-fee and one moderate-fee school in Mogale City. This sub-classification revealed subtle differences in socio demographic data and larger differences between subject nutrition and parental knowledge.

This study sampled 11% of the primary schools in the Mogale City area and the aim was to determine an overweight prevalence in Mogale City among grade one learners. This study found overweight / obesity in seventeen subjects representing 3.7% from the study sample. Overweight was found in the low-fee structure schools representing 3.9% . Six boys (3%) and eleven girls (4.8%) were found to be overweight from the total sample. One boy and one girl each were found with overweight and obesity having a BMI of 23.8 and 24.8 respectively.

Table 1: Group Height, Weight and BMI Data

	Boys	Girls
Total Learners (%)	208 (45)	249 (55)
Height in cm (SD)	117.1 (5.7)	116.3 (5.7)
Age in years (SD)	6.8 (0.5)	6.8 (0.6)
Weight in kg (SD)	20.9 (3.4)	20.6 (3.7)
BMI [W / H^2]	15.3	15.3
N= 457; p ≤ 0.05		

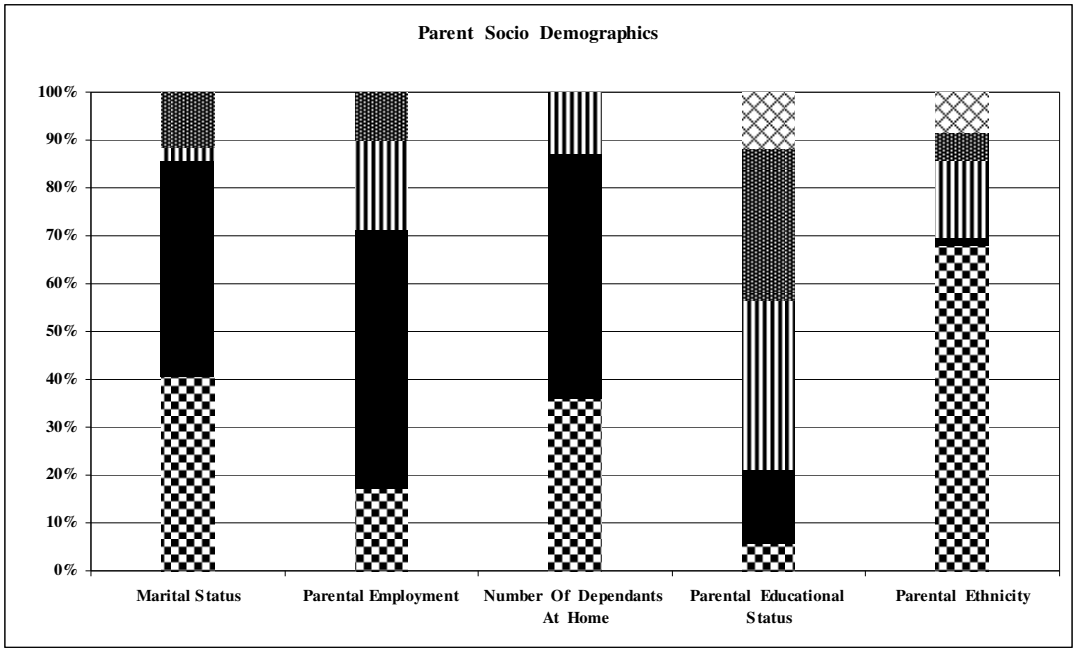
From Table 1: a total of 457 subjects at 5 participating schools gave assent and were measured for this survey. The average age for the sampled group was 6.8 years. The average height was 116cm (range 101-139). The average weight for the sampled group was 21 kg (range 13 – 45). A total for the sample group was compiled in the table above comparing the gender breakdown for each of the groups. There was minimal difference between boys and girls when viewed as a group. A T-test was performed comparing the heights of the boys vs. girls (p = 0.103) A T-test of the weights was done comparing the weights of the boys vs. girls (p = 0.41) The above results show no significant difference as the p-value is greater than 0.05 (appendices eight and nine).

Table 2: Grade- One Learner Age and Anthropometry

	Boys			**Girls**		
Age in years	**Height in cm (SD)**	**Weight in kg (SD)**	**Total (SD)**	**Height in cm (SD)**	**Weight in kg (SD)**	**Total (SD)**
6	114.9 (5.92) * 50th	20.1 (2.57) * 50th	**49 (10.7)**	112.9 (4.67) * 50th	18.8 (2.59) * 25th	**71 (15.5)**
7	117.6 (5.42) * 50th	21.2 (3.58) * 50th	**146 (32)**	117.2 (5.37) * 50th	21.2 (3.83) * 50th	**162 (35)**
8	120.2 (5.88) * 25th	21.4 (3.28) * 25th	**13 (3)**	121.3 (6.43) * 25th	22.9 (3.5) * 25th	**15 (3)**
9	0	0	**0**	122 * 10th	22.9 * 10th	**1**
N = 457; p ≤ 0.05;						
*** NCHS percentiles for Physical Growth**						

From Table 2: the total sample was classified according to age and gender and there are no significant differences between boys and girls (height $p = 0.1$); (weight $p = 0.4$). Differences do become apparent when one compares boys and girls of different age groups in grade-one. An incidental finding of this study is 8 and 9 year old subjects that have stunting of height and weight for age. Of note from Table 2 is that 9 year old girls measure at the 10^{th} percentile for height and weight from the sampled group (appendix eight).

Table 3: Parent Socio- Demographics



Marital Status		Parental Employment		No. of dependants at home		Parental Educational Status		Parental Ethnicity	
Single	188	Unemployed	80	≤ 2 dep.	167	No formal schooling	26	Black	316
Married	210	1 adult working	251	≥ 3 dep.	237	Schooling ≤ grade 8	72	Coloured	8
Divorced	13	Joint Income	87	No Response	60	Matriculated	164	Indian	74
No Response	53	No Response	46			Tertiary Education	147	White	27
						No Response	55	No Response	39

From Table 3: 464 consenting parents completed the questionnaire; 41% of parents are single, 17% of parents are unemployed, 51% of parents have more than 3 dependents and 32% of parents have tertiary education. Of note from the above table is the fair amount of "no responses" received on the questionnaire.

Table 4: Factors Considered by Parents when packing their child's lunch

Do you consider:	**Yes (%)**	**No (%)**	**No Response (%)**
the actual cost of the food?	182 (39)	103 (22)	179 (39)
the nutritional value of the food?	215 (46)	39 (8)	210 (45)
Your home culture when packing a lunch?	79 (17)	146 (31)	239 (52)
packing left over meals for lunch?	43 (9)	171 (37)	250 (54)
N = 464;			

From Table 4: Nutritional concerns (46%), financial concerns (39%) and Cultural factors (17%) were considered important to parents when packing their child's lunch. Nine percent of parents considered left over meals for their child's lunchbox. Almost 50% of parents offered a "no response" to this question on the questionnaire.

Table 5: Parents' Perceptions of their Families Weight

How do you perceive:	Thin (%)	Just Right (%)	Overweight (%)	No Response (%)
Your own weight?	34 (7)	322 (70)	49 (11)	52 (12)
Your spouse's weight?	56 (13)	285 (62)	61 (13)	55 (12)
Your child's weight?	94 (20)	245 (54)	4 (1)	114 (25)
N = 464;				

From Table 5: 11% of parents perceived their own weight to be "overweight", 70% to be "just right" and 7% perceived themselves to be "thin"

Thirteen percent of respondents perceived their spouse to be "overweight", 62% to be "just right" and 13% regarded their spouse to be "thin".

One percent of parents perceived their child to be "overweight", 54% to be "just right" and 20% regarded their child to be "thin".

Table 6: Parents' Family History of Lifestyle Diseases

A Family History of:	Yes (%)	No (%)	No Response (%)
Overweight	64 (14)	272 (58)	128 (28)
High Blood Pressure	92 (20)	267 (57)	105 (23)
High Cholesterol	37 (8)	282 (61)	145 (31)
Diabetes	51 (11)	219 (47)	194 (42)
N = 464;			

From Table 6: high blood pressure (20%), overweight (14%), diabetes (11%) and high cholesterol (8%) were the most common lifestyle diseases selected by parents. Medically, these risk factors may occur together or one may precipitate the other.

Table 7: Parental Knowledge Regarding Lifestyle Diseases and a Good Diet

	Yes (%)	**No (%)**	**No Response (%)**
Can you define a balanced diet?	122 (26)	212 (46)	130 (28)
Does your child consume a balanced diet?	286 (62)	124 (27)	54 (12)
Can you acquire a lifestyle disease by being an overweight child?	165 (36)	61 (13)	238 (51)
N = 464;			

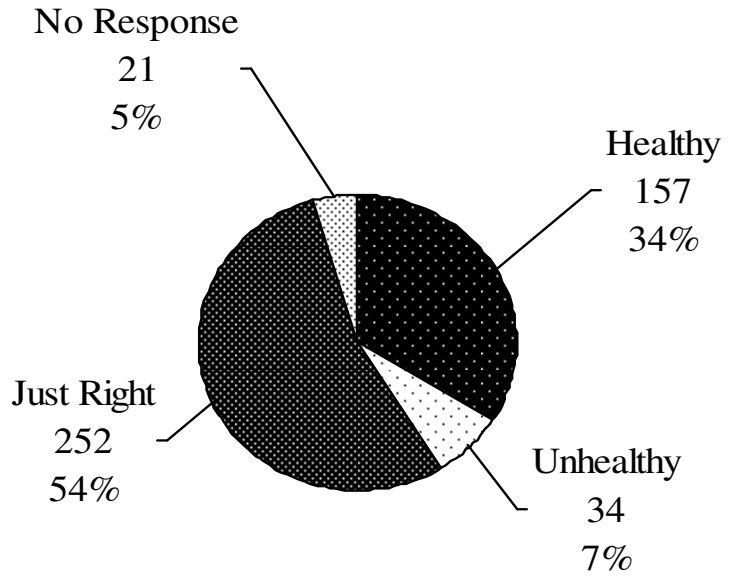


Figure 1: Parents' Description of their Child's Eating Habits

From Table 7 and Figure 1: 26% of parents defined a "balanced" diet and 36% of parents recognised an association between lifestyle diseases and being overweight. Sixty two percent of parents felt their child consumes a "balanced" diet and 34% of parents regard their child's eating habits as healthy. Twenty eight percent of parents could not define a "balanced" diet while 51% failed to recognise the association between lifestyle diseases and being overweight. This could possibly indicate a lack of knowledge regarding a "bad" diet and its association with lifestyle diseases.

Table 8: Learner Screen Time

Does your child:	**Yes (%)**	**No (%)**	**No Response (%)**
Snack in front of the television?	210 (45)	207 (45)	47 (10)
Own/ use a cellular phone daily?	28 (6)	396 (85)	40 (9)
N = 464;			

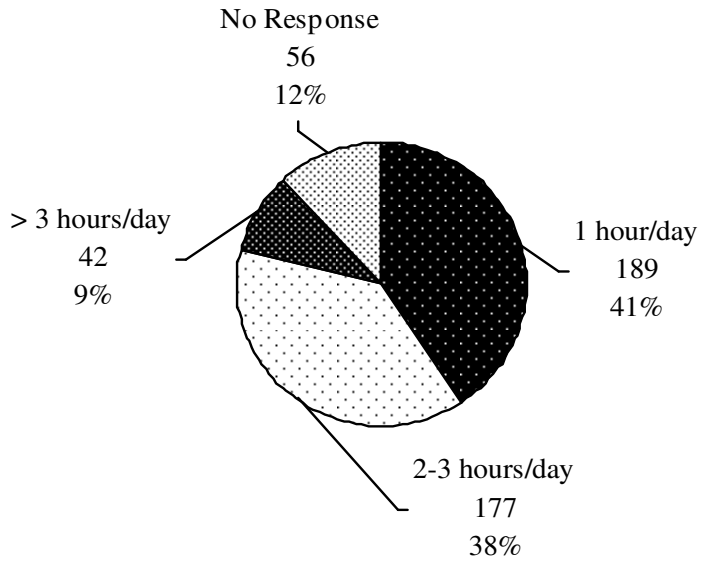


Figure 2: Hours of Television Viewed by Children Daily

From Table 8 and Figure 2: 45% of learners snack in front of the television, up to 6% of learners own / use a cellular phone daily, and a combined 19% of parents offered no response. 9% of learners view television for more than 3 hours per day, while a combined 79% of learners view for less than 3 hours / day.

For the purpose of data analysis, the 5 schools were classified into different socio-economic status using their fee structure. The Centre for Development Enterprise report cited the International Finance Corporation 2009 definition of school fees as (1) Low- fee School: less than R635 pm; (2) Middle-fee School: R635- R1825 pm; and (3) High-fee School Structure: ≥ R1825 pm over 10 months. (Mail & Guardian, Business, 7 September 2012).

Based on the above classification the 5 sampled schools from this survey yielded:

(a) Four schools with Low-fee School Structure &

(b) One school with Middle-fee School Structure

(c) There were no schools with a High- fee Structure

Table 9: Low-Fee vs. Moderate-Fee Schools by Learner Anthropometry

Low-Fee Structure Schools (n= 429)									Moderate-Fee Structure Schools (n= 28)								
	Boys				Girls					Boys				Girls			
Age years	Count (%)	Height in cm [SD]	Weight in kg [SD]	BMI	Count (%)	Height in cm [SD]	Weight in kg [SD]	BMI	Age years	Count (%)	Height in cm [SD]	Weight in kg [SD]	BMI	Count (%)	Height in cm [SD]	Weight in kg [SD]	BMI
6	48 (11)	114.8 [5.9] *50th	20.1 [2.6] *50th	15.2	69 (16)	112.8 [4.7] *50th	18.8 [2.6] *25th	14.7	**6**	1 (3.6)	115 *75th	20.3 *50th	15.3	2 (7)	115 [4.2] *50th	20.3 [3.5] *50th	15.3
7	138 (32)	117.6 [5.4] *25th	21.2 [3.58] *25th	15.3	145 (34)	117.4 [5.4] *50th	21.4 [3.7] *50th	15.5	**7**	8 (29)	118.1 [5.9] *50th	21 [3.8] *50th	15	17 (61)	116.2 [4.7] *25th	19.5 [3.1] *25th	14.4

8	13 (3)	120.2 [5.9] *10th	21.4 [3.3] *10th	14.8	15 (3.5)	121.3 [6.4] *25th	22.9 [3.5] *25th	15.6	**8**	0	0	0	0	0	0	0	0
9	0	0	0	0	1 (0.2)	122 *10th	22.9 *10th	15.4	**9**	0	0	0	0	0	0	0	0
	199 (46)			**15.1**	**230 (54)**			**15.3**		**9 (32)**			**15.1**	**19 (68)**			**14.8**

*** Physical Growth – NCHS Height and Weight Norm Percentiles**

N = 457

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From Table 9: There are no significant differences between the average height and weight of subjects who are of the same age in grade- one. The moderate- fee school has 6 and 7 year old subjects and fewer learners per school. Low- fee schools have significantly more subjects whose ages range from six to nine years old. Stunting of growth for 8 and 9 year old subjects within low- fee schools is evident as their anthropometry measures at only the 10^{th} percentile for age. The cause for this may be in part genetic, nutritional or other alternatives and should be further investigated.

A two tailed T-test comparing low- fee vs. moderate- fee schools shows that for height ($p = 0.21$) and for weight ($p = 0.113$); thus there is no significant difference.

A two tailed T test comparing 6 year olds within low-fee and moderate-fee schools: for height ($p = 0.62$) and for weight ($p = 0.99$) was not statistically significant. Thus their heights and weights are similar for both fee structures and thus shows no significant difference.

Table 10: Low-Fee vs. Moderate-Fee Schools by Parental Responses

Table 10.1: Marital Status

	Low-fee Structure (%)	**Moderate-fee Structure** (%)
Single	187 (44)	0
Married	179 (41)	31 (97)
Divorced	13 (3)	0
Widowed	0	1 (3)
No Response	53 (12)	0
	N = 432;	**N = 32;**

Table 10.2: Ethnicity

	Low-fee Structure (%)	Moderate-fee Structure (%)
Black	314 (73)	2 (6)
Coloured	6 (1)	2 (6)
Indian	49 (11)	26 (81)
White	26 (6)	1 (3)
No Response	37 (9)	1 (3)
	N = 432;	**N = 32;**

Table 10.3: Educational Status

	Low-fee Structure (%)	Moderate-fee Structure (%)
No Formal Schooling	1 (0.2)	0
Schooling ≤ grade 8	26 (6)	1 (3)
Schooling, but no matriculation	71 (16)	0
Matriculated	158 (37)	6 (19)
Tertiary Education	124 (29)	23 (72)
No Response	52 (12)	2 (6)
	N = 432;	**N = 32;**

Table 10.4: Adults Employed

	Low-fee Structure (%)	Moderate-fee Structure (%)
No Adults Employed	78 (18)	1 (3)
1 Adult Employed	233 (54)	18 (56)
Joint Income	73 (17)	13 (41)
No Response	48 (11)	0
	N = 432;	**N = 32;**

Table 10.5: Dependents

	Low-fee Structure (%)	**Moderate-fee Structure** (%)
1-2 Dependents	159 (37)	8 (25)
≥ 3 Dependents	214 (50)	22 (69)
No Response	59 (13)	2 (6)
	N = 432;	**N = 32;**

From Tables 10.1 – 10.5: There are significant differences between the socio demographic profile of parents within low-fee and moderate-fee structure schools. Differences in marital status, education, employment and the number of dependents per household were also noted.

Table 11: Low-Fee vs. Moderate-Fee Schools by Parental Perceptions and Knowledge

Table 11.1: Parents' Perceptions of their Family Members Weight

How Do You Perceive Your Own Weight?		
	Low-fee Structure (%)	Moderate-fee Structure (%)
Just Right	306 (71)	21 (66)
Overweight	53 (12)	6 (18)
Thin	22 (5)	5 (16)
No Response	51 (12)	0
How Do You Perceive Your Spouse's Weight?		
	Low-fee Structure (%)	Moderate-fee Structure (%)
Just Right	252 (58)	24 (75)
Overweight	32 (7)	4 (12)
Thin	40 (9)	4 (12)
No Response	108 (25)	0
How Do You Perceive Your Child's Weight?		
	Low-fee Structure (%)	Moderate-fee Structure (%)
Just Right	278 (64)	19 (59)
Overweight	4 (1)	1 (3)
Thin	99 (23)	12 (37)
No Response	51 (12)	0 0
	N = 432	**N = 32**

From Table 11.1: Among low- fee schools, 12% of parents perceived their weight to be "overweight", 5% perceived their weight to be "thin". Only 1% of parents perceived their child as "overweight".

Among moderate- fee schools, 18% of parents perceived themselves to be "overweight", while 16% felt they were thin. 3% perceived their child as being "overweight", while 37% felt their child was "thin".

Table 11.2: Knowledge of Acquiring 8 Chronic Illnesses by being an Overweight Child

	Low-fee Structure (%)	Moderate-fee Structure (%)
Recognised	1136 (33)	186 (73)
Did Not Recognise	435 (13)	54 (21)
No Response	1885 (54)	16 (6)
	N = 432 x 8 = 3456;	**N = 32 x 8 = 256;**

From Table 11.2: Parents were asked to recognise 8 chronic adult illnesses associated with childhood overweight. The above table shows the various responses received by parents of different school- fee structures. Among the moderate- fee structure schools, 73% recognised, while 21% failed to recognise the association between childhood obesity and chronic illnesses. Among low- fee schools, 33% recognised while 54% did not offer any response to the question.

Table 11.3: Parents To Define a Balanced Diet

	Low-fee Structure (%)	Moderate-fee Structure (%)
Yes	99 (23)	22 (69)
No	201 (47)	10 (31)
No Response	132 (30)	0 (0)
	N = 432;	**N = 32;**

From Table 11.3: Among low-fee schools, 23% of parents defined a balanced diet, while 47% did not. Among moderate-fee schools 69% defined a balanced diet, while 31% did not. Among the low- fee schools, 30% did not offer a response.

Table 11.4: Snacking While Watching TV

	Low-fee Structure (%)	Moderate-fee Structure (%)
Yes	193 (45)	16 (50)
No	190 (44)	16 (50)
No Response	49 (11)	0 (0)
	N = 432	**N = 32**

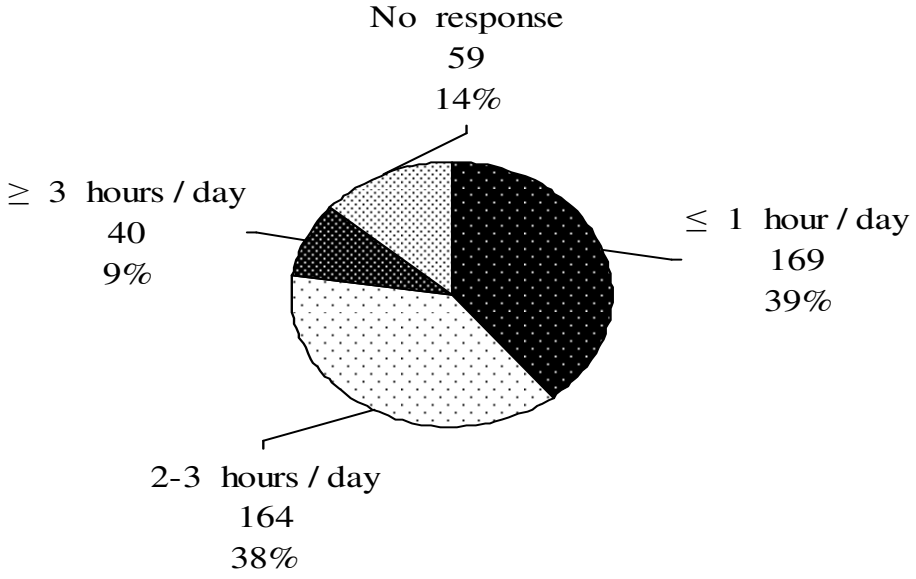

Figure 3: Low-fee Schools, Television Viewing Per Day

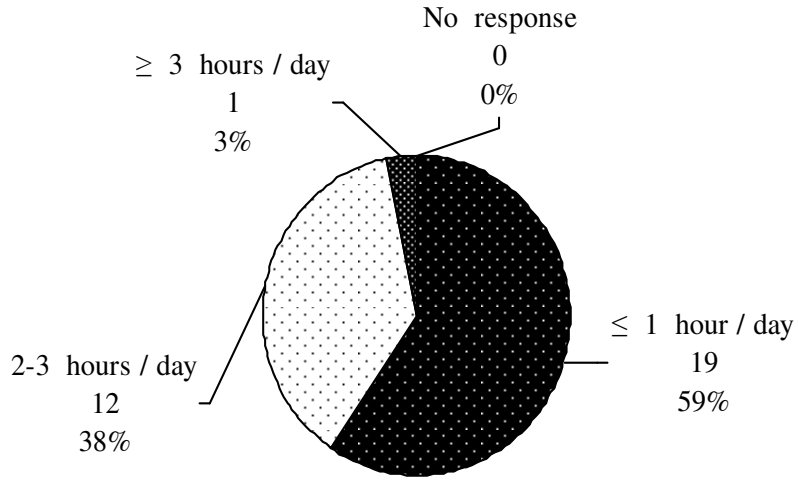

Figure 4: Moderate-fee Schools, Television Viewing Per Day

From Figures 3 and 4: a combined 47% of learners view television for more than 2 hours per day. 14% of parents did not offer a response as television may not be a pass-time for these learners. A combined 41% of moderate-fee learners viewed television for more than 2 hours per day.

Table 11.5: Daily Cellular Phone Usage

	Low-fee Structure (%)	**Moderate-fee Structure (%)**
Yes	26 (6)	1 (3)
No	364 (84)	31 (97)
No Response	42 (10)	0 (0)
	N = 432	**N = 32**

From Table 11.5: Among low-fee schools 6% of parents admitted their child owns / uses a cellular phone; while among moderate-fee schools, 3% of children own / use a cellular phone daily.

Table 11.6: Daily Physical Activity Participation

	Low-fee Structure (%)	**Moderate-fee Structure (%)**
Yes	337 (78)	28 (87.5)
No	46 (10)	4 (12.5)
No Response	49 (12)	0 (0)
	N = 432;	**N = 32;**

Table 11.7: Daily Consumption of Sweets or Chocolates

	Low-fee Structure (%)	**Moderate-fee Structure (%)**
Yes	152 (35)	16 (50)
No	230 (53)	16 (50)
No Response	50 (12)	0 (0)
	N = 432;	**N = 32;**

From Tables 11.6 & 11.7: Among subjects from the low-fee schools, 78% participated in daily physical activity while 12% offered no response. Thirty five percent admitted to daily consumption of sweets / chocolates.

Among moderate-fee school subjects, 88% admitted to daily participation in physical activity, while 50% admitted to daily consumption of sweets / chocolates.

Chapter Five

5.1 Discussion

Obesity refers to an excess of body fat that frequently results in significant impairment of health. This in turn is dependent on the lipid content of each fat cell and on the total number of fat cells (Foss & Keteyian, 1998; Myers, 2004; Robbins, Powers & Burgess, 2009). According to Foss and Keteyian (1998), adipocytes increase in number (hyperplasia) through early adolescence as well as increasing in size (hypertrophy). Payne and Hahn (2002) indicated that obesity is apparent when fat accumulation produces a body weight that is more than twenty percent above an ideal or desirable weight for height. Overweight on the other hand is apparent when the body weight is between one percent and nineteen percent above the desirable weight for height (Payne & Hahn, 2002). Thus overweight and obesity stem from the imbalance created when energy intake exceeds energy expenditure (Corbin & Welk, 2009; Siedentop, 2009).

In children, overweight and obesity are present when their body weight exceeds the 85^{th} and 95^{th} percentiles of their body mass index respectively (Bessesen & Kushner, 2002; Siedentop, 2009; World Health Organisation, 1998; Wuest & Bucher, 2009). This also implies that in most cases overweight may lead to obesity; however this is not necessarily true. An individual may be overweight due to the accumulation of lean tissue other than fat tissue (Corbin et al., 2009). This study has used the definition by Corbin et al when differentiating between subjects that are overweight or obese.

Some research has emerged on the prevalence of childhood overweight among young children in SA (Richardson, 1978; Monyeki et al., 1999; National Food Consumption

Survey, 2000). Richardson (1978) found a prevalence of overweight / obesity of 12-18% among white children, and 13-18% among black children aged one- six years. In a study conducted by Monyeki et al (1999) on the prevalence of obesity among pre-school black children in Ellisras, a rural town in SA, he found that boys between the ages of three-four years showed the highest prevalence of obesity (15%). According to the National Food Consumption Survey of 1999 (National Food Consumption Survey, 2000), the average prevalence of overweight in SA children aged one-nine years is currently 7.6%. However, the figure is much higher for children living in urban areas (12.5%), including four-six year old children (12%). A study conducted by Armstrong et al (2006) in SA determined the prevalence of obesity and overweight among primary school children. These authors found that the prevalence of obesity within the sample was 3.2 percent for boys and 4.9 percent for girls, whereas overweight prevalence was 14 percent for boys and 17.9 percent for girls.

This study has found overweight / obesity in seventeen subjects representing 3.7% from the study sample. The study findings can also agree that eleven girls (4.8%) and six boys (3%) were overweight from the study sample. This represents a boy to girl ratio of 1:1.8 among the overweight group. From the overweight/ obese group in this study, girls represented 64.7% while boys represented 35.3%. Among the overweight girls, one was six years old (9%); eight were seven year olds (73%); while two were eight year olds (18%). From the overweight boys, all six were seven year olds. In the findings of this study, some values that are consistent with the prevalence of overweight among children in the United States 11% to 24% (Flegal, 1999; Strand & Roesler, 1999; Ganley & Sherman, 2000) and in Canada between 7 to 43% (Marshall & Bouffard, 1997). Hernandez *et al*. (1998) found a prevalence of 32% in pre-schoolchildren and these obese children showed significantly higher levels

of blood pressure and other cardiovascular risks associated with being overweight. The findings of this study are that there is less overweight among the subjects (3.7%), but does agree that girls show a higher tendency for overweight than boys (4.8% vs. 3%).

When comparing private versus public schools, the authors Kamau et al (2011) found obesity of 7%; while 17% were overweight in private schools. Among the public school children 1.6% were obese while 5.7% children were overweight. The male children were overweight by 6.5% while 2.6% were obese. The results also demonstrated female pupils 10.9% were overweight while 3.6% were obese. These results showed that overweight and obesity are prevalent among primary school children between the ages of ten and fifteen in Nairobi, Kenya. The results further showed significant differences in body composition between boys and girls ($p \leq 0.05$) with female pupils being more susceptible to overweight and obesity as indicated by higher mean body mass index scores compared to their male counterparts. According to Deckelbaum and Williams (2001), there were approximately 22 million children under five years of age who were overweight across the world.

In the United States, the number of overweight children and adolescents has doubled in the last two decades (Siedentop, 2009; Wuest & Bucher, 2009), and similar increasing rates are being observed worldwide including in developing countries (Afolabi, Addo & Sonibare, 2004; Deckelbaum & Williams, 2001; Christensen et al., 2008; Pasquets et al., 2003; Pawloski et al., 2008). This study has found overweight present within low-fee structure schools in Mogale City and that girls have a higher overweight tendency than boys. However, both genders have an equal preponderance for obesity in the surveyed area. All the overweight/ obese learners were found within low- fee structure schools representing 4% of this group. Therefore, it can be

concluded that, obesity was found in 12% of the overweight group and within the low-fee structure schools. Six and seven year old boys within the low-fee structure schools measure at the 50th percentile, but eight year olds fall below the 10th percentile (Table 9). Six and seven year old girls in the low-fee structure schools measure at the 50th percentile, but fall to the 25th percentile at 8 years old. Within low-fee schools, eight year old boys measure at the 10th percentile while 9 year old girls fall to the 10th percentile.

This study has also found underweight and stunting of growth among the eight and nine year old in grade-one. The stunting of growth observed within this group is of concern but beyond the scope of this study. It may be in part attributable to genetics, nutritional, financial and other concerns.

Parental Demographics and Income

Family income provides the power to purchase goods and services, depending on their relative prices. In general, "healthy" food is relatively expensive and "bad" food is cheap (Drewnowski & Specter, 2004). As such, scholars have argued that greater family income can affect an adolescent's ability to maintain a healthy weight because it increases their ability to purchase "healthy" weight-related goods (Cawley, 2004). Furthermore, the costs for adolescents' physical activity is rising as schools implement pay-to-play policies for organised sports (McNeal & Ralph, 1998). This theoretical perspective is pervasive in the literature and leads to the argument that family income should be negatively correlated with adolescent weight. Instead of using money to promote a healthy weight, families and adolescents could spend their money on goods that generate risks for adolescent overweight, such as video games, or meals prepared away from home. This study has found that among low- fee structure schools (Table

9); underweight, overweight and obesity were observed among subjects. The possible contributing adverse socio- demographic factors within the low- fee structure schools (Table 10) are a high unemployment rate (18%) and having more than 3 dependents at home (50%).

Parents Education and Perceptions of their Families' Weight

Parents' education level was shown to have little impact on their classification of their child's weight in three studies (Adams et al, 2005; Carnell et al, 2005; Contendo et al, 2003). Baughcum et al. (2000) found low maternal education to be significantly associated with inaccurate classification of an overweight child after adjusting for a variety of demographic factors. Genovesi et al. (2005) found higher maternal education to be significantly associated with lower child's weight and more accurate perceptions of child's weight overall.

The findings of fifteen quantitative studies supported that a large proportion of parents of overweight children did not accurately perceive their child's overweight status. Baughcum et al. (2000) found that 79% of mothers of overweight children (23–60 months) did not perceive their child as overweight. Jackson et al. (1990) reported that sixteen out of seventeen mothers of overweight children (aged 35–70 months) rated them as "average." The findings of Adams et al (2005) supported that only 15% of overweight children (4.5–8.5 years old) were recognized as overweight by their caregivers. Young-Hyman et al. (2000) found that, although parents of obese and super-obese children described their child as "overweight" or "very overweight," only 46% of these parents described their children as "very overweight."

Three studies provided limited analyses comparing the accuracy of recognizing child overweight by parent's gender with that by family's role. The findings of these studies supported that mothers were more likely to accurately assess their child's weight than fathers (Adams et al., 2005; Holm- Denoma et al., 2005; Jeffery et al., 2005). Some studies have focused on the child's gender to parental perception of child overweight. Nine studies reported that child's gender did not affect parental classification of their child's weight (Adams et al., 2005; Baughcum et al., 2000; Carnell et al., 2005; Contendo et al., 2003; Genovesi et al., 2005; Jackson et al., 1990; Rhee et al., 2005; Rich et al., 2005; Young-Hyman et al., 2000). Four studies found that caregivers and parents were more likely to classify girls as overweight than boys (Boutelle et al., 2004; Fisher et al., 2006; Jeffery et al., 2005; Maynard et al., 2003). Holm- Denoma et al. (2005) found that fathers and mothers were significantly more likely to accurately identify overweight in their daughters than in their sons.

Nine of the fifteen quantitative studies examined how a child's age affected parents' perceptions of weight status. Five of these nine studies found no effect of child's age on parents' ability to classify their child as overweight (Adams et al., 2005; Baughcum et al., 2000; Boutelle et al., 2004; Carnell et al., 2005; Jackson et al., 1990). Four studies found that parents were less likely to consider younger children as overweight than older children (Genovesi Genovesi et al., 2005; Maynard et al., 2003; Rhee et al., 2005; Young-Hyman et al., 2000). The findings of the two qualitative studies also supported that parents were more likely to consider older children as overweight (Jain et al., 2001; Rich et al., 2005). Reasons that parents gave for not considering younger children as overweight included that child fat would go away as the child grew older (Jain et al. 2001) or the child was “tall or big-boned” (Rich et al., 2005).

Several authors have used maternal perceptions of their own weight to accurately judge their child's weight. The findings of six studies supported that mothers who correctly identify themselves as overweight could not correctly identify their child's weight status (Baughcum et al., 2000; Boutelle et al, 2004; Contendo et al, 2003; Jain et al, 2001; Jackson et al, 1990; Jeffery et al, 2005). Maynard et al (2003) found an association between mothers with a lower body mass index being more likely to report their child as overweight. Adams et al (2005) found that overweight mothers recognized overweight in their child significantly better than normal-weight or obese mothers.

Parents of the Mogale City survey were asked to perceive their family's weight. (Table 5). Seventy percent of respondents felt their own weight was "just right", 62% felt their spouse's weight and 54 % of parents felt their child's weight was "just right". The respondent parents of this study indicated that 20% felt their child was "thin", 1% felt their child was "overweight", while this study has found overweight in 3.7% of learners.

With the sub- classification of schools by fee- structure, this study has found that among moderate-fee schools 59% of parents perceived their child's weight to be "just right", 38% perceived their children to be "thin" while 3% felt their child was "overweight". However, no overweight or underweight was found among children measured within the moderate-fee schools.

Among low- fee schools, 64% of parents perceived their children to be "just right", 1% felt their child was overweight, 23% perceived them to be thin, while 12% did not respond to the question. The findings of this study however demonstrated underweight, overweight and obesity among these low-fee schools. This study finds

truth to the notion that perceptions are highly subjective and may be unreliable in most cases. However they do demonstrate the respondents beliefs and perceptions and highlights the importance of scientific measurements when dealing with the weight and development of minors.

Family History and Overweight

First-degree relatives of individuals with type 2 diabetes are more likely to be significantly overweight, demonstrate insulin resistance, and develop diabetes (Arslanian, 2005; Bao, 1995). They are also at increased risk for dyslipidemia as adults (Daniels, 2008). Adolescents with a family history of diabetes have been shown to perceive themselves to be at greater risk for developing the disease than peers without this family history (Ev, 2000; Mahajerin, 2008). Adults with a family history of type 2 diabetes are often aware of their increased risk of developing the disease and may undertake health behaviours that can prevent it (Baptiste-Roberts, 2007; Kim, 2002; Nishigaki, 2007; Pierce, 1995). Thus, a family history of diabetes or vascular disease optimally would lead to recognition that children in the family, especially children who are overweight, are at increased risk to develop these conditions.

In accordance with guidelines for prevention and management of obesity in children, clinicians should ask about a family history of obesity-related conditions (Olney, 2007). The American Diabetes Association recommends that overweight children aged ten years with two risk factors (family history of type 2 diabetes, minority status, or demonstrating evidence of insulin resistance) be screened for type 2 diabetes every two years (American Diabetes Association, 2000). Family history is increasingly recognized as a potentially useful tool for the detection of children at risk for diabetes and cardiovascular diseases (Trotter, 2007; Valdez, 2007). However, family

history may be underutilized in screening and counseling (Trotter, 2007; Valdez, 2007).

Prior studies have examined the influence of a positive family history of diabetes or cardiovascular disease on parental perceptions of health risks among overweight children, in particular racial/ethnic groups (Adams et al, 2005; Young-Hyman, 2000). Among African American parents, a family history of diabetes, hypertension, or hypercholesterolemia did not significantly influence perceived risk of overweight status as a health concern (Young-Hyman, 2000). Among Native American families, only parents and grandparents with diabetes perceived that their child's weight status could impact the child's risk for diabetes (Adams et al, 2005).

Respondent parents of the Mogale City survey have indicated their positive family history for four chronic medical conditions (Table 6). A history of high blood pressure (20%), a history of overweight (14%), a history of diabetes (11%) and a history of high cholesterol (8%) were selected. These medical conditions are associated with lifestyle and closely associated with being overweight.

Learner Screen Time

Associations between television viewing, media use, and children's socio-demographic and weight status characteristics have been studied more frequently (Henderson, 2007; Lumeng et al, 2006; Mark et al, 2006; Marshall et al, 2006). Many studies have found that television viewing time and computer use is similar for boys and girls; however boys are more likely to play video games, and likely to have very high screen times (>4 hours per day) (Marshall et al, 2006).

Sedentary behaviour is not simply the inverse of physical activity (Gordon-Larsen et al, 2000; Biddle et al, 2004; Must & Tybor, 2005), and children who are highly physically active may also spend a lot of time in sedentary activities. Thus it is important to understand the prevalence and socio-demographic correlates of low levels of physical activity and high levels of sedentary behaviour individually, as well as in combination. Very little is known about how these two risk factors become clustered together (Sanchez et al, 2007).

This study has found respondent parents admitting that 41% of learners viewed an hour of television per day, 38% of learners viewed two to three hours per day, and 9% of learners viewed more than three hours per day. 12% of parents did not offer a response perhaps due to affordability as TV viewing may not be their main pass time.

A study by Wijga et al (2010) shows that in children between the ages of five and seven found that screen time was the only behavioural factor found to be statistically significant and associated with overweight. Over the past fifty to sixty years, television has played an increasingly greater role in the lives of most Americans (Nielsen Report on Television, 2000). Survey research has indicated that total viewing time is increasing and that Americans are currently watching more than thirty hours of television per week (Nielsen Report on Television, 1993; 2000). On average, the television occupies more than four hours of an individual's day and consequently, it has been blamed for many social ills, not the least of which is physical inactivity among children and adults (Du Rant, 1994; Robinson, 1993; Tucker 1993, 1990). Men and women between the ages of twenty five and fifty four view television for 3h56 minutes per day and 4h22 minutes per day, respectively. Children aged five–

eleven and twelve–seventeen years view 2h48 minutes of television per day (Nielsen Report on Television, 2000). Other research suggests that five–seven- and eight–eighteen year old children and adolescents are watching television, and playing video and computer games 2.5h and 4.5 hours per day, respectively (Roberts, 1999).

An extrapolation of this data would indicate that children and adolescents spend more than three years of their waking lives watching television and playing video/computer games by the age of seventeen (Nielsen Report on Television 2000; Robinson, 1998, 2001). If children spend more than three hours daily watching television, this means that when calculated over one year, it is the single most time-consuming activity for children, second only to sleeping (Nielsen Report on Television, 2000). Results from the Mogale City survey indicated that up to 9% of learners in low-fee structure schools (n= 429) and 3% in moderate-fee structure schools (n= 32) admitted to viewing TV for more than three hours per day. Among the low-fee structure schools 6% (n=429) and from the moderate-fee structure schools 3% (n= 32) admitted to owning / using a cellular phone daily.

A study conducted by Anderson et al (2008), suggests that a substantial proportion of young children in the US are inadequately active and highly sedentary. Low levels of active play and high levels of screen time in young children are likely contributors to childhood obesity rates in the US. When these behaviours are combined, in almost 20% of four–five year old boys and girls and over 35% of nine–eleven year old girls, the positive energy balance required for excess weight gain is particularly likely to result (Sherry, 2005). In addition, other than age and gender, the socio-demographic factors most strongly associated with low active play were not the same as those associated with high screen time. Based on a multivariate model, Mexican

American children had increased likelihood of low active play whereas non-Hispanic black children had increased likelihood of high screen time.

In contrast to other studies (Gordon-Larsen et al, 2000), we observed that higher wealth [poverty to income ratio] was associated with increased likelihood of low active play, but not associated with likelihood of high screen time. Many aspects of diet and physical activity have been examined as aetiologic factors related to overweight. Some of the strongest evidence points to the impact of TV viewing on children (Robinson, 1999; Gortmaker et al, 1996; Taveras et al, 2006; Miller et al, 2008). Taveras et al, 2006 found that TV/ video viewing was associated with unhealthy dietary behaviours among children, including consumption of high-fat foods, fast foods, and sugar-sweetened beverages and consumption of fewer fruits and vegetables. One way in which TV/ video viewing might influence dietary patterns in children is through food advertising on TV. Kotz and Story (1994) analyzed food advertising in children's programming and found that fast food restaurant advertising is prevalent during children's programming, representing nearly 11% of total advertisements. Another way in which TV may influence eating patterns is through food messages embedded within program content. Story and Faulkner (1990) found, in a content analysis of food messages in TV, that food references occurred an average of 4.8 times per 30 minutes of program content, more often than food references during commercials, and more than one half of the food references were for foods that are low in nutritional value.

The Mogale City survey has found that 45% of learners snacked meals regularly in front of the television. In low-fee structure schools, 39% of learners viewed TV for less than one hour per day, 38% viewed between two-three hours, while 9% view

television for more than three hours per day (n= 429). In the moderate-fee structure 50% admitted to snacking in front of the TV (n= 32). 59% of learners admitted to viewing TV for less than one hour per day, 38% viewed TV between two-three hours per day while 3% viewed TV for more than three hours per day (n= 32).

School income and parental education/ employment

Despite the large role that schools have in adolescent's lives, few studies have examined how school-level resources influence adolescent weight. Two exceptions focus on parallel resources to those that we investigate at the family level: the average family income of schools (Richmond & Subramanian, 2008) and the average education level of parents in the school (O'Malley, Johnston, Delva, Bachman, & Schulenberg, 2007). In these studies, both school-level resources have a significant, negative association with adolescent weight. School poverty may also be associated with adolescents' weight indirectly. Poor schools have a greater prevalence of juvenile delinquency, disorder, and classroom disruption (Mrug, Loosier, & Windle, 2008), making them stressful environments that induce individuals' stress response. Unfortunately, chronic activation of the stress response increases abdominal fat (Anagnostis et al, 2009; Bjorntorp & Rosmond, 2000; Fraser et al., 1999). Therefore poorer schools have an adverse effect on weight as related to the environment.

The socio- demographic characteristics of the parents in the Mogale City survey within low- fee structure schools (Table 10); this study has found that 44% were single parents, a combined 24% had no formal schooling/ schooling without matriculation and only 29% obtained a tertiary education. (n= 429). In moderate- fee schools, this study has found 56% of homes with one adult working, while 41% had a joint income. The percentage of parents that were married totalled ninety seven and 72% had achieved a

tertiary education. This study has found overweight and obesity only within low-fee structure schools, this would tend to suggest that school poverty for resources may have a negative association with children's weight. This study then concurs with the findings of O'Malley, Johnston, Delva, Bachman, & Schulenberg (2007) that poor school resources within a low-fee structure school may lead to nutritional concerns for both under and overweight among the learners.

5.2 Conclusion and recommendations

This study has proven its hypothesis that overweight/ obesity does exist in West Rand schools, Mogale City; however the prevalence was low. From the sampled group, the learners were classified among low- fee and moderate-fee schools. The majority of the learners were classified within the low- fee structure schools with underweight, overweight and obesity. More girls were found to be overweight than boys but obesity was found equally between the two genders.

This study created an awareness for childhood nutrition, physical activity, screen time, and parental knowledge regarding childhood overweight. The findings of this study paves the way for a broader focus on both under and over-nutrition among low-fee structure schools. The findings of the study recommends public health collaboration between the Departments of Health and Education to bring about behaviour change among teachers and parents. The Public Health drive would be focused on the parents of toddlers and pre- schoolers. This study also recommends parental counseling / education and cues to active change regarding childhood over and under-nutrition. However, the rope of inequality, poverty and lack of education remains tightly tied around the neck of the masses and this will take many decades to be corrected.

Limitations of the study

- The majority of subjects were from previously disadvantaged communities
- After sub- classification according to fee structure, the majority of learners were from the low-fee structure schools
- There were no schools selected from a high- fee structure
- This study has focused on overweight children amongst grade- one learners while a number of learners displayed underweight / stunted growth
- The study could have explored the aspect of physical activity among children in greater detail

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Appendices

Appendix One: Parent Consenting Letter

The Parent/ Guardian of a Grade-One Learner

Consenting Letter to:

(1) Complete a Parental Questionnaire at home &

(2) Record your Child's Height and Weight at school

Dr Abdul Hameed Ismail

PO Box 9682

Azaadville

1750

01 August 2011

I …… (Name) the Parent / Guardian of…..

(Name of Grade-One Learner) at…….. (Name of school)

Mogale City, hereby consent to the following study (please tick):

☐ Completing a Parental Questionnaire;

☐ Record my Child's height and weight

The title of this research is: The Overweight Prevalence amongst Grade-One Learners and Parental Perceptions of Childhood Nutrition/ Physical Activity in West Rand, Gauteng.

1. The Gauteng Educational Department has approved this study in all Mogale City schools.

2. The Parental Questionnaire and child measurement is for research purposes only.
3. Group analysis will be conducted and all information kept strictly confidential.
4. The questionnaire documents (a) demographic data of the parent/ guardian and (b) beliefs/ practices regarding childhood nutrition.
5. There is no consequence for not consenting to the Questionnaire/ children's measurements.
6. Thanking you for your time.

Dr. Abdul Ismail (MB. Ch. B) (MPH)

Researcher

mogalecitygradeonesurvey@gmail.com

Signature and date of parent/ guardian

_____

_____ (date)

Appendix Two: Parental Questionnaire

PARENTAL QUESTIONNAIRE OF A GRADE-ONE LEARNER

Title:

The Overweight Prevalence amongst Grade-One Learners and Parental Perceptions of Childhood Nutrition/ Physical Activity in West Rand, Gauteng

(a) To participate in this survey, it is mandatory to have a registered grade-one learner at this school

(b) A single parent/ guardian may complete only one questionnaire for this survey, irrespective of the number of learners you have in grade-one

(c) All information collected is kept strictly confidential and for research purposes only

(d) Thank you for your time

Contact person regarding this research

Dr Abdul Hameed Ismail (MBChB) (MPH)

Researcher/ Medical Practitioner

083 630 9998

mogalecitygradeonesurvey@gmail.com

Section One: Demographic Data

- Please tick only one block and provide a comment in the space below:

1.1 Are you the biological parent or guardian of this child?

☐ Parent

☐ Guardian

1.2 Age Category of Parent/ Guardian

☐ < 20 yrs

☐ 20 – 39yrs

☐ > 40yrs

1.3 Gender of the Parent/ Guardian

☐ Male

☐ Female

1.4 Marital Status of the parent/ guardian

☐ Single

☐ Married

☐ Divorced

☐ Other (specify) _____

1.5 Total number of dependants in your home (immediate and not extended family):

- ☐ 1 - 2 dependants
- ☐ > 3 dependants

1.6 Ethnicity of parent/ guardian

- ☐ White
- ☐ Black
- ☐ Indian
- ☐ Coloured
- ☐ Other (specify) _____

1.7 Highest education level of parent/ guardian completing this questionnaire:

- ☐ No formal schooling
- ☐ Schooling completed, less than grade 8
- ☐ Schooling completed, but did not matriculate
- ☐ University/ College education

1.8 Adults employed (part/ full time) in your home for the year:

- ☐ No adults working in your home
- ☐ One person working (sole bread winner)
- ☐ Two or more persons working (joint income)

1.9 As the parent/ guardian, do you work full time or part time?

- ☐ Part time employed
- ☐ Full time employed
- ☐ Self employed
- ☐ Unemployed

Please specify_____

1.10 How much do you spend on food for your house per month?

- ☐ less than R500 per month
- ☐ between R500 & R1000 per month
- ☐ between R1000 and R2000 per month
- ☐ more than R2000 per month
- ☐ I do not know

1.11 Do you spend money on <u>daily</u> fruit and vegetables?

- ☐ Yes
- ☐ No

If yes, then state approximate amount per month

_____

1.12 Do you buy **separate ingredients** to prepare your child's lunch (e.g. peanut butter, jam, margarine or fruit etc)

☐ Yes

☐ No

Please comment

_____

1.13 My choice of lunch box content (e.g. peanut butter, margarine, fries, sweets, jam; fruit, yogurt etc.) is <u>most strongly affected</u> by the following:

Factor	Yes	No	I don't know
Financial concern			
Cultural way/ belief			
Nutritional concern			
"Left over" food			

1.14 Do any of the child's family members have any of the following medical conditions, either currently or previously? (Please tick)

Medical Condition	Yes	No	I don't know
High Blood Pressure			
High Cholesterol			
Overweight or large body size			
"Sugar" Diabetes			

Any comments

……

……

……

1.15 Does your grade-one learner have any **chronic illnesses**, currently or previously (unwell for more than 3 months)?

☐ Yes

☐ No

☐ I don't know

If yes, then please specify _____

1.16 Does your child in grade-one regularly attend at a doctor/ clinic/ hospital?

☐ Yes

☐ No

☐ I don't know

If yes, then please specify _____

1.17 Does your child's school have a F**ood Program** (i.e. receives food/ drinks etc.) either occasionally or daily?

☐ Yes

☐ No

☐ I don't know

If yes, then please specify _____

1.18 Does your child **walk to school** daily (on most days of the week) either for part or all of the way?

☐ Yes

☐ No

Please specify _____

1.19 How many minutes does your child spend **walking to school** every day/ on most school days?

☐ Less than 10 minutes' walk per day

☐ Between 10 to 20 minutes' walk per day

☐ More than 20 minutes' walk per day

☐ I don't know

Please specify if required _____

End of Section One

Section Two: Parental Perceptions/ Knowledge concerning childhood obesity/ over nutrition

2.1 How do you perceive your <u>own</u> weight?

- ☐ "I am thin"
- ☐ I am "just right"
- ☐ "I am overweight / fat"

Please state your weight if you know it.....kg

2.2 How do perceive your <u>spouses/ partners</u> weight?

- ☐ He / she is thin
- ☐ He / she is "just right"
- ☐ He / she is overweight / fat

2.3 How do you perceive the **weight of your child** that is in grade-one?

- ☐ He / she is thin
- ☐ He / she is "Just right"
- ☐ He / she is overweight / fat

2.4 Can you estimate your child's weight in kilograms?

My child in grade-one is .....kg

2.5 Do you think it is possible to develop a Chronic Medical Condition in adulthood by being an overweight child?

_____

_____

Look at the following table and answer in the space provided....

Chronic Medical Condition in adulthood	Yes, it is possible to develop as an adult by being an obese child	No, it is not possible to develop as an adult by being an obese child	IF YES, how could you explain this?	IF NO, then why do you say so?
High blood pressure				
"Sugar" Diabetes (Type 2)				
Heart disease e.g. angina or heart attack				
Joint pains/ Osteo-arthritis i.e. "over use" joint disease				
High cholesterol				

Low self-esteem or poor self- image				
Psychological problems e.g. Depression				
Obesity/ overweight as an adult				

2.6 In a few words, can you explain what a "balanced diet" means to you?

_____

_____

_____

2.7 Does your child eat <u>three "balanced" meals</u> a day?

☐ Yes

☐ No

Comment / Specify

_____

_____

_____

2.8 Does your child have snacks between meals?

☐ Yes

☐ No

Please specify what kind of snacks

_____

2.9 How often does your child have a snack between meals?

☐ Not very often (once a week)

☐ Fairly often (three times per week)

☐ Daily

2.10 Does your child eat meals/ snacks while watching television?

☐ Yes

☐ No

If yes, then please comment

_____

2.11 On average, how many hours does your child spend watching TV per day?

☐ Less than one hour

☐ Between one to three hours

☐ More than three hours

2.12 Does your child own a cellular phone?

☐ Yes

☐ No

If yes, is it used daily?

_____

2.13 Does your child play computer games daily?

☐ Yes

☐ No

Please specify

_____

2.14 Does your child participate in physical activity (i.e. not a sport, but runs and plays freely)?

☐ Yes

☐ No

2.15 For what length of time does your child play actively daily (i.e. runs and plays freely)?

☐ Not at all

☐ Less than 30 minutes per day

☐ Between 30 to 60 minutes per day

☐ More than 60 minutes per day

2.16 Does your child play organized team sport e.g. netball, swimming, soccer or cricket?

☐ Yes

☐ No

If yes, please specify

_____

2.17 For how many hours does your child play a team sport/ week?

☐ Less than 1 hour per week

☐ Between 1 to 2 hours per week

☐ More than 2 hours per week

2.18 What food do you usually pack in your child's lunch box?

Please specify

_____

_____

2.19 If required, do you usually give him/ her as an additional snack/ spending money to buy snacks?

_____

_____

2.20 Does your child eat fruit, regularly?

☐ Yes

☐ No

Comment _____

2.21 Does your child eat vegetables regularly?

☐ Yes

☐ No

Comment _____

2.22 Does your child have sweets or chocolates regularly?

☐ Yes

☐ No

If yes, please specify

_____

2.23 How would you describe your child's eating habits?

☐ Healthy

☐ Unhealthy

☐ "Just right"

Please Comment

_____

_____

2.24 When reviewing your child's diet, is there anything you would like to change?

☐ Yes

☐ No

Please specify

_____

2.25 When reviewing your child's activity level, is there anything you would like to change?

☐ Yes

☐ No

Please specify

_____

End of questionnaire

Thank you for your time.....

Appendix Three: Grade-one Learner Assent Form

Name of school _____ Date: _____

Child number and code _____

Can I measure your height?

☐ Yes

☐ No

Can I weigh you on the scale?

☐ Yes

☐ No

Appendix Four: Data Record Sheet for Grade-One Learner, Mogale City

School_____

Date_____ Recorded By_____

Learner number and tracing code	Age of learner @ next birthday in 2012	Gender	Height (cm)	Weight (kg)	BMI (W/ H^2)	Average height for age	Average weight for age
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							

Appendix Five: Ethical Clearance Certificate

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Dr Abdul Hameed Ismail

CLEARANCE CERTIFICATE	M110939
PROJECT	The Overweight Prevalence amongst Grade-One Learners and Parental Perceptions of Childhood Nutrition/Physical Activity in West Rand, Gauteng
INVESTIGATORS	Dr Abdul Hameed Ismail.
DEPARTMENT	Centre for Exercise Science and Sports Med
DATE CONSIDERED	30/09/2011
M1109390DECISION OF THE COMMITTEE*	Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 20/01/2012 **CHAIRPERSON** .....
(Professor PE Cleaton-Jones)

*Guidelines for written 'informed consent' attached where applicable
cc: Supervisor : Prof Yoga Coopoo

DECLARATION OF INVESTIGATOR(S)
To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University.
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES...

Appendix Six: A Survey at Your School: Letter of Request

Dr Abdul Hameed Ismail

PO Box 9682

Azaadville

1750

01 August 2011

mogalecitygradeonesurvey@gmail.com

The Principal/ School Governing Body

_____(school)

Mogale City, Krugersdorp

1750

Dear Sir/ Madam

My name is Dr Abdul Hameed Ismail; I am a medical doctor in private practice in Randfontein. I have completed my Masters in Public Health in 2007 and currently completing a Master of Science degree at the University of the Witwatersrand in Sports Medicine.

The title of my research is: The Overweight Prevalence amongst Grade-One Learners and Parental Perceptions of Childhood Nutrition/ Physical Activity in West Rand, Gauteng

The prevalence of childhood overweight is increasing in South Africa and around the world. This may be due in part to dietary practices and a lack of physical activity. This study aims to document childhood overweight/ obesity in West Rand schools and determine parental perceptions regarding childhood over nutrition.

I hereby request permission to:

(1) Measure all grade-one learners' height/ weight and

(2) Administer a Parental Questionnaire to all consenting parents during the month of January 2012.

The questionnaire and anthropometric measurements of all grade-one learners will be done at school over the 3 day sampling period. The Gauteng Education Department has given approval to conduct this study in all Mogale City schools.

I would value your endorsement for conducting this survey at your school.

Thanking you kindly in advance,

Dr Abdul Ismail (MBChB) (MPH)

mogalecitygradeonesurvey@gmail.com

Appendix Seven: Parent Information Handout

Study Title:

The Overweight Prevalence amongst Grade-One Learners and Parental Perceptions of Childhood Nutrition/ Physical Activity in West Rand, Mogale City

Hello and Welcome to All Parents of Grade-one learners

Research is a process of collecting information, learning about a topic and trying to find an answer to a question. We are doing research in the area of childhood nutrition and parental practices regarding their children. Worldwide, research has shown that young children are becoming more overweight and we would like to know why. In this study we are concerned with children being overweight in the Mogale City area. You, as parents of grade-one learners are our main study population. Our concern is that childhood nutrition and parental practices are related and we would like to know more about this.

Invitation

We are asking/ inviting parents of grade-one learners to participate in this research study that will require you to (a) complete a Parental Questionnaire at your home and (b) allow the researcher to weigh and measure your learner's height at school.

The Study

We intend collecting information from the parents of all grade-one learners by hosting a parental questionnaire which is to be completed at home. The questionnaire is in English and should not take longer than 25 minutes to complete. The questions pertain to our children's food consumption, screen time and activity level at home/ school. All responses are completed on the questionnaire paper in writing, these are confidential and are for research purposes only. All grade-one learners will be

measured at school as arranged with the school's Principal. This will not affect the daily academic activities by educators and learners. On the day of the study; the procedure will be explained to all learners, the educator will gain assent from each subject after which measurements will be taken. The measurements will be taken using a Medical scale and height measurement device. This will be done at school behind a privacy screen. All data collected will be recorded and compared to standard levels for that age group. The outcome of this study will be communicated to the Department of Education. A total number of 45 primary schools are located in the Mogale city area and these will be divided into 5 clusters of 9 schools each. One school within each cluster will be selected for sampling. A 3 day sampling period has been allocated to each school in which parents of grade-one learners will complete the questionnaire at home and all learners measured for height and weight at school. The Department of Education has approximately 500 learners at Mogale City Primary schools. This study is confined to parents and learners in the Mogale City area only because this is our area of concern. As participants in this study there are no further requirements on behalf of you or your child in grade-one.

Risk

There is no risk involved for participating in this study, either for you or for your child. In the event of an adverse event, we will bear responsibility for the consequences and attempts to compensate will be made.

Benefits

The benefits of this study are to increase public knowledge about a growing concern around childhood obesity, activity levels, eating habits etc. One may benefit by becoming acutely aware of your child's habits, eating patterns and activity levels. Your child will have his/ her height and weight measured behind a privacy screen at

school, however there is no direct benefit for you or your child by participating in this study.

Participation

We assert that participation is completely voluntary. Refusal to participate will not result in any penalty or loss of benefits to which the participant is otherwise entitled. You may discontinue participation at any time without penalty loss of benefits to which the participant is otherwise entitled. There is no monetary compensation for your participation in this study.

Confidentiality

All information is confidential, however absolute confidentiality cannot be guaranteed. Certain information may be disclosed if required by law. Certain organizations that may inspect and/or copy our research records for quality assurance and data analysis include Research Ethics Committee, Department of Education. If results of this study are published, it may lead to groups or populations being identified.

Contact details of the researcher:

Dr. Abdul Ismail (MB ChB) (MPH)

011 4124601

Fax to email: 0866 22 9380

mogalecitygradeonesurvey@gmail.com

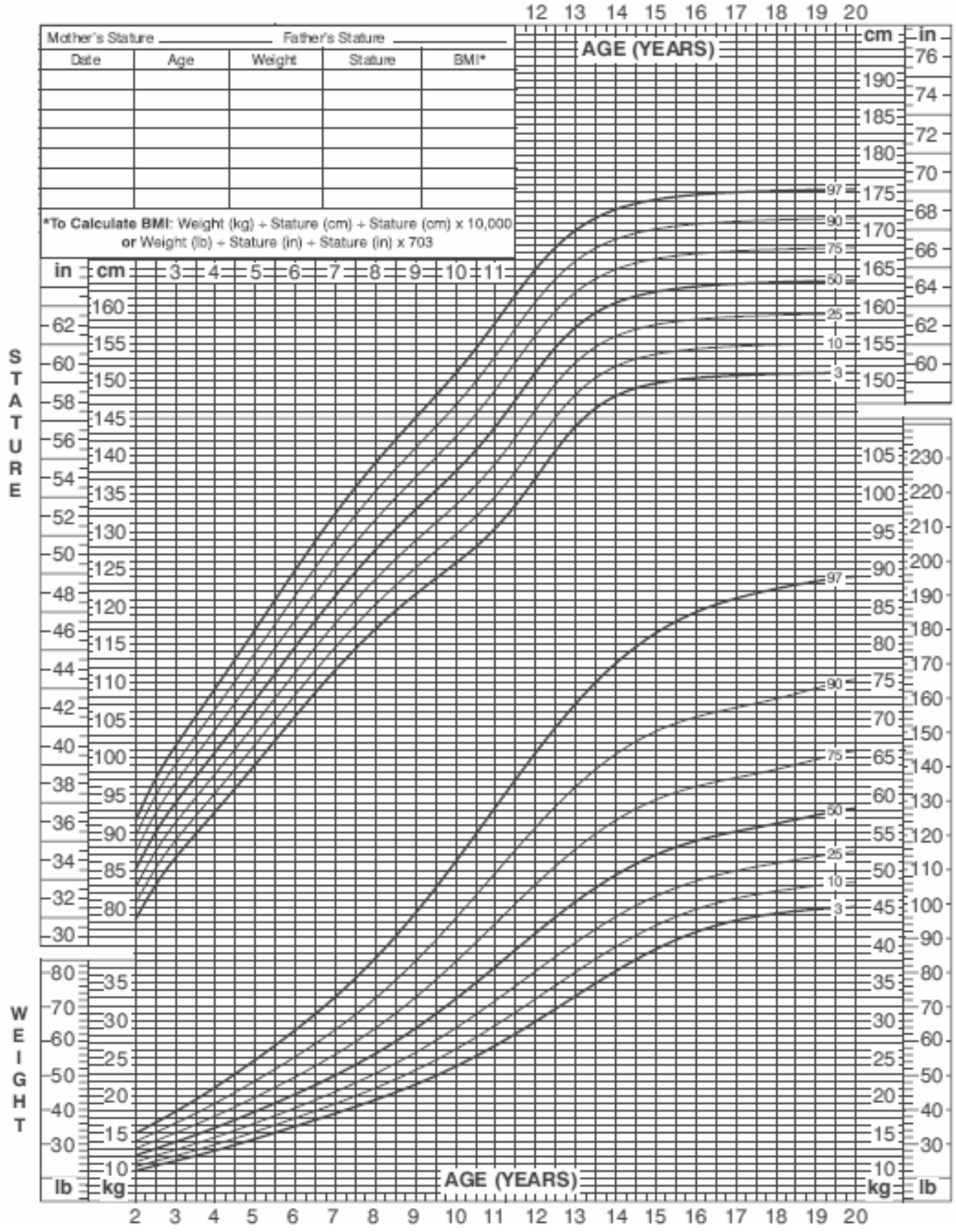
Contact details for HERC Chairman (complaints/ problems):

Prof Cleaton-Jones

011 7172301

Thanking you for your time

Appendix Eight: Stature-for-age and Weight-for-age percentiles for girls aged 2-20



Appendix Nine: Stature-for-age and Weight-for-age percentiles for boys aged 2-20