SOFT DRINK CONSUMPTION AMONG GRADE 11 AND GRADE 12 LEARNERS AT A SECONDARY SCHOOL IN GAUTENG, SOUTH AFRICA

by

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DECLARATION

I declare that the work on which this dissertation is based **"Soft drink consumption among grade 11 and grade 12 learners at a secondary school in Gauteng, South Africa"**, hereby submitted to the University of Limpopo, for the degree of Masters in Public Health has not previously been submitted by me for a degree at this or any other university; that it is my work in design and in execution, and that all material contained herein has been duly acknowledged.

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ABSTRACT

Background: Over the last few decades, soft drink consumption has been steadily increasing especially at an alarming rate among adolescents. Soft drinks have been associated with positive energy intake. An unhealthy diet along with a lack of physical activity is a major risk factor for health problems like overweight and obesity, cardiovascular diseases and diabetes. Children and adolescents are becoming very susceptible to the development of NCDs due to an increase in consumption of heavily processed and highly caloric foods, leading to early onset of morbidity.

Aim of the study: To investigate soft drink consumption among grade 11 and 12 learners at a secondary school in Gauteng, South Africa

Methods: A quantitative descriptive survey was conducted among 382 learners (grade 11 and 12) of Liverpool secondary school. A self-administered questionnaire was used to collect data. STATA version 10 was used for data entry and analysis.

Results: All learners who participated in the survey reported that they consumed soft drinks over the past 12 months. Out of the 382 learners, only 55 (14.4%) were non-frequent consumers. Carbonated drinks were the most commonly consumed (73.6%). Factors such as frequent snacking (p=0.042), frequent fast food consumption (p=0.001) and easy availability of soft drinks (p=0.00) positively influenced the consumption of soft drinks. Over 55% of the learners had very poor knowledge about the health effects caused by increased consumption of soft drinks.

Conclusion: In line with the high consumption of soft drinks, the level of awareness of the health effects of these unhealthy dietary practices among the learners in this study is very poor. Interventions to improve good or healthy dietary habits have to be started both at the home and school level.

CHAPTER I: INTRODUCTION

The focus of this research was to assess the level of soft drink consumption among the learners in South Africa. This study mainly investigated three variables: level of soft drink consumption, factors associated with soft drink consumption and the level of knowledge about health effects of soft drink consumption among the learners. This chapter begins with a brief introduction on the larger problem at hand namely the chronic diseases and the possible association of soft drinks with these diseases. Furthermore, it describes the statement of the research problem, research purpose, questions and objectives. At the end of the chapter, the importance of conducting this research has been stated.

1.1 BACKGROUND OF THE STUDY

The urbanisation and economic development in South Africa have brought about a dietary transition from a traditional to a westernized diet, where the quality and quantity of food have changed. This has been accompanied by an increase in consumption of heavily processed and highly caloric foods such as breakfast cereals, candy, bakery products, and sweetened beverages. Out of these products, soft drinks have come to light as having a drastic rise in consumption especially in children of 12 to 17 years (World Health Organization, 2004). This rising consumption of energy dense foods has led to the displacement of essential nutrients from the diet (Grimm, Harnack & Story, 2004). The major non-communicable diseases (NCDs) in South Africa are cardiovascular diseases, diabetes, cancers, chronic respiratory diseases and mental illness (Bradshaw, Steyn, Levitt & Nojilana, 2011). The unhealthy diet along with a lack of physical activity has been linked to the onset of non-communicable diseases (WHO, 2004). National surveillance of South Africa also shows that these unhealthy lifestyles are already an issue among the children and youth (Bradshaw et al, 2011). The national youth risk behaviour survey of 2008 reported 19.7% of learners to be overweight and 5.3% learners to be obese (Reddy et al, 2010). Many adult diseases have their origins in the childhood stages. This has been evident by the dramatic increases in chronic diseases of lifestyle — such as obesity, hypertension,

coronary heart disease, and type 2 diabetes (Steyn, Myburgh & Nell, 2003; St-Onge, Keller & Heymsfield, 2003). Recognising the unhealthy lifestyle habits among the children , the South African Department of education introduced 'life orientation' classes in schools in 2002. The main goal of this was to help the learners develop skills, knowledge and attitudes that would help the learners make informed decisions on health and social issues (Department of Education, 2002).

1.2 PROBLEM STATEMENT

Over the past 20 years, the portions of soft drinks have increased. According to the '2008 Global Soft Drinks' report, the net annual consumption of soft drinks over nearly 200 nations is said to be 552 billion litres, which amounts to 82.5 litres per person annually. By 2012, soft drink consumption is projected to increase to 95 litres per person annually (Zenith International, 2008). Developing countries like South Africa are actually the largest growth markets for soft drink producers. The average value of South Africa's consumption per year is 116 litres per person. This is quite high compared to the global average of 82.5 litres (Wojcicki & Heyman, 2010; Onyemelukwe, Bakari & Ogbadu, 2006).

School children are the main target in marketing strategies for soft drinks. They are easily swayed by the eye-catching endorsements. Furthermore, children and adolescents are not competent enough to make healthy dietary choices. Health surveys of various countries show that beverages represent a majority of the calories consumed by children and teenagers (St-Onge et al, 2003; Garriguet, 2008; Sa`nchez-Villegas et al, 2008; Barquera et al, 2010). The South African national youth risk behaviour survey (2008) showed that 50.3% of the learners consumed soft drinks for at least four days a week (Reddy et al, 2010). The increased consumption of these soft drinks displaces other healthier choices such as water, milk, fresh fruit and vegetable juices. As the children grow older, there is an increase and variation in the consumption of beverages. Teenagers tend to drink more carbonated beverages and sweetened fruit juices (Grimm et al, 2004).

The alarming trend of a rise in soft drink consumption in consumers especially children and adolescents have come under serious notice with possible links to the degenerative diseases (Sales-Peres, Magalhães, Machado & Buzalaf, 2007; Forshee, Anderson & Storey, 2008; Mercola,2009). Although soft drinks are the not the sole reason for the degenerative diseases, they definitely contribute to the onset of the diseases. The most common health effects associated with increased soft drink consumption are obesity, diabetes, tooth decay, osteoporosis and bone fractures, nutritional deficiencies, heart diseases, addictions, eating disorders, neurotransmitter dysfunctions and neurological disorders (Duyff, 2006; Mercola, 2009). Despite nutritional information being available on each can of soft drink, both the young and the old continue to consume many litres of soft drink, irrespective of the fact that soft drinks have no nutritional value, except for its high calorie content. Multiple factors have been shown to influence soft drink consumption such as preference for taste ,easy availability , low pricing, soft drink consumption habits of parents and friends (Grimm et al, 2004; Denney-Wilson et al, 2009; Hattersley et al, 2009). In addition, marketing of these soft drinks also makes it "cool" to be seen consuming them and even associates certain brands of soft drinks with achievement in certain sports. Moreover, these drinks are conveniently priced such that even the poor can manage to afford them. This has made it impossible for any campaigns to discourage consumption of soft drinks.

Although globally many studies have been conducted with regard to soft drink consumption, research on this behalf in South Africa is seriously lacking. A thorough investigation of the problem (increased soft drink consumption) is essential to unravel the deeper complexities of the issue. Only then, can any interventions be expected to be successful. It is on this background that the researcher decided to undertake this study in order to determine the level of soft drink consumption and the level of knowledge about health effects of consumption of soft drinks among grade 11 and 12 learners.

1.3 RESEARCH AIM

The aim of this research is to investigate soft drink consumption among grade 11 & 12 learners at Liverpool Secondary School, Actonville.

1.4 RESEARCH QUESTIONS

The study was designed to answer four main questions which are as follows:

1. What is the prevalence of soft drink consumption among grade 11 & 12 learners at Liverpool Secondary School, Actonville?
2. What are the patterns of soft drink consumption among these learners?
3. What are the behavioural and socio-environmental factors associated with consumption of soft drinks among these learners?
4. What are the learners' knowledge about the health effects of increased consumption of soft drinks?

1.5 RESEARCH OBJECTIVES

1. To determine the proportion of learners of grade 11 and 12 at Liverpool Secondary School, Actonville who consume soft drinks.
2. To determine the patterns of soft drink consumption among these learners.
3. To identify the behavioural factors associated with the consumption of soft drinks among these learners.
4. To identify the socio-environmental factors associated with the consumption of soft drink among these learners.
5. To assess the knowledge about the health effects of increased consumption of soft drinks among these learners.
6. To determine the association between behavioural and socio-environmental factors and consumption of soft drinks among these learners.

1.6 SIGNIFICANCE OF THE STUDY

Rates of soft drink consumption are slowly increasing to become a silent health hazard. Injudicious use of these soft drinks is putting the children's lives at risk with indirect adverse effects. Unlike other countries like the United States of America, studies on the prevalence of soft drink consumption and their associated health effects have not been extensively documented in South Africa. Prospective research is needed to explore whether the findings from the other countries can be replicated in South Africa also. Moreover, the role of factors like age, gender, ethnicity diversity and other socio-economic factors in the consumption of soft drinks may be specific to the African population. Research from the perspective of the consumer is really needed to understand the extent of the problem. Therefore, further investigation is needed.This research intends to investigate the soft drink consumption amongst teenage learners on a small scale at a local school namely Liverpool secondary school. The researcher hopes that the results obtained would help in better understanding of the problem especially the implications of soft drinks and would provide awareness to the learners, their parents and the community.Since tackling the soft drink issue would need individual-based and school-based interventions, this study would help in better planning and implementing strategic interventions.

1.7 CONCLUSION

This chapter supports the significant problem of unhealthy dietary intake in the form of soft drink consumption. The necessity to develop strategies for prevention and to reduce the burden of chronic diseases is evident. Proper nutrition is an essential component for the prevention and management of chronic diseases, for better quality of life. Because of the importance of this problem, the research study contributed to the limited existing knowledge about the soft drink consumptions among adolescents.

CHAPTER II: LITERATURE REVIEW

This chapter deals with the review of literature relevant to the research topic- soft drink consumption among adolescents. The review of literature is discussed under different sections which are soft drink consumption trends, factors related to soft drink consumption and the possible health effects related to increased consumption of soft drinks. Literature of soft drink consumption both worldwide and in Africa has been reviewed.

2.1 DEFINITION OF SOFT DRINKS

A soft drink is a non-alcoholic beverage that typically contains water, a sweetener, acid and a flavouring agent (Ashurst, 2005). Other ingredients may include fruit or fruit juice, carbon dioxide, preservative and colorants. Although small amounts of alcohol may be detected in a soft drink, this alcohol content should not exceed 0.5% of the total volume otherwise the drink will be considered alcoholic. The name "soft" is due to the low amounts of alcohol unlike hard drinks which refer to alcoholic beverages. Soft drinks may be caffeinated or non caffeinated; may be served chilled or at room temperature and are rarely heated. These beverages can be categorized as water drinks; carbonates; dilutables, still and juice drinks and functional drinks. Not all beverages are soft drinks. Examples of beverages that are not considered to be soft drinks are: pure juices, hot chocolate, brewed tea and coffee, milk, and milkshakes (Ashurst, 2005).

2.2 TRENDS IN CONSUMPTION OF SOFT DRINKS

Soft drinks have become extremely popular across the globe. There are approximately 200 countries consuming soft drinks .On an estimate, 82.5 litres of soft drinks are consumed per person per year. According to the '2008 Global Soft Drinks' report, America alone represents 25% of the total beverage market energy intake consumption of more than 50 billion litres of soft drinks per year (Zenith International, 2008). Developing countries like those in Asia, Latin America and Africa represent the largest growth markets for soft drink producers. Consumers in

developing countries are being targeted by the soft drink industry with aggressive marketing often viewed by children (Moreno et al, 2005; Zenith International, 2008).

2.2.1 Prevalence of soft drink consumption

In this section, worldwide prevalence of soft drink consumption has been documented. This has been divided into two parts: reports from developed countries and reports from developing countries.

a) Prevalence of soft drink consumption in developed countries

Data from the National Health surveys of America (from 1977-1979, 1994) has shown that there was a steady increase in the rates of soft drink consumption rates among teenagers. Daily soft drink consumption increased by 65% in adolescent girls and by 74% in adolescent boys. The prevalence of soft drink consumption was 82.5% in adolescents. The mean soft drink intake was calculated at 18 ounces a day (St-Onge et al, 2003).

Kassem, Wee, Modeste & Johnston (2003) reported that in a study conducted in Los Angeles involving 707 female teenagers aged 13-18 years, a high rate of soft drink consumption was noticed. Nearly 96.3% reported consuming soft drinks.

A meta-analysis on the association of sugar sweetened beverages and body mass index conducted by Forshee et al (2008) showed that in the United States of America, the average consumption of soft drinks in adolescent males and females was 630 g/day and 409 g/day respectively. Among the younger children, there was a lesser preference for carbonated drinks compared to the adolescents.

The Canadian food consumption survey had shown that on an average, daily consumption of soft drinks increased from 68 grams to 376 grams in males and from 47 grams to 179 grams in females. Beverages alone supplied 30% of the daily calories among the adolescents (Garriguet, 2008).

A survey conducted among 100 Singaporean adolescents aged 11-21 years showed that 97.6% of the participants consumed sweetened drinks. Of these, 49.4% adolescents consumed the drinks 2-5 times a week, 32.5% consumed soft drinks daily and 25.3% consumed the drinks once a week or less (Lew & Barlow, 2005).

A study by Linardakis et al (2008) conducted among 856 Greek children aged 4-7 years showed that 59.8% of all children consumed soft drinks daily. Males drank more than the girls.

The SUN cohort study conducted in Spain by Sa`nchez -Villegas et al (2008) among university graduates showed that following a westernized dietary lifestyle was associated with increased consumption of sweetened sugar beverages. The mean consumption of soft drinks was found to be 24.8 g/day.

A study conducted on 4834 Australian children aged 2-16 years showed that the mean consumption rate of carbonated drink among adolescents was 426 ml/day whilst the mean consumption rate for fruit drinks was 175 ml/day. A greater preference for carbonated beverages was reported (Hafekost, Mitrou, Lawrence & Zubrick, 2011).

b) <u>Prevalence of soft drink consumption in developing countries</u>

The national dietary survey in Mexico in 2006 showed a prevalence of 76.1% of soft drink consumption among children (Barquera et al, 2010).

Norwegian adolescents have actually shown a decrease in soft drink consumption between 2001 and 2008; probably as a result of educational interventions in place. However, there has been an increased consumption of diet drinks. Males still tend to drink more and frequently than the females (Stea, Øverby,Klepp & Bere, 2012). A study was conducted in 2005 among 2870 Norwegian students of grade 9 and 10. The results showed 63% of the students to consume regular soft drinks while 27% consumed the diet versions at least two times a week. Among these, 32% consumed soft drinks at least once per week at school (Bere, Glomnes, Velde & Klepp, 2007).

Sayegh, Dini, Holt & Bedi (2002) found that snacking was quite high among kindergarten children in Amman, Jordan. Among the snacks, soft drinks were popular since more than 50% of the children consumed carbonated drinks regularly. Among the children who consumed carbonated drinks regularly, 60.7% were boys. Sweetened fruit juices were the next popularly consumed drink.

Sawaya et al (2007) conducted a study to assess the consumption patterns of artificially colored foods among children in Kuwait and results have shown that soft drinks are widely consumed amongst other 'colored' caloric dense foods.

In 2005, a cross-sectional study was conducted in 100 schools among 23,976 adolescents aged 12-19 years in Jiangsu Province, China by Pan, Zhang & Shi (2011). The results showed that 20.5% of the participants reported consuming soft drinks daily.

Ratnayake & Ekanayake (2012) conducted a cross-sectional study among school going 17 year olds in Sri Lanka. The results showed that 82% of the adolescents consumed sweetened soft drinks at least once a week. Among these adolescents, 77% consumed carbonated drinks and 48% consumed sweetened fruit drinks at least once weekly.

In 2010, a study was carried out among 400 adolescents aged 8-17 years in Dar-Es-Salaam, Tanzania. The frequency and amount of soft drink consumption was assessed. The prevalence of consumption of soft drinks was 61.5%; out of which the prevalence of sweetened juice consumption was 68.3% and prevalence of carbonated beverages was 61.3%. Compared to carbonated beverages which was consumed only once a week, fruit juices was consumed daily by most students. The consumption of soft drinks was also influenced by the type of school. Carbonated beverage consumption was more prevalent among government school students while students from private schools drank more fruit juices (Dhirani, 2010).

In Nigeria, a study has shown nearly 16% of children in Ibadan aged 6-18 months were given soft drinks at least once per day as a weaning drink (Bankole,

Aderinokum, Odenloye & Adeyemi, 2006). In an urban area of Uganda, 24-37% of school children drank soft drink daily (Kiwanuka, Astrom & Trovik, 2006).

Theron et al (2007) reported that carbonate drinks were the most commonly consumed item among South African urban children. Consumption was also high in remote areas of South Africa as shown by MacKeown and Faber (2005) where children aged 4 and 24 months consumed soft drinks 2-3 times a week. Differences of soft drink intake also exist among ethnicities as shown in a study by Steyn et al (2011) where soft drinks purchased from street food vendors ranged from 4.8% in whites to 16.4% in blacks. Non carbonated soft drinks were found to be one of the main contributors to the added sugar consumption in rural areas while in urban areas there were multiple contributors. The consumption of carbonated beverages was greater in the urban areas (33%) while in rural areas it was below 3% (Steyn et al, 2003).

2.3 FACTORS ASSOCIATED WITH CONSUMPTION OF SOFT DRINKS

2.3.1 Personal factors

a. **Age, race, gender**: The type, amount and frequency of consumption of soft drinks varies with increasing age. As children get older, consumption patterns changes with a greater liking towards these sweetened drinks than nutritious drinks like milk. Boys were found to drink more beverages than girls. Boys tend to consume more of carbonated beverages while girls consumed fruit juices, still drinks and diet drinks. Globally, on an average Hispanics and blacks consume more soft drinks than whites (Forshee et al, 2003; Grimm et al, 2004).

b. **Preference**: Preference for the taste of soft drinks is the strongest predictor for soft drink consumption. As preference for the taste increases, so does the amount of soft drinks consumed. The caffeine and the sugar content of soft drinks promote the preference towards soft drinks in adolescents. The type of soft drink preferred differs from one individual to another. Preference may also vary upon factors like age, gender and knowledge. Older children may prefer carbonated

beverages while younger children may prefer fruit juices or squashes. Boys may prefer regular carbonated drinks while girls may prefer diet drinks or still drinks like iced tea. Sometimes, excessive parental restriction placed on a child's soft drink consumption can actually lead to its increased preference (Grimm et al, 2004; Gour, Srivastava & Adhikari,2010).

c. **Knowledge**: Knowledge plays a crucial part in one's decision to consume, not to consume or even restrict consumption of a product. Adolescents who are ignorant or confused about the implications of soft drinks on health are more likely to consume soft drinks. A study by Temple, Steyn, Myburgh & Nel (2006) in Cape Town showed that learners did not have correct knowledge if the foods they consumed were healthy or unhealthy. However, learners attending schools of higher status had better knowledge on healthy and unhealthy foods and had better dietary practices. Therefore, knowledge is also linked to the socio-economic status of the parents (Cunningham & Marshall, 2003; Ward, 2009).

2.4.2 Socio-environmental factors

a. **Easy availability of soft drinks**: The school and home environment are the easiest sources of soft drinks for learners since they spend a substantial amount of time here. Unless the food environment is healthier, unhealthy dietary choices like soft drinks will be opted for. More availability of soft drinks in homes also mean no or relaxed restrictions leading to greater consumption. In the school environment, vending machines and the school tuck shops provide soft drinks very easily. Greater opportunities to drink sweetened beverages would result in increased intake (Cullen & Zakeri, 2004). Shops in the near radius of schools and the homes are the next easy sources for soft drinks. Learners travelling to and from school by foot can easily access these shops (Grimm et al, 2004; Fernandes, 2008).

b. **Soft drink consumption of family and friends:** Parental and peer influence play a pivotal role in adolescent soft drink consumption behaviour. Sometimes, parental influence may be greater and vice versa. Parents, a role model for

children may influence them both positively and negatively. Those parents who consume soft drinks on a regular basis may be less strict about their children's soft drink consumption compared to parents who place restriction. However, there may be a dilemma sometimes as restriction may cause increased preference. Adolescents with a high level of agreeableness or who may want to "fit in" will be likely to consume more soft drinks. Taste preferences and soft drink purchasing habits of parents can also influence beverage consumption of children (Grimm et al, 2004; Patrick & Nicklas, 2005; de Bruijn et al, 2007, Wouters et al, 2010). Sweetened beverages can also be consumed as snacks at friends' homes or in fast-food restaurants. Grimm et al (2004) reported that 80% of children stated that carbonated soft drinks were readily available in the home and if parents regularly drank carbonated soft drinks, children were almost "three times more likely to consume carbonated soft drinks five or more times per week". This was also linked to parental education. Children belonging to families with less parental education were more likely to have relaxed restrictions on the consumption of soft drinks (Nilson, Krokstad, Holmen & Westin, 2010).

c. **Fast food purchasing habits of the learners**: Fast food purchases will be almost always accompanied by soft drink purchases. Frequent visits to the fast-food outlets would then lead to greater soft drink intake (Grimm et al, 2004; Patrick et al, 2005; de Bruijn et al, 2007).

d. **Influence of advertising on soft drink consumption**: Heavy marketing strategies are carried out to promote soft drinks. These ads are in such a way so as to be visually appealing to the viewers. Greater television viewing means greater viewership of these soft drink advertisements. These ads are often endorsed by celebrities with catchy themes making it very attractive especially to children. Moreover, these soft drinks are often conveniently priced such that it is easily affordable (Grimm et al, 2004; Patrick et al, 2005; de Bruijn et al, 2007).

2.4.3 Behavioural factors

a. **Frequent snacking habits of the learners**: Snacking can be healthy (like nuts, fruits) or unhealthy (like cookies, chocolate, chips, soft drinks).With the increase of convenient eating, many proper meals have been replaced by snacks mostly unhealthy. Unhealthy snacking has been on the rise especially among children and adolescents. In schools where proper and tasty meals are not available, unhealthy snacking is widely found among learners. Out of these, soft drinks are definitely the most consumed. Boys tend to snack more than girls (Kim, Han, Song & Lee, 2011).

b. **Meal skipping habits of the learners**: Skipping meals are associated with frequent snacking. Breakfast is the most widely skipped meal especially in adolescent girls. Skipping of meals lead to slower metabolism and a drop in blood sugar. This is often compensated for by overeating later on in the day and greater intake of snacks which may include soft drinks. Since these sweetened beverages have less hunger satisfying effects, it may lead to even more intake (Verzeletti, Maes, Santinello & Vereecken, 2010).

c. **Family meals**: Sitting down for a proper family meal around the table would mean intake of more nutritious food and less intake of unhealthy foods like soft drinks as restrictions would be placed on them. More family meals create a positive health environment with higher intake of fruits, vegetables and grains (an increase in essential nutrients). Children would also be encouraged to follow healthy dietary practices (Madani et al, 2008; Verzeletti et al, 2010).

d. **Television viewing habits of the learners**: Television (TV) watching, working on the computer and video games replaces more physical activities. There would be an increased dietary intake by eating during viewing time. Studies have shown that eating in front of the TV or the computer was associated with lower fruit, vegetable, intake and increased intake of unhealthy snacks (Caroli et al, 2004; Sherry, 2005).

e. **Level of physical activity of the learners**: Sedentary behaviour is associated with longer hours of TV or computer viewing with greater unhealthy food intake (Grimm et al, 2004; de Bruijn et al, 2007). On the other hand, children who are physically active are more obliged to look after their health and will refrain from sweetened beverages. They would prefer healthier beverage options.

2.4 EFFECTS OF INCREASED SOFT DRINK CONSUMPTION

a) Dental diseases

Dental caries is a destructive process causing initial decalcification of the tooth enamel, leading to continued destruction of the dentine, finally causing cavitations of the tooth (Medilexicon Medical Dictionary, 2012). In addition to the frequency and total sugar consumption, the pathogenesis of the disease is also correlated to the teeth, oral bacteria and time. Oral bacteria especially 'Streptococcus mutans' ferments sugars in the sweetened beverages into acid producing a sustained acidic environment of pH <5.5. This starts a demineralization process that is capable of destroying tooth enamel (Steyn et al, 2003). Since sugars from soft drinks have strong adhesive properties, its clearance from the mouth by saliva is slow and difficult. This can easily contribute to dental decay. Individuals who consumed three or more sugared sodas a day had a 17- 62% higher rate of dental cavities (Peterson, 2007). WHO has recommended a sugar intake of less than 10% of total energy intake for the prevention of caries. In South Africa, consumption in urban areas has exceeded the 10% recommended by the WHO. The prevalence of dental caries approaches 90% in most South African adult communities (Steyn et al, 2003; Mercola, 2009).

Dental erosion is the destruction of tooth substance by chemical processes caused by a variety of extrinsic and intrinsic factors. This disease differs from dental caries in that it is not caused by bacteria (Medilexicon Medical Dictionary, 2012). Extrinsic factors causing dental erosion can be frequent consumption of acidic foodstuffs like soft drinks. Dental erosion is the most common chronic dental disease of children aged 5–17 years. Acids in the soft drinks are able to dissolve enamel within 20 minutes of consumption (Mercola, 2009). In comparison to the volume of beverage

consumed, the length of time the teeth are exposed to the acidic environment is more crucial to erosion. Carbonated drinks are more detrimental than non carbonated beverages since they are more acidic and may be often held in the mouth for a longer time. Factors that have a modifying effect on the development of erosion include the amount, type and strength of the acid level, buffering capacity of the drink and concentration of phosphate, calcium and fluoride in the drinks (Sales-Peres et al, 2007).

Stained teeth: This is discoloration of teeth either by extrinsic or intrinsic factors (Medilexicon Medical Dictionary, 2012). The colorants used in soft drinks often lead to brownish black/yellowish stains on teeth.

b) Overweight and obesity

Overweight is a medical condition where the body mass index is between 25 and 29.9 and obesity is a condition where the body mass index is 30 or above (Goedecke, Jennings & Lambert, 2006). Overweight and obesity are the fifth leading risk for global deaths. According to the 2008 WHO report of South Africa, 65% of adults are overweight and 31% are obese.

Obesity is a multifactorial disease. Soft drinks do not cause obesity but is only a significant contributor. The main culprit is the sweeteners found in soft drinks. The sweeteners in soft drinks contain is highly caloric than ordinary sugar and induces physiologic and hormonal responses that lead to weight gain (Mercola, 2009). A meta-analysis of 88 studies showed that increased soft drink intake was associated with increased energy intake and body weight (Vartanian, Schwartz & Brownell, 2007). Consumption of sweetened soft drinks leads to decreased energy expenditure, decreased hunger satisfaction leading to increased food intake and thus contributing to obesity (St-Onge et al, 2003; Vartanian et al 2007). Various studies have shown that there is a drastic increase of both overweight and obesity in children over the years during which there has been an increased intake of processed foods and that too in large servings (Forshee et al, 2003; St-Onge et al, 2003).Overweight and obesity in children is particularly alarming because of the predisposition to morbidity and

mortality. Some of the medial abnormalities associated with overweight and obesity during childhood are "elevated serum lipids, blood pressure, and serum insulin, type 2 diabetes, increased linear growth and advanced bone age, hepatic steatosis, cholelithiasis, and sleep apnea" (Mercola, 2009).

c) Liver diseases

Drinks with a high sugar content can cause a condition called *non-alcoholic fatty liver* disease where there is accumulation of fat inside liver cells (Medilexicon Medical Dictionary, 2012). People drinking more than two servings of soft drinks a day have increased chances for a fatty liver, leading to cirrhosis of the liver very similar to that found in chronic alcoholics (Mercola, 2009). Fructose, found in soft drinks is highly absorbable in the liver where it is converted to fat (steatosis). This may induce fatty liver. Even small doses of aspartame which is found in diet drinks and the preservative sodium benzoate can cause liver cell damage eventually lead to cirrhosis of the liver and various other conditions (Byme, 2011).

d) Bone diseases

Osteoporosis is a medical condition in which the bones become brittle and fragile from loss of tissue, as a result of hormonal changes, or deficiency of calcium or vitamin D (Medilexicon Medical Dictionary, 2012). During the formation of new bones and remodeling of old bones, the body maintains a steady phosphorus and calcium ratio in the bloodstream. Intake of phosphoric acid containing soft drinks (like colas) causes an elevated level of phosphorus in the blood (Mercola, 2009). Furthermore, the increased ingestion of sugar from the highly caloric soft drinks increases urinary excretion of calcium, magnesium, chromium, copper, zinc, and sodium by impairing reabsorption in the kidneys. This loss of calcium in the blood leads to activation of the parathyroid hormone (PTH), causing the release of calcium from the bones for maintaining the balance. This process when continued over time, results in the weakened bone structure (osteoporosis). This excess of calcium now in the blood is eliminated by excretion in the urine, deposition in joints (causing osteoarthritis, bursitis, gout,), formation into stones (like kidney stones), and

deposition in arteries (calcified plaque). Therefore with less calcium available, the bones become more porous and prone to fracture (Mercola, 2009).

The tolerable upper limit of phosphorus in children is 3-4 grams. A 12-ounce can of carbonated soft drink contains phosphoric acids averaging about 30 milligrams. Even this low amount can be damaging if consumed in excess especially during the peak bone-building years of childhood and adolescence. Phosphoric acid in the drink can leach toxic amounts of aluminum (from the can) into the soft drink. Aluminum exposure increases the amount of bone break-down, while, at the same time, reducing new bone formation. Aluminum causes excessive loss of calcium in the urine resulting in osteoporosis accompanied by severe bone pain (Vartanian et al, 2007; McGartland et al, 2003).

e) Chronic kidney disease

Chronic kidney disease also known as chronic renal disease, is a progressive loss in renal function over a period of months or years (Medilexicon Medical Dictionary, 2012). Individuals who consume a lot of artificially sweetened drinks are more likely to experience a decline in kidney function; especially when there is a consumption of more than two beverages a day. Cola drinks can lead to increased demineralization of calcium from bones leading to formation of insoluble calcium stones in the kidney. The metabolism of high-fructose corn syrup used to sweeten soft drinks may lead to hyperuricemia leading to formation of uric acid crystals in the kidney. Drinking three cans of soft drink per week can increase the risk of developing kidney stones by 15 percent (Vartanian et al, 2007; Mercola, 2009).

f) Diabetes

Diabetes is a metabolic disease where there is an elevated blood sugar level. As of the year 2008, the prevalence of diabetes in the South Africa was about 10% among the adults (WHO, 2008). Caffeine in the soft drinks causes the release of adrenaline which is accompanied by a rise in blood sugar. The pancreas then reacts by secreting insulin which lowers blood sugar levels by pushing sugar into cells for oxidation and

energy production. Excess sugar is then stored as fat. A can of soft drink contains about 10 teaspoons of sugar. Thus, excessive consumption exceeds the WHO recommended 10% limit of calorie intake from added sugars, causing a sustained increase in blood sugar level specifically type II diabetes. Sugar causes the clumping of red blood cells. This obstructs the flow of delivering oxygen to the cells and removing carbon dioxide from the cells. The result is a detrimental build-up of wastes (Vartanian et al, 2007; Mercola, 2009).

g) Adrenal fatigue

Adrenal fatigue is a syndrome that results when the adrenal glands function below the necessary level (Medilexicon Medical Dictionary, 2012). During soft drink intake, a 'stress' situation is induced and cell metabolism speeds up. The adrenal glands responds to the stress and maintains homeostasis. Continuos soft drink consumption causes overstimulation of the adrenals leading to adrenal exhaustion; symptoms of which are fatigue, lethargy, lack of energy ,sleep difficulties, lightheadedness, dizziness, lowered blood pressure and blood sugar, nausea, body pain, weight gain, and being prone to infections. Caffeine in the drinks stimulates the adrenal gland without providing actual nourishment (Vartanian et al, 2007; Mercola, 2009).

h) Heartburn & acid reflux

Acid reflux is the condition in which the acid in the stomach regurgitates towards the oesophagus. This causes indigestion which is *heartburn* (Medilexicon Medical Dictionary, 2012). Heavy consumption of soft drinks is a strong predictor of heartburn. Acidic carbonated beverages deliver a lot of air in the form of carbon dioxide to the stomach, which can cause distension thus, triggering reflux. As the consumption of carbonated soft drinks increases, there is an increased duration of oesophageal exposure to acid. The consumption of one can of soda a day can lead to 53.5 minutes of elevated acid levels in the stomach. As a result, severe irritations in form of chest pain or heartburns occur (Wilson, 2007; Mercola, 2009).

i) Hypertension

Hypertension is a chronic medical condition where there is an elevated blood pressure in the arteries (Medilexicon Medical Dictionary, 2012). The following mechanisms have been suggested to explain how soft drinks can cause high blood pressure i)Obesity which is an outcome of increased soft drink intake puts the heart under great strain to pump enough blood thus predisposing to hypertension. ii) The glucose and fructose from the beverages increase levels of uric acid in the blood interfering with blood vessels' ability to dilate and expand, thus causing a rise in pressure. iii) Excess sugar from the soft drinks causes the body to retain more water, and can also increase blood pressure. iv) The sugar in the drinks may also increase levels of catecholamine hormones, which can cause blood pressure to rise (Mercola,2009; Park,2011). The American Heart Association recommends that soft drink consumption be restricted to no more than three 355 ml cans of soda a week (Vartanian et al, 2007; Brown et al, 2011). Prevalence of hypertension in South Africa is 42% (WHO, 2008).

j) Heart diseases

Research has shown that drinking more than one soft drink a day is associated with an increased risk of developing *metabolic syndrome*. This syndrome is a group of symptoms such as "central obesity, elevated blood pressure, elevated fasting blood sugar, elevated fasting triglycerides, and low levels of HDL or 'good' cholesterol" (Mercola, 2009; Medilexicon Medical Dictionary, 2012). Higher prevalence of the metabolic syndrome poses a greater risk for cardiovascular disease. Individuals with greater intake of soft drinks typically have unhealthy diets, and a sedentary life. Larger consumption of sweeteners found in soft drinks can lead to weight gain, increased insulin resistance, a lowering of high density lipids and an increase in triglyceride levels. The caramel content of soft drinks can also promote insulin resistance and can be "proinflammatory". Caffeine in the drinks blocks neurotransmitter receptor sites in the central nervous system causing constriction of the cerebral arteries, rapid heartbeat, high blood pressure, and excessive excretion of urine (Dhingra et al, 2007; Vartanian et al, 2007; Mercola, 2009).

k) Gastrointestinal distress

Gastrointestinal distress is a condition where there is increased stomach acid levels and moderate to severe gastric inflammation with possible stomach lining erosion (Medilexicon Medical Dictionary, 2012). Drinking soft drinks upsets the acid-alkaline balance of the stomach lining, creating a sustained acid environment causing inflammation of stomach and duodenal lining. Phosphoric acid in colas is neutralized in the body by its use of alkaline minerals like sodium, potassium, magnesium, and calcium forming salts which are then excreted in the urine. This sodium depletion creates acidity in the bowels. Mucous plaques then grow on the intestines, causing serious bowel diseases. Prolonged low stomach acidity causes overgrowth of harmful bacteria, yeasts and parasites in the gastrointestinal (GI) tract. This may break down the protective mucosal lining, thus allowing the penetration of microorganisms into the bloodstream, lodging in organs and cause the formation of carcinogens that provoke cancer. Digestion is impaired since phosphoric acid causes the body to reduce secretion of hydrochloric acid used for digestion of protein and fats and the absorption of minerals. This inadequate digestion results in bloating and flatulence (Vartanian et al, 2007; Mercola, 2009).

l) Caffeine addiction

Caffeine addiction is a compulsion to take caffeine. A typical can of cola contains 35 to 38 milligrams. Diet drinks can have even more caffeine –around 40 mg. Childhood use of caffeine can lead to dependence later in life with negative effects on brain development. Regular users when not consuming caffeinated drinks often are subject to mental sluggishness , depression, and a dull, generalized headache. At excessive doses, caffeine can cause aggression, restlessness, anxiety, recklessness, insomnia, irritability, and irregular heart beat (Mercola, 2009).

m) Infections

Sugar in the soft drinks impairs immune function by competing with Vitamin C for transport into white blood cells. This reduces the ability of white blood cells to

destroy invading bacteria, which leads to chronic infections. Sugar also supports the growth of harmful bacteria and yeast in the GI tract which leads to infestations in the blood and body organs (Vartanian et al,2007).

n) Neurological disorders

Disorders of the nervous system of the body is termed *neurological disorders*. Aspartame, used in diet sodas, is a potent neurotoxin and endocrine disrupter. On digestion, aspartame breaks down into three metabolites: aspartic acid, phenylalanine, and methanol. The product *aspartic acid* causes serious chronic neurological disorders by over stimulating neurons such that sensitive neurons are slowly destroyed *Phenylalanine* decreases serotonin (a brain neurotransmitter related to emotion and sleep) leading to emotional disorders, depression, and poor quality sleep. *Methanol* is metabolized by the liver into formaldehyde (which is a neurotoxin, carcinogen, mutagen, and teratogen) and formic acid. Methanol slowly accumulates and causes symptoms which include headaches, tinnitus, shooting pains, memory lapses, numbness, and nerve inflammation, blurred vision, retinal damage, and blindness (Vartanian et al, 2007; Mercola, 2009).

o) Cancer

Some of the artificial sweeteners used such as saccharin have been shown to have carcinogenic effect in humans. Among the different types of cancer found in humans, pancreatic cancer is the most likely to be attributed to soft drinks. People who drink two or more sweetened soft drinks a week may have a higher risk of pancreatic cancer. The high levels of sugar in soft drinks increase the level of insulin in the body which is produced in the pancreas. Rising insulin promotes pancreatic cancer cell growth. The caramel coloring in the soft drinks also is a cancer-causing agent. The metabolic product of aspartame, formaldehyde over time gets accumulated and is carcinogenic (Vartanian et al, 2007; Leap & William, 2009 ; Mercola, 2009).

2.5 CONCLUSION

Consumption rates in children and adolescents have become increasingly alarming over the past few decades. This can lead to serious health abnormalities in the future thus affecting the social and economic status of an individual. It has become the utmost importance that curtailment of its use is necessary early in life itself. An understanding of the different types of soft drinks, their ingredients and their possible contributions to degenerative diseases (as discussed in this chapter) is necessary to comprehend the impending problem. As shown in the literature, various personal, behavioural and socio-environmental factors contribute to the consumption of soft drinks. Greater exploration of the factors is essential for better interventions. The literature review shows that in comparison to other countries like the United States of America, there is less literature on consumption of soft drinks in South Africa. Although interventions are very important at the home and school level, the health care sector, government, media and the soft drink industry too have to play a role. Although South Africa has put down obesity guidelines (Steyn et al, 2003), laws on the consumption of soft drinks have not been put into place. Only with systematic and strategic interventions, can the rate of chronic disease in the country be controlled.

CHAPTER III: METHODOLOGY

This chapter focuses on the methodology followed in this study. The researcher has outlined the study design, setting, study population and the sample size. The data collection method, validity and reliability of the study, data analysis and the ethical considerations have also been elaborated upon in this chapter.

3.1 RESEARCH DESIGN

This research investigation was a cross-sectional descriptive quantitative study design aimed at investigating soft drink consumption among grade 11 and 12 learners. The cross-sectional design was the most appropriate in this study as the prevalence of soft drink consumption among the learners was studied. The research was designed in such a way as to provide answers to the main objectives of the study namely to determine the patterns and prevalence of soft drink consumption, to identify the factors associated with soft drink consumption, to assess the learners' knowledge on health effects of increased soft drink consumption and to determine any association between the behavioural and socio-environmental factors with the soft drink consumption. The research study incorporated the fact that through adolescence, dietary patterns change and this diet includes heavily processed foods; soft drinks being one of them.

3.2 STUDY SETTING AND SITE SELECTION

The study was conducted at Liverpool Secondary school situated at Actonville in South Africa. This is a public school offering grades 8-12. Learners from different racial backgrounds are enrolled in the school.

3.3 STUDY POPULATION

The study population were learners of grade 11 and 12. These learners were 16-20 years of age. No discrimination was made between genders for participation in the study. Thus, both boys and girls were included in the study. The total number of the learners in the targeted population was 400.

The learners of grades below 11 and 12 were not included in the study as they would not have sufficient knowledge about the health effects involved in the increased consumption of soft drinks. and would not be able to comprehend and answer the questions pertaining to this matter.

3.4 STUDY SAMPLE

Since the number in the target population, 400 was small; a sample of convenience was used to select all learners who were available during the study period. A sample of 382 learners in both grade 11 and 12 were used in the study.

Inclusion criteria

- All learners of grade 11 and 12 who gave consent and who were present at school on the day of the study were included.

Exclusion criteria

- Learners of grade 11 and 12 who were not willing to participate in the study were not included.
- Learners below grade 11 were not studied.

3.5 DATA COLLECTION INSTRUMENT

A self-administered questionnaire was used to assess the prevalence of soft drink consumption, factors associated with their consumption and to assess the learners' knowledge on the ill effects of consumption. Both open and closed ended questions were used.

The questionnaire was divided into five main categories: socio-demographic information, frequency of soft drink consumption, preferences of soft drinks, factors associated with the soft drink consumption and the level of knowledge on health effects of increased soft drink consumption.

In total, the questionnaire consisted of 45 questions. Dichotomous, multiple answer, likert scale and contingency questions were used (Brace, 2008). For contingency questions, instructions were given in the questionnaire itself to guide the respondent as to which questions had to be answered next.

3.6 VALIDITY AND RELIABILITY OF THE STUDY

To ensure validity of the questionnaire, questions were designed in such a manner as to provide answers to the research objectives. The instrument was prepared using simple words that were easy to understand. Difficult terms were avoided as much as possible. The questionnaire was in English just as the medium of language in the school. Moreover, the questionnaire was also pretested on 10 learners who had homogeneous, characteristics as those participating in this study to make sure that questions could be easily comprehended and would not misinterpreted. The learners were requested to comment on the clarity of the questions and they were requested to make suggestions. Time required to complete the questions was also noted. These 10 learners were then not included in the final study. Pre-testing the questionnaires helped in making the necessary corrections and to improve the data collection process; this ensured the reliability of the instrument. An introductory letter was attached to the questionnaire where the learner was informed of the purpose of the research and the need to respond truthfully.

3.7 DATA COLLECTION PROCEDURE

The questionnaire was administered in the learners' respective classrooms. On the day when the assent forms were issued to the learners, an opportunity to address learners about the study was given to brief the learners on the contents of the assent form and the questionnaire.

The objectives of the study were explained. To avoid any confusion, the different container sizes in which the soft drinks are sold were shown to the learners. Assent forms were distributed and assent was obtained. Only those learners who had given assent to the study were asked to complete the questionnaire. The learners were advised to fill in the questionnaire anonymously to ensure confidentiality. They were asked to answer honestly to the best of their abilities.

The researcher was given only a certain period of time to conduct the study; therefore, the services of other teachers were enlisted. The fourth period of the day was used. Teachers were informed about the study and each teacher who was on duty at that period issued the questionnaire to the learners. The duration of each period is 45 minutes and the duration of the questionnaire was approximately 40-45 minutes. Teachers collected all the questionnaires at the end of the study on the same day. The questionnaires were then submitted to the researcher.

The researcher tried to follow up any learner in a particular class who was not present on the day of the study during the days the study was conducted. The completed questionnaires were stored safely. Out of the 400 questionnaires handed out, 390 questionnaires were returned; yielding a response rate of 97.5%. Only 382 questionnaires were correctly and fully completed. Questionnaires that had not been correctly filled in and those which were incomplete were destroyed.

3.8 DATA ANALYSIS

Only the 382 questionnaires which had been correctly and fully completed were used for statistical analysis. Data were cleaned, coded and transferred into STATA 10 for analysis. Every response to a question was assigned a unique code. In the case of missing responses, the questionnaires were not disqualified as the other responses were analyzed. Quantitative (categorical) data were collected through this research. Simple descriptive statistics were used to analyze frequencies for quantitative data. Chi-square test was used to determine associations between variables. Each computed statistical value was compared to the critical value in the statistical table to determine its significance. To ensure dependability of the data analysis, double-data capture

method (entry of data twice which is then analysed separately) was used to test the reliability of the questionnaires administered.

3.9 ETHICAL CONSIDERATIONS OF THE STUDY

Various steps were taken into consideration to conduct research in an ethical manner and they included the following:

- Approval was obtained first from the Research, ethics and publication committee at the University of Limpopo (Appendix A). Then permission was obtained from the Gauteng department of education (Appendix B) and the principal of Liverpool Secondary school. (Appendix C)

- As the learners were not of legal age, assent from learners was needed. Letters of assent were issued to the learners and the researcher explained the content of these letters to them .No learner was compelled; only those interested was asked to partake in the study. Since the topic of soft drink consumption with regards to the children's health comes under 'life orientation' which is already dealt in schools, informed parental consent was not sought.

- All participants were assured that the information provided by them would be kept confidential. A separate assent form was provided providing details on the research, where they were required to sign. A clause had been added to the assent form whereby confidentiality was assured. In addition, instructions were also provided at the top of the questionnaire to the learners, to refrain from writing down their name. The questionnaires completed did not have any identification. Their identification was strictly kept confidential by the researcher. Data from the study was kept secure under lock and the key was with the researcher itself to ensure confidentiality.

CHAPTER IV: RESULTS

This chapter presents the findings obtained from the relevant analysis carried out on the data collected in this study. The results are a direct input into the objectives of this study.

The results are presented in two parts: the first part describes the overall findings of the study in descriptive statistics, while the second part comprises the inferential statistics calculated between soft drink consumption and the various factors associated with it.

4.1 SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE LEARNERS

A total of 382 learners from grade 11 and grade 12 in Liverpool Secondary school participated in the study. The learners' ages ranged from 16 years to 20 years. The mean age of the learners was 17.1 years (Standard deviation 0.85). There were 217 (56.8%) females and 165 (43.2%) males. Majority of the learners were Asians. Of the 382 learners, 360 (94.2%) stayed with their parents. Among the 360 learners who stayed with their parent(s), most of them reported their parents' highest level of education to be high school education. Out of the 22 learners who stayed with their guardian, eleven (50%) learners reported their guardian had studied till the tertiary level.

Table 1 below summarizes the socio-demographic characteristics of the learners.

Table 1: Socio-demographic characteristics of the learners

Characteristics		***n (%)***	***Males (%) (n=165)***	***Females (%) (n=217)***
Age (n=382)	16-17 years	287(75.1)	117(40.7)	170(59.3)
	18-20 years	95 (24.9)	48(50.5)	47(49.5)
Grade (n=382)	11	223(58.4)	99(44.4)	124(55.6)
	12	159(41.6)	66(41.5)	93(58.5)
Ethnicity (n=382)	Asian	186(48.7)	94(50.5)	92(49.5)
	Black	156(40.8)	54(34.6)	102(65.3)
	Colored	33(8.6)	10(30.3)	23(69.7)
	Others	7(1.8)	7(1.0)	0(0.0)
Staying with (n=382)	Parents	360(94.2)	155(43.1)	205(56.9)
	Relatives	16(4.2)	8(50.0)	8(50.0)
	Others	6(1.6)	2(33.3)	4(66.6)
Father's highest level of education (n=360)	None	1(0.3)	0(0.0)	1(1.0)
	Primary	7(1.9)	2(28.6)	5(71.4)
	High School	168(46.7)	72(42.8)	96(57.2)
	Tertiary	118(32.8)	49(41.5)	69(58.5)
	Unknown	66(18.3)	32(48.5)	34(51.5)
Mother's highest level of education (n=360)	None	1(0.3)	0(0.0)	1(1.0)
	Primary	10(2.8)	5(50.0)	5(50.0)
	High School	196(54.4)	77(39.3)	119(60.7)
	Tertiary	111(30.8)	53(47.7)	58(52.3)
	Unknown	42(11.7)	20(47.6)	22(52.4)
Guardian's highest level of education (n=22)	Primary	3(13.6)	2(66.6)	1(33.3)
	High School	5(22.7)	3(60.0)	2(40.0)
	Tertiary	11(50.0)	3(27.3)	8(72.7)
	Unknown	3(13.6)	2(66.6)	1(33.3)

4.2 PREVALENCE OF SOFT DRINK CONSUMPTION AMONG THE LEARNERS

The learners were asked if they had consumed soft drinks over the last 12 months and what type of soft drink they often consumed. All 382 learners reported they had consumed soft drinks over the last 12 months although the types of soft drinks consumed varied for different learners. Thus, the prevalence of soft drink consumption among the learners is 100%.

The various soft drinks consumed has been divided into four categories: *carbonates* (colas, sodas, root beer and ginger ale) *water drinks* (sparkling and flavoured water), *dilutables, still and juice drinks* (sweetened fruit juices and nectars, sweetened vegetable juice and nectars, fruit powders, iced tea, squash, punch), and *functional drinks* (sports and energy drinks, vitamin water drinks). Among the 382 learners who consumed soft drinks, carbonates were the most often consumed as reported by 73.6% learners. In comparison with carbonated drinks, other drinks fared poorly. Out of the 382 learners , only 12.8% consumed dilutables,still and juice drinks; followed by 7.1% of the learners consuming functional drinks and lastly 6.5% consumed water drinks. Table 2 below shows the results.

Table 2: Type of soft drink often consumed by the learners

Soft Drinks	***n (%)***	***Males (%)***	***Females (%)***	***Chi2 value***
Carbonates	281(73.6)	124(44.1)	157(55.9)	χ^2= 10.6007 **P= 0.014**
Water drinks	25(6.5)	8(32.0)	17(68.0)	
Dilutables, still and juice drinks	49(12.8)	15(30.6)	34(69.4)	
Functional drinks	27(7.1)	18(66.7)	9(33.3)	
Total	**382**	**165**	**217**	

At a p value of 0.014, there is a significant association with the type of soft drink often consumed and gender.

4.3 PATTERNS OF SOFT DRINK CONSUMPTION AMONG THE LEARNERS

4.3.1 Frequency of soft drink consumption of the learners

The learners were asked how frequently they consumed soft drinks. Soft drink consumption 2-3 times per day was reported the highest (n=87, 22.8%) by the learners whereas consuming soft drinks once a month or less was the least reported (n=16, 4.2%). At a p value of 0.002, there is a significant association between gender and frequency of soft drink consumption. Table 3 shows the results.

Table 3:Frequency of soft drink consumed by the learners

Frequency of soft drink consumption	***n (%)***	***Males (%)***	***Females (%)***	***Chi2 value***
Once a month or less	16(4.2)	10(62.5)	6(37.5)	χ^2=24.7095 P=**0.002**
2-3 times per month	33(8.6)	11(33.3)	22(66.7)	
1-2 times per week	55(14.4)	17(30.9)	38(69.1)	
3-4 times per week	72(18.8)	29(40.3)	43(59.7)	
5-6 times per week	32(8.4)	10(31.3)	22(68.7)	
1 per day	39(10.2)	17(43.6)	22(56.4)	
2-3 times per day	87(22.8)	38(43.7)	49(56.3)	
4-5 times per day	23(6.02)	13(56.5)	10(43.5)	
≥6 times a day	25(6.5)	20(80.0)	5(20.0)	
Total	**382**	**165**	**217**	

4.3.2 Amount of soft drink consumed at a single time by the learners

The learners were asked to indicate the amount of soft drink they consumed at a single time. The results show that of the 382 learners, 150 (39.3%) learners drank a medium glass of soft drink at a single time whereas only 5 (1.3%) learners consumed more than 2 litres of soft drink at a single time as shown in Table 4. No statistical significance was found (at 5% significance level) between gender and the amount of soft drink consumed at a single time.

Table 4: Amount of soft drink consumed by the learners at a single time

Soft drink consumed at a single time	***n (%)***	***Males (%)***	***Females (%)***	***Chi2 value***
Small glass	33(8.6)	9(27.2)	24(72.7)	χ^2=11.7651 P= 0.162
Medium glass	150(39.3)	61(40.7)	89(59.3)	
Large glass	45(11.8)	17(37.8)	28(62.2)	
1 can	32(8.4)	16(50.0)	16(50.0)	
500 ml bottle	71(18.6)	33(46.5)	38(53.5)	
1 litre bottle	25(6.5)	12(48.0)	13(52.0)	
1.5 litre bottle	10(2.6)	7(70.0)	3(30.0)	
2 litre bottle	11(2.9)	6(54.5)	5(45.5)	
>2 litres	5(1.3)	4(80.0)	1(20.0)	
Total	**382**	**165**	**217**	

4.3.3 Frequent and non-frequent consumers of soft drinks.

To differentiate the frequent consumers from the non frequent consumers, a guideline was set that those who reported drinking more than 330ml 3 or more days a week were categorized as frequent consumers compared to the non-frequent consumers- who drank less than 330ml and that too less than 3 days a week. Based on this, only 55 learners (14.4%) were non-frequent consumers while the rest 327 learners (85.6%) were categorized as frequent consumers. At a p value of 0.090, there is no statistical significance (at 5% significance level) among gender and the frequency of soft drink consumption.

Table 5: Number of frequent and non-frequent consumers of soft drinks

Soft drink consumption	***n (%)***	***Males (%)***	***Females (%)***	***Chi2 value***
Non-frequent consumers	55(14.4)	18(32.7)	37(67.3)	χ^2=2.8685 P=0.090
Frequent consumers	327(85.6)	147(44.9)	180(55.1)	
Total	**382**	**165**	**217**	

4.3.4 Occasion(s) on which soft drinks were consumed by the learners.

The learners were asked to indicate the occasion(s) on which they would consume soft drinks. The results showed that of the 382 learners, 205 (53.7%) learners reported taking soft drinks when they were feeling thirsty. Consuming soft drinks during a celebration and along with meals were reported to be the next frequent occasions. Table 6 below shows the results.

Table 6: Occasions for taking soft drinks

Occasions	*n(%)*	*Males (%)*	*Females (%)*
Feeling thirsty	205(53.7)	84(40.9)	121(59.1)
Celebration	187(48.9)	75(40.1)	112(59.9)
With meals	186(48.6)	79(42.5)	107(57.5)
After meals	156(40.8)	64(41.0)	92(59.0)
With snacks	171(44.8)	76(44.4)	95(55.6)
While travelling	162(42.4)	68(41.9)	94(58.1)
After playing	113(29.6)	58(51.3)	55(48.7)
Without any reason	183(47.9)	79(43.2)	104(56.8)

4.4 PREFERENCE OF SOFT DRINKS AMONG THE LEARNERS

4.4.1. Most preferred soft drink of the learners.

The learners were asked to indicate their most preferred soft drink and the results have been shown below in Table 7. Carbonated drinks were the most preferred (58.9%) followed by dilutables, still and juice drinks (20.9%). A p value of 0.00 shows a significant association between gender and preferred soft drink.

Table 7: Most preferred soft drink among the learners

Type of Soft Drinks	*n (%)*	*Males (%)*	*Females (%)*	*Chi2 value*
Carbonates	225(58.9)	105(46.7)	120(53.3)	χ^2=19.3639 **P=0.000**
Dilutables, still and juice drinks	80(20.9)	21(26.3)	59(73.7)	
Water drinks	31(8.1)	10(32.3)	21(67.7)	
Functional drinks	46(12.0)	29(63.0)	17(37.0)	
Total	**382**	**165**	**217**	

4.4.2 Diet drinks consumption of the learners

The learners were asked if they consumed diet drinks. Out of the 382 learners, 177 (46.3%) reported they rarely consumed diet drinks. Only 14 (3.7%) learners consumed diet drinks daily of which 42.8% were males and 57.2% females. Table 8 summarizes the results.

Table 8: Diet drinks consumed by the learners

Consuming "diet" or "sugar free" drinks	*n(%)*	*Males (%)*	*Females (%)*
Never	156(40.8)	67(42.9)	89(57.1)
Rarely	177(46.3)	77(43.5)	100(56.5)
More than once per week	29(7.6)	12(41.4)	17(58.6)
Daily	14(3.7)	6(42.8)	8(57.2)
More than once per day	6(1.6)	3(50.0)	3(50.0)
Total	**382**	**165**	**217**

4.5 FACTORS ASSOCIATED WITH THE CONSUMPTION OF SOFT DRINKS

4.5.1 Behavioural factors

a. Eating habits of learners

The learners were asked how often they would skip breakfast, the number of meals and snacks consumed in a day; how often would they eat meals together with family and how often would they eat fast food. Table 9 below shows that only 159 (41.6%) learners ate breakfast regularly. More than three-quarters of the learners ate ≤ 3 meals a day. Majority of the learners ate ≤ 3 snacks per day. Of the 382 learners, only 162 (42.4%) learners always ate their meals along with their families. Occasional fast food consumption was reported by 166 (43.5%) learners.

Table 9: Eating habits practiced by the learners

Eating habits		***n(%)***	***Male (%)***	***Female (%)***
Skipping breakfast (n=382)	Every morning	159(41.6)	82(51.6)	77(48.4)
	Few times a week	124(32.5)	45(36.3)	79(63.7)
	Once a week or less often	99(25.9)	38(38.4)	61(61.6)
Number of meals in a day (n=382)	≤ 3 meals	296(77.5)	119(40.2)	177(59.8)
	> 3 meals	86(22.5)	46(53.5)	40(46.5)
Number of snacks in a day (n=382)	≤ 3 snacks	252(65.9)	104(41.3)	148(58.7)
	> 3 snacks	130(34.03)	61(46.9)	69(53.1)
Eating with family (n=382)	Always	162(42.4)	58(35.8)	104(64.2)
	Most of the time	128(33.5)	66(51.6)	62(48.4)
	Sometimes	63(16.5)	26(41.3)	37(58.7)
	Rarely	20(5.2)	10(50.0)	10(50.0)
	Never	9(2.3)	5(55.5)	4(44.4)
Fast food eating (n=382)	Never	5(1.3)	4(80.0)	1(20.0)
	Occasionally	166(43.5)	67(40.3)	99(59.7)
	Once a week	101(26.4)	37(36.6)	64(63.4)
	2-3 times a week	61(15.9)	32(52.5)	29(47.5)
	Once a day	13(3.4)	9(69.2)	4(30.8)
	More often	36(9.4)	16(44.4)	20(55.6)

b. Television, computer and video games viewing habits of the learners

The learners were asked whether they had a television, computer or videogame console in their rooms, the number of hours spent viewing them during weekdays and weekends and whether they ate meals and snacks while in front of the television. As shown in Table 10, about 59.9% of the participants had television or computer in their rooms and 55.2% of them reported eating meals and snacks while in front of television. In addition, viewing of less than 2 hours during weekday (38.2%) and 3-4 hours during weekend (29.1%) were reported the most.

Table 10: Television, computer and videogame habits practiced by the learners

TV/computer/videogames habits		***Frequency (%)***
Having TV, computer videogames in own room (n=382)	Yes	229(59.9)
	No	153(40.1)
Eating meals in front of TV (n=382)	Yes	211(55.2)
	No	30(7.8)
	Sometimes	141(37.0)
Hours of TV viewing in a week day (n=382)	≤ 2 hours	146 (38.2)
	3-4 hours	127(33.2)
	5-6 hours	49(12.8)
	≥ 7 hours	60(15.7)
Hours of TV viewing in a weekend day (n=382)	≤ 2 hours	83(21.7)
	3-4 hours	111(29.1)
	5-6 hours	81(21.2)
	≥ 7 hours	107(28.0)

c. Involvement of learners in physical activity

The learners were asked if they participated in any form of physical activity for at least 20 minutes a day. If so, they were asked to write down the type of physical activity, the number of days and the minutes per session for which physical activity was performed. Nearly two-thirds (63%) of the learners participated in physical activity for at least 20 minutes per day (Figure 1). Responses regarding the type of physical activity were

categorized into 3: sports, dance and exercise. For learners who took part in more than one category of physical activity, a fourth category –combination was included. The category of sports included responses such as boxing, cricket, cycling, karate, netball, soccer, swimming and volleyball. Many learners participated in dance classes, so dance was given a separate entity. Exercise included responses like aerobics, jogging, running, yoga, weightlifting, walking and working out at the gym. The number of days was divided into 3 or less than 3 days and more than 3 days. The minutes per session were categorized into 3: 0-30 minutes, 31-60 minutes and more than 60 minutes.

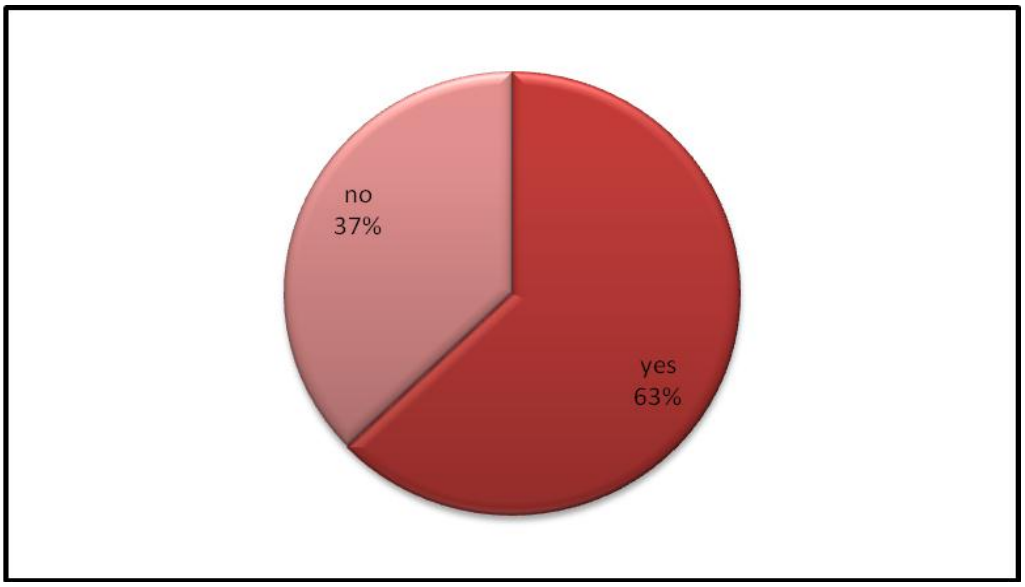

Figure 1: Frequency of learners participating in physical activity

Figure 2 shows that of the 382 learners, 45% performed exercise while 38% of the learners performed more than one category of physical activity.

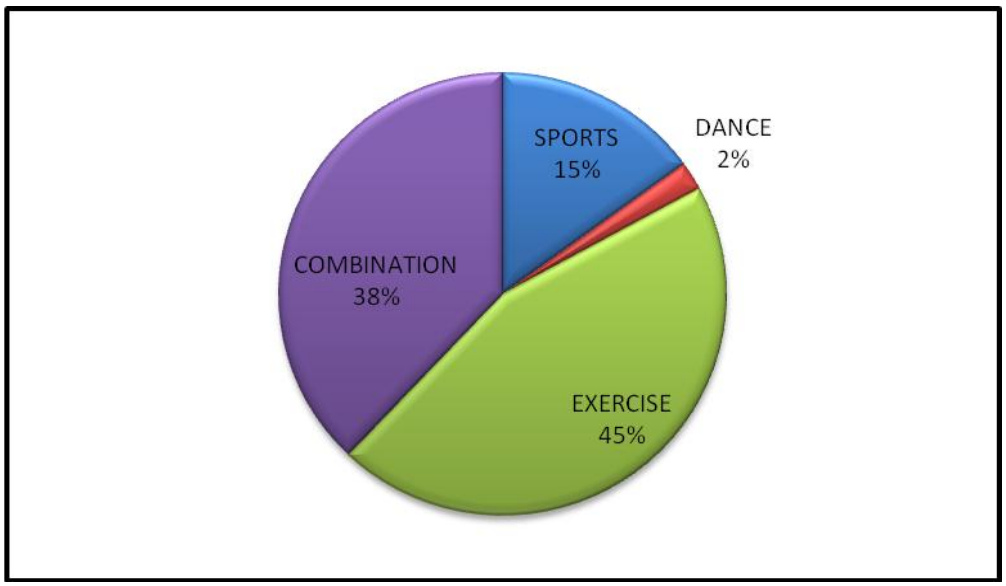

Figure 2: Distribution of type of physical activity participated by the learners

Majority of the learners participated in physical activity more than 3 days a week as shown in Figure 3.

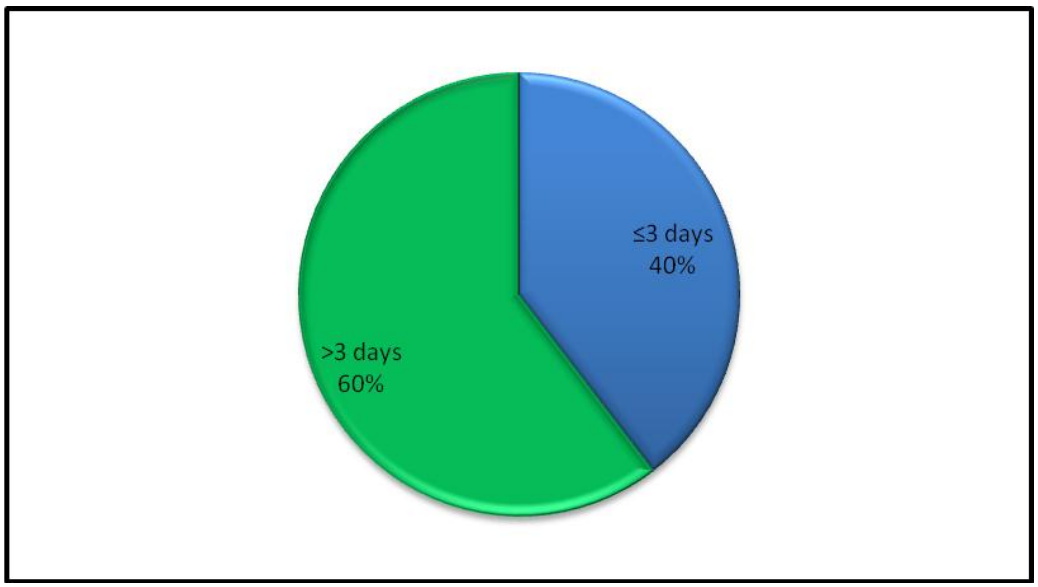

Figure 3: Distribution of the number of days per week physical activity is performed by the learners

As shown in Figure 4 below, 23% of the learners participated in physical activity for more than an hour while 46% of the learners participated in physical activity for 30 minutes or less.

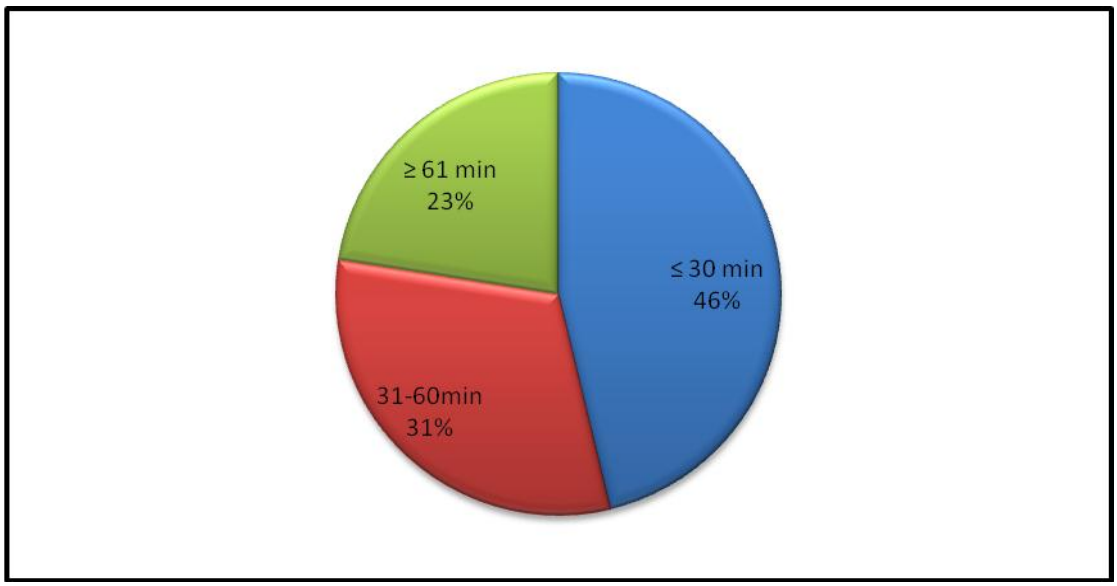

Figure 4: Distribution of the number of minutes spent per session of physical activity by the learners.

4.5.2 Socio-environmental factors

a. Easy availability of soft drinks

The learners were asked to indicate if soft drinks were easily available to them and the results show that about three-quarters (n=281, 73.6%) of the learners bought soft drinks from the school. Majority of the learners (99.2%) reported easy availability of soft drinks near their home. Table 11 below shows the results.

Table 11 : Availability of soft drinks

Availability of soft drinks	***Yes (%)***	***No (%)***
Buying soft drink from school (n=382)	281(73.6)	101(26.4)
Buying soft drink from shops near school (n=382)	243(63.6)	135(35.3)
Shops near home (n=382)	379(99.2)	3(0.8)
Buying from shops near home(n=379)	347(91.5)	32(8.4)

b. Influence of family and friends on soft drink consumption

With regards to family members' influence on consumption of soft drinks, almost all learners (97.6%) reported that their parents drank soft drinks. Figure 5 shows only 4.9% of learners had been discouraged always by their family members.

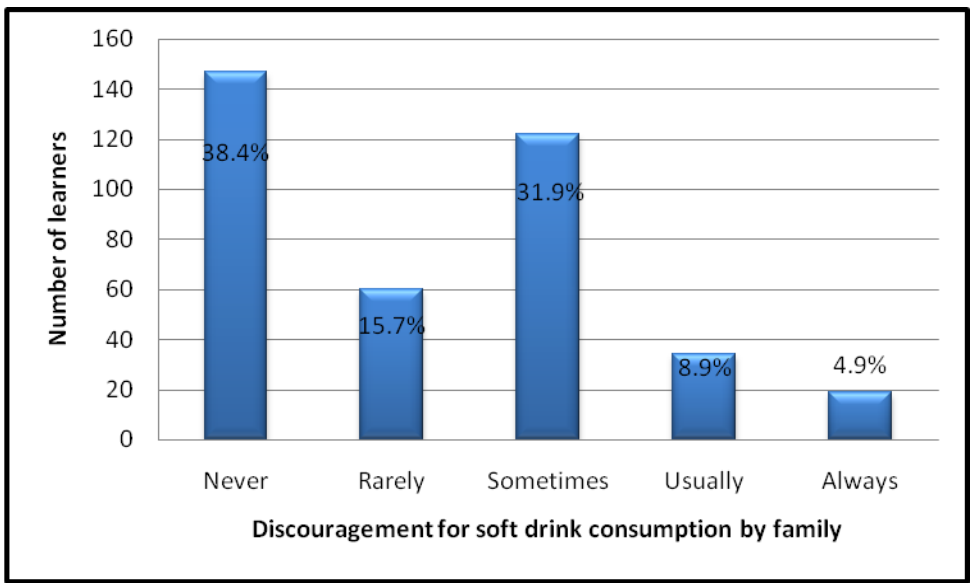

Figure 5: The number of learners who were discouraged from consuming soft drinks by their family members.

With regards to peer influence, learners reported that all their friends drank soft drinks. Figure 6 shows that majority of the learners (84.5%) had never been discouraged by their peers from taking soft drinks.

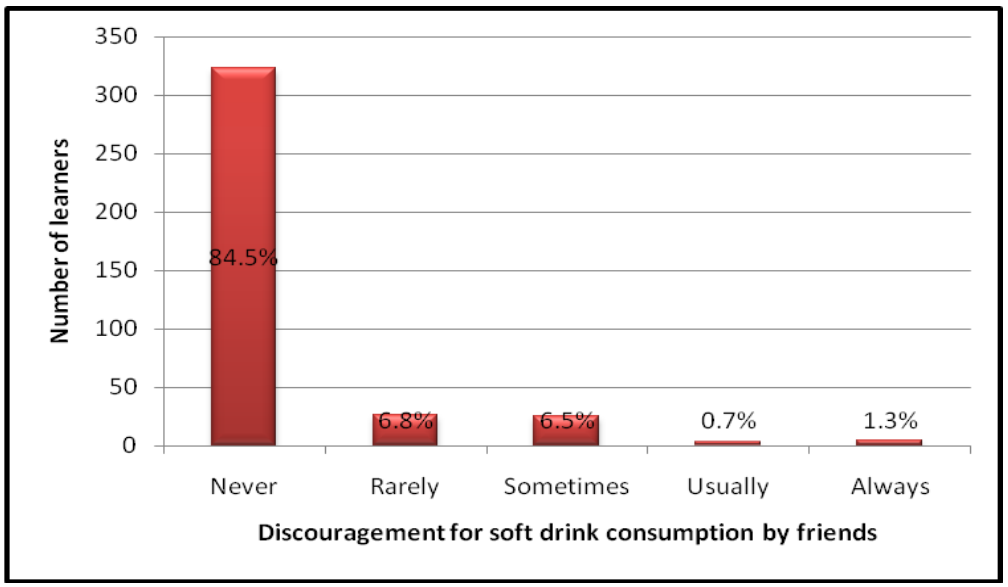

Figure 6: The number of learners who were discouraged from consuming soft drinks by their friends.

c. ***Influence of advertisements on soft drink consumption***

The learners were asked to indicate if soft drink advertisements influenced their decision to buy the products. Figure 7 shows that 141 (37%) learners felt that advertisements of soft drinks did not necessarily make them buy soft drinks. Only 46 (12 %) learners agreed that advertisements influenced them to buy soft drinks.

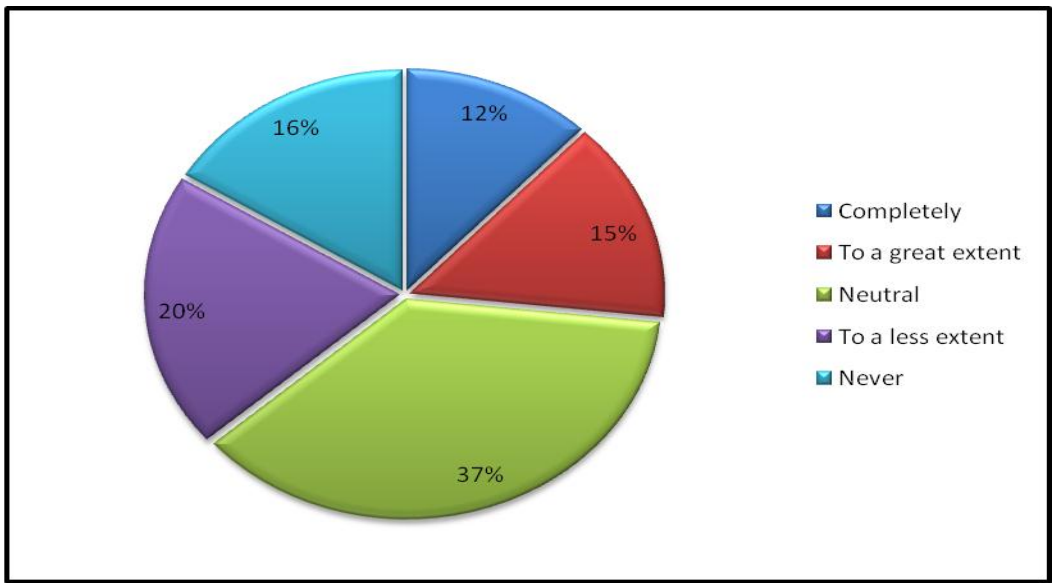

*Figure 7: Influence of advertisements on the soft drink consumpti**on***

4.6 ASSOCIATION BETWEEN BEHAVIOURAL AND SOCIO-ENVIRONMENTAL FACTORS AND SOFT DRINK CONSUMPTION

To determine the association between behavioural and socio-environmental factors and consumption of soft drinks among the learners, these factors were cross tabulated with the learners' soft drink consumption (frequent or non frequent) and the chi-square value was determined. Each computed statistical value was compared to the critical value in the table to determine its significance. The interpretation arrived from the findings gave the basis of either rejecting or accepting the stated hypothesis. $P<0.05$ was considered significant. Factors whose odds ratio differed from 1 and whose confidence intervals did not contain 1 were considered significant. Since all learners reported that their friends consumed soft drinks, this factor could not be cross tabulated. As shown in the Table 12 below, the factors found to be significant were snacking habits ($p=0.042$), fast food outlet visits ($p= 0.001$), buying soft drinks from school ($p=0.001$), from shops near school and home ($p=0.012$ and $p=0.006$ respectively), and easy availability of soft drinks at home ($p=0.00$). Therefore, learners who had frequent snacking habits were 2.02 times more likely to consume soft drinks compared to those who had lesser snacking habits; learners who frequently visited fast food outlets were 1.68 times more likely to consume soft drinks and those who had soft drinks readily available at home were 1.90 times more likely to consume soft drinks. Table 12 summarizes these results.

Table 12: Association between behavioral and socio-environmental factors and consumption of soft drinks

Factors		*P value*	*Odds ratio*	*Z value*	*95% C.I*
Father's education		0.824	0.95	-0.22	0.66-1.38
Mother's education		0.753	0.93	-0.32	0.63-1.38
Guardian's education		0.527	1.54	0.63	0.40-5.97
Taking breakfast		0.908	0.98	-0.12	.69-1.4
Number of meals/day		0.241	1.57	1.17	0.73-3.36
Number of snacks/day		**0.042***	2.02	2.04	1.02-3.98
Family meals		0.433	1.12	0.78	0.83-1.52
Fast food		**0.001***	1.68	3.26	1.23-2.31
Physical activity		0.893	1.04	0.13	0.57-1.88
Gadgets in room		0.141	0.65	-1.47	0.36-1.15
Family meals in front of TV		0.529	0.90	-0.63	0.67-1.22
Number of hours of TV/ computer/videogames viewing	Week day	0.318	1.15	1.00	0.87-1.52
	Weekend day	0.554	1.08	0.59	0.83-1.39
Family soft drink consumption		0.873	0.83	-0.16	0.96-7.31
Buying drinks	School	**0.001***	0.36	-3.37	0.20-.66
	Shops near school	**0.012***	0.48	-2.51	0.26-0.85
	Shops near home	**0.006***	0.32	-2.76	0.14-0.72
Availability at home		**0.000***	1.90	4.65	1.44-2.45

***Significant at 5% level of confidence*

4.7 KNOWLEDGE LEVELS ABOUT THE HEALTH EFFECTS OF INCREASED CONSUMPTION OF SOFT DRINKS

4.7.1 Health effects of increased consumption of soft drinks

The learners were asked to choose from a list of twelve diseases, the health effects which they think would result from increased soft drink consumption. Overweight and

obesity (53.9%) and diabetes (68.8%) were the health effects most reported as resulting from increased consumption of soft drinks. Table 13 shows the results.

Table 13 : Health effects of increased consumption of soft drinks

Health effects	***Yes (%)***
Overweight and obesity	206(53.9)
Skin cancer	98(25.6)
Pain in joints	30(7.8)
Weak eye vision	114(29.8)
Dental decay	194(50.8)
Weak bones	55(14.4)
Diabetes	263(68.8)
High blood pressure	96(25.1)
Kidney stones	88(3.0)
Darkening of skin	112(29.3)
Addiction	173(45.3)
Fracture of bones	15(3.9)

4.7.2 Learners' knowledge on health effects of soft drinks .

The knowledge of learners in this study was categorized according to the norm-referenced performance-rating scale developed by Whati, Senekal, Steyn & Nel (2005) For this, each correct response was assigned a code of 1 and for an incorrect response a code of 0. Finally, the responses were added up having a maximum of 9 correct responses out of the given 12 responses. Therefore as per this rating scale, 212 (55.5%) learners showed very poor knowledge regarding health effects caused by increased consumption of soft drinks. Only 22 (5.7%) learners had excellent knowledge on the health effects of soft drinks. Table 14 shows the results.

Table 14: Interpretation of the knowledge responses on the health effects of increased soft drink consumption

Performance score%	*Frequency (%)*	*Interpretation*
<34	212(55.5)	Very poor
34-51	70(18.3)	Below average
52-57	54(14.1)	Average
58-75	23(6.02)	Above average
76+	22(5.7)	Excellent

4.8 CONCLUSION

All 382 learners drank soft drinks over the past 12 months which means a soft drink consumption prevalence of 100%. Carbonated drinks were the most often consumed by 281 (73.6%) learners. Females drank more dilutables, still and juice drinks than males. Functional drinks were more often consumed by males than females. Majority of the learners consumed soft drinks 2-3 time a day. Of the 382 learners, 150 (39.3%) learners drank a medium glass of soft drink at a single time. Only 55 learners (14.4%) were non frequent consumers of soft drinks. Most of the learners rarely consumed diet drinks. The factors found to be significant to soft drink consumption were snacking habits (p=0.042), fast food outlet visits (p= 0.001), buying soft drinks from school (p=0.001), from shops near school and home (p=0.012 and p=0.006 respectively), and easy availability of soft drinks at home (p=0.00). Only 22 (5.7%) learners had excellent knowledge on the health effects associated with increased soft drink consumption.The researcher has interpreted the data according to the statistical analysis. Frequencies and graphical representations (bar and pie diagrams) have been utilized to enhance the reader's understanding of the study contents. Based on this information, conclusions and recommendations will be made and presented in Chapter 5.

CHAPTER V: DISCUSSION, CONCLUSION AND RECOMMENDATIONS

This chapter reports the key findings that relate to the research questions of the study. The prevalence and patterns of soft drink consumption, behavioral and socio-environmental factors at play and the learners' knowledge related to soft drink consumption are discussed here. The evidence provided is correlated with the existing body of knowledge to ensure scientific plausibility. Lastly, based on this evidence this chapter will also put forward recommendations to tackle the problem at hand; namely the soft drink consumption among learners.

5.1 DISCUSSION OF THE RESULTS

5.1.1 The first question of the research study was "*What is the prevalence of soft drink consumption among grade 11 and 12 learners in Liverpool secondary school, Actonville*?"

From the analysis of the study, it has been shown that all the participants (100%) have consumed soft drinks within a span of 12 months. Therefore, the prevalence of soft drink consumption is 100%. It can be assumed that a result very much similar or closely similar would be obtained even if a larger setting would be considered. These results are supportive of the findings by Block (2004) in the United States where it was reported that consumption of soft drinks by teenagers had increased by 300% from 1979.Similar findings were also reported by Garriguet (2008) among Canadian adolescents and Gour et al (2010) among Indian teenagers.

5.1.2 The next question was "*What are the patterns of soft drink consumption among these learners*?"

The study found out that both grade 11 and grade 12 learners had consumed soft drink in the last twelve months prior to this study. The learners were broadly categorized into frequent and non-frequent consumers based on their consumption. The learners who drank more than 330 ml 3 or more days a week were categorized as frequent

consumers. The learners who drank less than 330 ml and that too less than 3 days a week were categorized as non-frequent consumers. Fourteen percent of the learners – 33% of which were males and 67% females, were found to be non-frequent consumers and the rest frequent consumers. Even though there were more females in the study, 89% of the males were frequent consumers compared to 82% females. This is similar to the findings reported by the American soft drink association (Valentine, 2011) and Forshee et al (2003). At the same time, this is in contrast to findings by Gour et al (2010) where 61.4% of males were found to be more frequent consumers of soft drink compared to just 38.4% of females.

The Australian nutrition survey showed that until the age of 12 years, the amount of soft drink consumption for both males and females were the same. But after 12 years, the soft drink consumption of males would double that of females (Hector et al 2009). The reason behind this difference was partly because girls would have a negative attitude towards soft drinks in that these would make them gain weight.

Of the 382 learners, 46% drank soft drinks at least once a day similar to the findings of de Bruijn et al (2007) where forty-three percent of Dutch adolescents consumed at least one can of soft drink on every day of the week. In this study, although the majority of female learners consumed soft drinks; the frequency of soft drink consumption did vary by gender ($p=0.002$) where 54% of the males consumed at least 1 soft drink per day compared to 36% of females.

Carbonates (73.6%) were the most widely consumed followed by fruit juices (12.4%) , functional drinks (7%) and finally water drinks (7%). Carbonated drinks were also the most preferred drink among the learners. This is similar to the findings by Grimm et al (2004) and Forshee et al (2003) where older children preferred carbonated beverages unlike younger children who preferred fruit juices. Diet drinks were not a popular option among the learners not even among the females. This is in contrast to the findings by Arcella, Le Donne, Piccinelli & Leclercq (2004) where Italian adolescent females drank more diet drinks.

5.1.3 The third question was "*What are the behavioural and socio-environmental factors associated with increased consumption of soft drinks among these learners?*"

According to Leap et al (2009), understanding food related lifestyle that influences teenagers' soft drink consumption may help in the expansion of significant interventions and policies for these teenagers and their families.

a) *Meal consumption habits of learners*: It was considered that skipping meals would lead to increased soft drink consumption later in the day for energy recompensation (Brown et al, 2010). Similarly, frequent snacking was also associated with soft drink consumption. In the case of eating breakfast, only 41.6% of the learners took breakfast every morning. This percentage could be attributed to the fact that most of the learners walked to school and so would skip breakfast to save time. Fewer girls consumed breakfast regularly; some owing to their "dieting" habits. Majority of the learners involved in this study would take less than three snacks per day. On testing the variables -skipping breakfast, number of meals taken and snacking against soft drink consumption, only the habit of frequent snacking was found to be statistically significant ($p=0.042$). The learners who ate more than 3 snacks a day were 2 times more likely to consume soft drinks than those who ate less than 3 snacks a day. Statistical significance between snacking and soft drink consumption was also reported by Kim et al (2011) at a p value of 0.002. The learners were also asked if they sat down with their family for meals. This was considered important because family meals would lead to higher intake of nutritious food and lesser intake of caloric food like soft drinks. Taking meals together ensures that the parents are able to monitor what their children are eating (Verzeletti et al, 2010). Most of the time, the learners would eat meals together with the family members as reported in this study. But no statistical significance was found between family meals and soft drink consumption. This is in contrary to that reported by Verzeletti et al (2010) where statistical significance was found between the two variables.

b) *Fast food consumption habits of learners:* The study sought to find out how many times learners ate from fast-food outlets. Regular patronage of fast-food outlets would lead to adolescents buying more soft drinks due to the options of "combo meals" for better value for money (Denney-Wilson et al, 2009). Majority reported that they bought from fast-food restaurants occasionally. In this study, fast-food purchasing was found to be statistically significant to soft drink consumption. Leap et al (2009) reported similar findings where frequent eating fast food was positively associated with soft drink consumption. Therefore, increased eating from fast food restaurant was accompanied by more frequent consumption of soft drinks ($p=0.001$).

c) *Physical activity of learners*: In this study, 63% of the learners would involve themselves in physical activity for at least twenty minutes per day. Walking was the most common physical activity practiced by the learners as most of the learners walked to and from school. But physical activity did not have any statistical significance to the soft drink consumption. This could be attributed to the fact that during these activities, learners get thirsty and would refresh themselves with these soft drinks. Another reason could be that due to an existing misconception that functional drinks are good for a healthy body, there would be an increased uptake of such drinks. A study by Ranjit et al (2010) in Texas shows that although physical activity is associated with healthy dietary behaviours, there is still a high prevalence of soft drink consumption especially sports beverages among adolescents.

d) *Television and computer viewing habits of learners*: Another behavioural factor that was being investigated in this study was the presence of television, computer and video game console in the learners' rooms. Nearly 60% had such gadgets in their bedrooms. With regards to eating snacks while watching television, 55% reported eating meals and snacks while in front of television. Parents are not able to constantly monitor what their children watch and for how long. Eating while watching television leads to increased consumption of caloric foods because one is not paying attention to the amount of food he/she is eating. Thirty eight percent of

the learners spent less than 2 hours during weekday and 29% spent 3-4 hours during weekend in front of television, computer and playing video games similar to the findings by Gour et al (2010). Teenagers, who spend most of their time watching television or playing video games, may have a tendency of drinking more soda due to excessive snacking. Leap et al (2009) reported that skipping breakfast and not having daily evening meals with parents, having regular fast foods at the restaurants, frequent television viewing behaviour, snacking while watching television and using personal computers increased their daily soft drink consumptions. In this setting, television/computer does not play a significant role with a p value greater than 0.05 whilst Gour et al (2010) reported that television viewing did have a significant role in increased soft drink consumption among Indian teenagers.

e) *Soft drink consumption of family and friends*: A study by Blaine and Isabel (2006) associated soft drink consumption to parenting style; where soft drink intake was lower in families with "highly involved and moderately stern parenting". Strict parenting practices indicate a significant regulation on the intake of soft drinks. There was a high prevalence of soft drink consumption (>90%) among family and friends as reported by the learners. Those who consume more soft drinks are less likely to discourage others from consumption. Parental and peer influence plays a major role in determining the consumption of soft drinks (Grimm et al, 2004; Madani et al, 2007). Only 5% of the parents discouraged soft drinks regularly. In the case of peers, 85% never discouraged their friends from consuming soft drinks. This "freedom to drink" is one of the main factors for increased consumption of soft drinks. The influence of parents and peers could not be tested for significance since more than 90% of them consumed soft drinks.

f) *Ease of availability of soft drinks*: Another socio-environmental factor that was investigated in this study was the ease of availability of soft drinks in the school and shops near school and home. About three-quarters (73.2%) agreed that they bought soft drinks from the school. Almost all participants had shops selling soft drinks near their homes (99.0%).Since there were many learners who would walk

to school, soft drinks becomes easily accessible from such shops as evident by the fact that 92% of the learners would buy soft drinks from these shops. Easy availability from the school, the shops near school and home and at home was found to be significant to the soft drink consumption (p=0.001, 0.012,0.006 and0.00 respectively). Out of the four easily available places to get soft drinks, those who have a steady supply from home were 1.9 times more likely to consume soft drinks. Grimm et al (2004) reported that school-aged children who had soft drinks easily available at home were 2.82 times more likely to consume soft drinks.

g) *Influence of advertisements on soft drink consumption*: The drastic rise in consumption of soft drinks has been also attributed to the targeting of teenagers by soft drink companies as the demand for soft drink among the adults is stagnant. According to NSDA (2009) soft drinks companies invest a lot on advertising of their products, in a teenager friendly manner. These adverts are also strategically placed at social areas most visited by children such as school grounds, playgrounds, movies, amusement parks and are also exhibited through the media like televisions, radio, games, internet and magazines. Celebrity endorsements and eye-catching phrases are often used to create a visual impact(Leap et al, 2009; Denney-Wilson et al, 2009). The learners were asked if they felt they were influenced by soft drink ads to which only 29% responded they were indeed positively influenced.

5.1.4 The fourth question to be answered by the study was "*What are the learners' knowledge about the health effects of increased consumption of soft drinks*?"

Poor or misconstrued knowledge on the nutritional status of a food item may lead to its overindulgence. In this study, nearly 50% of the respondents knew that overweight and obesity; diabetes; dental decay and addiction resulted from increased consumption of soft drinks. But they were less aware of the other health effects of soft drinks. On rating their performance scores, 56% of the learners had very poor

knowledge on the health effects of increased consumption of soft drinks. A study by Temple et al (2006) in Cape Town showed that respondents fared poorly when asked if the soft drinks are healthy or not where only 41% of the learners pointed out that soft drinks were unhealthy. Studies have shown that adolescents generally have poor knowledge about nutritional quality of food items. Even if they have knowledge about healthy foods, they find it difficult to follow a healthy eating plan (Bester & Schnell, 2004).

5.2 LIMITATIONS OF THE STUDY

The results of this study cannot be fully generalized to the whole population in the country since it has been limited to one geographical area. Extensive research is needed taking into consideration both the urban and the rural areas as well as teenagers belonging to various socio-economic strata. Instead of convenience sampling as performed here, a random sample will help in better generalization of results. Moreover, the cross-sectional nature of the study did not allow determination of causal effects. Increasing the age group of the sampled population would allow researchers to understand soft drink consumption patterns in a broader age group. Since the questionnaire was based on dietary recall, there is a chance for potential bias. The use of a more standardized and validated questionnaire will help in better assessment of the role of factors and knowledge in soft drink consumption.

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5.3 CONCLUSION

Globally, a dietary transition is occurring towards a diet of heavily processed and caloric foods. The review of literature has shown that amongst the processed foods, soft drinks have become one of the top energy contributors. Children and adolescents have been shown to be the most vulnerable to these energy dense drinks. Many studies have been conducted to understand the prevalence of soft drink consumption, the underlying factors leading to increased consumption and possible links between soft drinks and degenerative diseases (Kennedy, Nantel & Shetty, 2006; Holmes et al, 2010).

Presently, research on the soft drink consumption habits in South Africa is limited. The main focus of this research was to investigate the soft drink consumption among learners in South Africa and thus to compare with the results from other countries. This study has shown a high prevalence of soft drink consumption among the learners which is similar to findings documented in countries like the United States of America and the United Kingdom. If this trend of soft drink consumption is continued, it will give way to early onset of adult diseases. Understanding the prevalence, factors and possible implications of soft drink consumption is of public health importance as it will help in strategic intervention and management of the problem. This study has provided additional information on the soft drink consumption amongst learners.

5.4 RECOMMENDATIONS

Further research is necessary to generalize the findings to the whole of the country. Nevertheless, the following study recommends the following that will help reduce soft drink consumption among teenagers.

Interventions have to be started at the school level and at the home. Although interventions are very important at these levels; the health care sector, government, media and the soft drink industry too have to play a role.

At school

i. Commercial advertising for junk food like cool drinks at schools should be restricted.

ii. For additional funding, the school authorities often encourage tuck shops and informal vendors selling unhealthy food items like soft drinks on the school premises. This should be limited.

iii. The foods sold at the tuck shops should be regulated. Healthier options like fresh drinks should be made available.

iv. Because proper meals are sometimes not available at school, learners often depend on snacks. Thus, supply of nutritious meals at school should be made mandatory. Teenagers should be informed on the need to take enough meals every day to combat the urge to consume soft drinks.

v. Promotion of healthy eating patterns which are low in fat and sugar and high in nutrients should be encouraged to learners.

vi. To encourage children to drink plain water, easily accessible water-coolers should be installed in the schools as an alternative to cold soft drinks from vending machines.

At home

i. Since home environment plays an important role in the dietary quality of the learners, the family members should also be involved in addressing the health issues and the promotion of healthy eating.

ii. Healthy snacks and drinks should be readily available at home.

iii. Fast-food patronage should be restricted.

iv. Healthy meals should be encouraged rather than pre-packed and processed meals.

v. Any unhealthy habits like soft drink consumption and any health issues of learners like obesity are most likely to be noticed by family members. Early interventions should be taken to monitor any unhealthy dietary patterns, to introduce preventive measures and if needed provide treatments at the earliest.

vi. Reduce the amount of time spent in front of the television, the computer or while playing video games.

Health centres

Collaboration between public and private sector is needed to implement proper measures against unhealthy dietary habits. Frequent checkups of learners can be recommended with monitoring of vital statistics and body mass index.

Government

i. Food labelling rules should be made stricter. The contents and nutrition information should be clearly stated on the labels.

ii. Advertisements should be monitored.

iii. Like countries such as Britain, France; the sale of soft drinks in schools can be banned (Vartanian et al, 2007).

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APPENDIX A

UNIVERSITY OF LIMPOPO
Medunsa Campus

MEDUNSA RESEARCH & ETHICS COMMITTEE

CLEARANCE CERTIFICATE

P O Medunsa
Medunsa
0204
SOUTH AFRICA

Tel: 012 - 521 4000
Fax: 012 - 560 0086

MEETING: 07/2010

PROJECT NUMBER: MREC/H/162/2010: PG

PROJECT :

Title: Soft drink consumption among grade 11 and grade 12 learners in Liverpool Secondary School, Actonville, South Africa

Researcher: Dr A Rajan
Supervisor: Ms Busi Ntuli-Ngcobo
Co-supervisor: Ms L Skaal
Department: Public Health
School: Health Care Sciences
Degree: MPH

DECISION OF THE COMMITTEE:

MREC approved the project.

DATE: 09 September 2010

9/9/2010

RESEARCH & PARTNERSHIP
2010 -09- 09
MEDUNSA CAMPUS

PROF GA OGUNBANJO
CHAIRPERSON MREC

Note:
i) **Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee.**
ii) **The budget for the research will be considered separately from the protocol.**
PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.

African Excellence - Global Leadership

APPENDIX B

UMnyango WezeMfundo
Department of Education

Lefapha la Thuto
Departement van Onderwys

Enquiries: Diane Buntting (011) 843 6503

Date:	4 October 2010
Name of Researcher:	Dr A. Rajan
Address of Researcher:	172 Ravens Rock
	Transvaal Street
	Ravensklip; Witfield; 1459
Reference No:	D2011/40
Telephone Number:	011 022 1929 / 071 363 9359
Fax Number:	None
Email address:	Doc.amy09@yahoo.com
Research Topic:	Soft drink consumption among Grade 11 and Grade 12 learners at a Secondary School in Gauteng
Number and type of schools:	ONE Secondary School
District/s/HO	Ekhuruleni North

Re: Approval in Respect of Request to Conduct Research

This letter serves to indicate that approval is hereby granted to the above-mentioned researcher to proceed with research in respect of the study indicated above. The onus rests with the researcher to negotiate appropriate and relevant time schedules with the school/s and/or offices involved to conduct the research. A separate copy of this letter must be presented to both the School (both Principal and SGB) and the District/Head Office Senior Manager confirming that permission has been granted for the research to be conducted.

Permission has been granted to proceed with the above study subject to the conditions listed below being met, and may be withdrawn should any of these conditions be flouted:

1. ***The District/Head Office Senior Manager/s concerned must be presented with a copy of this letter that would indicate that the said researcher/s has/have been granted permission from the Gauteng Department of Education to conduct the research study.***
2. ***The District/Head Office Senior Manager/s must be approached separately, and in writing, for permission to involve District/Head Office Officials in the project.***
3. ***A copy of this letter must be forwarded to the school principal and the chairperson of the School Governing Body (SGB) that would indicate that the researcher/s have been granted permission from the Gauteng Department of Education to conduct the research study.***

Office of the Chief Director: Information and Knowledge Management
Room 501, 111 Commissioner Street, Johannesburg, 2000 P.O.Box 7710, Johannesburg, 2000
Tel: (011) 355-0809 Fax: (011) 355-0734

4. ***A letter / document that outlines the purpose of the research and the anticipated outcomes of such research must be made available to the principals, SGBs and District/Head Office Senior Managers of the schools and districts/offices concerned, respectively.***
5. ***The Researcher will make every effort obtain the goodwill and co-operation of all the GDE officials, principals, and chairpersons of the SGBs, teachers and learners involved. Persons who offer their co-operation will not receive additional remuneration from the Department while those that opt not to participate will not be penalised in any way.***
6. ***Research may only be conducted after school hours so that the normal school programme is not interrupted. The Principal (if at a school) and/or Director (if at a district/head office) must be consulted about an appropriate time when the researcher/s may carry out their research at the sites that they manage.***
7. ***Research may only commence from the second week of February and must be concluded before the beginning of the last quarter of the academic year.***
8. ***Items 6 and 7 will not apply to any research effort being undertaken on behalf of the GDE. Such research will have been commissioned and be paid for by the Gauteng Department of Education.***
9. ***It is the researcher's responsibility to obtain written parental consent of all learners that are expected to participate in the study.***
10. ***The researcher is responsible for supplying and utilising his/her own research resources, such as stationery, photocopies, transport, faxes and telephones and should not depend on the goodwill of the institutions and/or the offices visited for supplying such resources.***
11. ***The names of the GDE officials, schools, principals, parents, teachers and learners that participate in the study may not appear in the research report without the written consent of each of these individuals and/or organisations.***
12. ***On completion of the study the researcher must supply the Director: Knowledge Management & Research with one Hard Cover bound and one Ring bound copy of the final, approved research report. The researcher would also provide the said manager with an electronic copy of the research abstract/summary and/or annotation.***
13. ***The researcher may be expected to provide short presentations on the purpose, findings and recommendations of his/her research to both GDE officials and the schools concerned.***
14. ***Should the researcher have been involved with research at a school and/or a district/head office level, the Director concerned must also be supplied with a brief summary of the purpose, findings and recommendations of the research study.***

The Gauteng Department of Education wishes you well in this important undertaking and looks forward to examining the findings of your research study.

Kind regards

4 October 2010

Shadrack Phele MIRMSA
[Member of the Institute of Risk Management South Africa]
CHIEF EDUCATION SPECIALIST: RESEARCH COORDINATION

The contents of this letter has been read and understood by the researcher.	
Signature of Researcher:	
Date:	

APPENDIX C

Letter to School Authority

MEDUNSA
University of Limpopo
12 March 2011

Mr. N.R. Kaalan
Principal
Liverpool Secondary School,
Actonville
Sir,

Sub: Request to conduct research

I am a second year student registered in the Master of Public Health programme at Medunsa Campus. My research focus is on soft drink consumption among teenagers. I herewith request permission to conduct research on grade 11 & 12 learners at your institution for purposes of a dissertation on the topic: SOFT DRINK CONSUMPTION AMONG GRADE 11 &12 LEARNERS AT A SECONDARY SCHOOL IN GAUTENG,SOUTH AFRICA.
The aim of this research is investigate soft drink consumption among grade 11 & 12 learners in Liverpool Secondary School, Actonville .In order to do this; participants will be requested to complete a questionnaire which will take no more than 30 minutes to complete. Please find attached a clearance certificate from the Medunsa Research and Ethics Committee (MREC) and an approval letter from the Gauteng Department of Education(DOE). I undertake to rigorously adhere to all ethical considerations and measures in conducting the research. I hereby request permission to conduct this study at your institution. Thank you for your cooperation in this regard.

Yours sincerely,

Amy Rajan (Mrs)
Student no: 200906020
Contact Details: 0713639359
E-mail: doc.amy09@yahoo.com

Research supervisor:
Busi Ntuli-Ngcobo (Mrs)
Supervisor/Lecturer
Contact Details: 0836835553
E-mail: busi_ntuli-ngcobo@embanet.com

APPENDIX D

Letter to School Governing Body

MEDUNSA
University of Limpopo
12 March 2011

The Chairperson,
School Governing Body,
Liverpool Secondary School,
Actonville

Sir/Madam,

Sub: Request to conduct research

I am a second year student registered in the Master of Public Health programme at Medunsa Campus. My research focus is on soft drink consumption among teenagers. I herewith request permission to conduct research on grade 11 & 12 learners at your institution for purposes of a dissertation on the topic: SOFT DRINK CONSUMPTION AMONG GRADE 11 &12 LEARNERS AT A SECONDARY SCHOOL IN GAUTENG, SOUTH AFRICA.
The aim of this research is investigate soft drink consumption among grade 11 & 12 learners in Liverpool Secondary School, Actonville .In order to do this; participants will be requested to complete a questionnaire which will take no more than 30 minutes to complete. Please find attached a clearance certificate from the Medunsa Research and Ethics Committee (MREC) and an approval letter from the Gauteng Department of Education(DOE). I undertake to rigorously adhere to all ethical considerations and measures in conducting the research. I hereby request permission to conduct this study at your institution. Thank you for your cooperation in this regard.

Yours sincerely,

Amy Rajan (Mrs)
Student no: 200906020
Contact Details: 0713639359
E-mail: doc.amy09@yahoo.com
Research supervisor:
Busi Ntuli-Ngcobo (Mrs)
Supervisor/Lecturer
Contact Details: 0836835553
E-mail: busi_ntuli-ngcobo@embanet.com

APPENDIX E

Informed Assent Form for *children* who are invited to participate in the research titled. "Soft drink consumption among learners of grade 11 & 12 at a Secondary School in Gauteng,South Africa"

Principal investigator: **Amy Rajan**

Organization: **School of Public Health, University of Limpopo**

This Informed Assent Form has two parts:

1. ***Information Sheet (gives you information about the study)***
2. ***Certificate of Assent (this is where you sign if you agree to participate)***

PART I: INFORMATION SHEET

Introduction

My name is **Amy Rajan** and I am a student at **School of Public Health, University of Limpopo.** I am doing some research, which might help our government do more to help teenagers become and stay healthier. I am going to give you information and invite you to be part of a research study. You can choose whether or not you want to participate. There may be some words you don't understand or things that you want me to explain more about because you are interested or concerned. Please be free to ask me.

Purpose: Why are you doing this research?

Drinking a lot of soft drinks has increased considerably among the children and adolescents of South Africa. This causes harm to your body. In this study we will talk to you about your habits of soft drink consumption

Choice of participants: Why are you asking me?

As you are a teenager studying in Liverpool Secondary School,Actonville, you are invited to participate in my research

Participation is voluntary: Do I have to do this?

You don't have to be in this research if you don't want to be. Even if you say "yes" now, you can change your mind later and it's still okay.

Procedures: What is going to happen to me?

You will be given a questionnaire about your soft drink habits. You have to tick the most suitable response(s) under each question. If you do not wish to answer some of the questions included in the questionnaire, you may skip them and move on to the next question.

Benefits: Is there anything good that happens to me?

Your participation is likely to help us find out more about dietary patterns of teenage girls and boys and we hope that these findings will help children and adolescents to lead healthier lives.

Confidentiality: Is everybody going to know about this?

The researcher will protect the confidentiality of research participants.i.e.no information about participants will be disclosed. The researcher also gives a firm undertaking that participants will not be identified from the documents (assent form and questionnaire) emanating from the study.

Who to Contact: Who can I talk to or ask questions to?

If you have any questions you may ask me, even after the study has started. If you wish to ask questions, you may contact me:

Amy Rajan
Mob: 0713639359
E- Mail id: doc.amy09@yahoo.com

UNIVERSITY OF LIMPOPO (Medunsa Campus) ENGLISH ASSENT FORM

Statement concerning participation in Research Study

Name of Study

SOFT DRINK CONSUMPTION AMONG GRADE 11 &12 LEARNERS AT A SECONDARY SCHOOL IN GAUTENG, SOUTH AFRICA

I have read the information on the proposed study and was provided the opportunity to ask questions and given adequate time to rethink the issue. The aim and objectives of the study are sufficiently clear to me. I have not been pressurized to participate in any way.I understand that participation in this study is completely voluntary and that I may withdraw from it at any time and without supplying reasons. I know that this study has been approved by the Medunsa Campus Research and Ethics (MCREC), University of Limpopo (Medunsa Campus). I am fully aware that the results of this study will be used for scientific purposes and may be published. I agree to this, provided my privacy is guaranteed.

I hereby give consent to participate in this Study.

....
Name of learner Signature of learner

....
Place. Date Witness

___

Statement by the Researcher

I provided verbal and/or written information regarding this Study

I agree to answer any future questions concerning the Study as best as I am able.I will adhere to the approved protocol.

....……
.....

Name of Researcher Signature Date Place

APPENDIX F

QUESTIONNAIRE: SOFT DRINK CONSUMPTION IN LEARNERS OF GRADE 11 &12 AT A SECONDARY SCHOOL IN GAUTENG,SOUTH AFRICA

INSTRUCTIONS

Please complete the questionnaire according to your personal views; it will take approximately 40-45 minutes.
Please **DO NOT WRITE YOUR NAME** on the questionnaire!
Please read the questions carefully and **MARK WITH A TICK (☑) IN THE BOX/BOXES WHERE APPLICABLE.**
Please answer **ALL** questions.

NOTE: Soft drinks include carbonated drinks (cola), flavoured water, sparkling water, iced tea, sweetened fruit or vegetable juices and nectars, squashes, fruit punch, root beer, sodas,sports and energy drinks, vitamin water drinks, fruit powders and ginger ale

1. SOCIO-DEMOGRAPHIC INFORMATION

1.1 AGE (in years) ☐

1.2 SEX

Male ☐ Female ☐

1.3 GRADE ☐

1.4 ETHNICITY

Black		Asians	
White		Others	
Coloured			

1.5 You are staying with:

Parent(s)		Others	
Relatives			

1.6 If you are living with parent(s), Please tick the highest level of formal education completed by father

None		Tertiary	
Primary		Unknown	
High school			

1.7 Please tick the highest level of formal education completed by mother

None		Tertiary	
Primary		Unknown	
High school			

1.8 If you are not living with your parents, then please tick the highest level of formal education completed by local guardian/caregiver

None		Tertiary	
Primary		Unknown	
High school			

2. FREQUENCY OF SOFT DRINK CONSUMPTION

2.1 Over the past 12 months, did you drink soft drinks?

Yes ☐ No ☐

If yes,please answer the next question.If the answer is NO, please skip to question 5

2.2 What soft drinks do you <u>often</u> drink?(Please tick *one* appropriate box)

Carbonated drinks (cola)		Squashes	
Flavoured water		Fruit punch	
Sparkling water		Sodas	
Iced tea		Fruit powders	
Sweetened Fruit juices		Sports and energy drinks	
Sweetened Fruit nectars		Vitamin water drinks	
Sweetened Vegetable juices		Root beer	
Vegetable nectars		Ginger ale	

2.3 How often do you drink soft drinks? (Please tick *one appropriate box*)

Never		5-6 times per week	
Almost never		1 time per day	
Once a month or less		2-3 times per day	
2-3 times per month		4-5 times per day	
1-2 times per week		6 or more a day	
3-4 times per week			

2.4 At a single time, how much soft drink will you usually drink? (Please tick *one appropriate box*)

Small glass(118-178ml)		1 litre bottle	
Medium glass(236-350 ml)		1.5 litres bottle	
Large glass(473-590 ml)		2 litres bottle	
330 ml(1 can)		More than 2 litres bottle	
500ml bottle			

3. PREFERENCES OF SOFT DRINKS

3.1 What type of soft drink(s) do you drink? (Please tick *all appropriate* boxes)

Carbonated drinks (cola)		Squashes	
Flavoured water		Fruit punch	
Sparkling water		Sodas	
Iced tea		Fruit powders	
Sweetened Fruit juices		Sports and energy drinks	
Sweetened Fruit nectars		Vitamin water drinks	
Sweetened Vegetable juices		Root beer	
Vegetable nectars		Ginger ale	

3.2 From the above list, which do you like the most? (Please *write appropriate answer* in the provided box)

3.3 How often was your drinks "diet" or "sugar free"? (Please tick *one appropriate box*)

Never	
Rarely	
More than once a week	
Daily	
More than once a day	

3.4 On what occasions, do you often drink the soft drinks? (Please tick *all appropriate boxes*)

Feeling thirsty		With snacks	
Party/Celebration		While travelling	
With meals		After playing	
After meals		Without any reason	

3.5 Do advertisements of soft drinks make you want to buy soft drinks ?(Please tick *one appropriate box*)

Completely		To a less extent	
To a great extent		Never	
Neutral			

4. FACTORS ASSOCIATED WITH SOFT DRINK CONSUMPTION

SKIPPING BREAKFAST

4.1 How often do you eat breakfast before going to school? (Please tick *one appropriate box*)

Every morning	
Few times a week	
Once a week or less often	

SKIPPING MEALS

4.2 During a regular day, how many meals do you usually eat?

---------- Meals per day

FREQUENT SNACKING

4.3 During a regular day, how many snacks do you usually eat?

---------- snacks per day.

FAMILY MEALS

4.4 How many times a week do you eat meals with your family together? (Please tick *one appropriate box*)

Always	
Most of the time	
Sometimes	
Rarely	
Never	

FAST FOOD

4.5 How often do you eat fast food (McDonalds, KFC, Nandos, etc)? (Please tick *one appropriate box*)

Never		2-3 times a week	
Occasionally		Once a day	
Once a week		More often	

PHYSICAL ACTIVITY

4.6 In a week do you exercise or participate in any physical activity for at least 20 minutes? (Please tick *one appropriate box*)

Yes [ ] No [ ]

If yes,answer the next question.If no, skip to question 4.8

4.7 If yes (Please *write* in the provided boxes)

Which exercise activity do you do?	How many days per week do you exercise?	How many minutes per activity/session do you exercise?

TELEVISION, COMPUTER AND VIDEOGAMES

4.8 Do you have a television/computer in your bedroom?

Yes [ ] No [ ]

4.9 Do you and your family typically eat meals and snacks in front of the television?

Yes	
No	
Sometimes	

4.10 How many hours of television, video games and computer time (non work related) do you spend on a weekday? (Please tick *one appropriate box*)

None		4 hours	
1 hour or less		5 hours	
2 hours		6 hours	
3 hours		7 hours or more	

4.11 How many hours of television, video games and computer time do you spend on the typical weekend day? (Please tick *one appropriate box*)

None		4 hours	
1 hour or less		5 hours	
2 hours		6 hours	
3 hours		7 hours or more	

SOFT DRINK CONSUMPTION OF FAMILY AND FRIENDS

4.12 Do your family members drink soft drinks?

Yes ☐ No ☐

4.13 Do your family members ever discourage you from drinking soft drinks? (Please tick *one appropriate box*)

Never	
Rarely	
Sometimes	
Usually	
Always	

4.14 Do your friends drink soft drinks?

Yes		No	

4.15 Do your friends ever discourage you from drinking soft drinks? (Please tick *one appropriate box*)

Never	
Rarely	
Sometimes	
Usually	
Always	

EASY AVAILIBILTY

4.16 Does your school sell soft drinks?

Yes		No	

If your answer is YES, answer the next question. If your answer is NO, go to question 4.19.

4.17 If yes, do you buy soft drinks from the school?

Yes		No	

If your answer is YES, answer the next question. If your answer is NO, go to question 4.19.

4.18 How many times do you buy soft drinks from the school? (Please tick *one appropriate box*)

1-2 times per week	
3-4 times per week	
Every day when in school	

4.19 Are there shops selling soft drinks near your school?

Yes ☐ No ☐

If your answer is YES, answer the next question. If your answer is NO, go to question 4.21.

4.20 If yes, do you buy soft drinks from these shops?

Yes ☐ No ☐

4.21 Are there shops selling soft drinks near your home?

Yes ☐ No ☐

If your answer is YES, answer the next question. If your answer is NO, go to question 4.23.

4.22 If yes, do you buy soft drinks from these shops?

Yes ☐ No ☐

4.23 How frequently are soft drinks available at your home? (Please tick *one appropriate box*)

Never	
Rarely	
Sometimes	
Usually	
Always	

5. KNOWLEDGE LEVELS

5.1 Please read this statement "*Increased drinking of soft drinks causes harm*"

True ☐ False ☐ Do not Know ☐

If your answer is TRUE, answer the next question. If your answer is FALSE or DO NOT KNOW, go to question 5.3.

5.2 If true, what kind of harm is caused by too many soft drinks? (Tick *all boxes applicable*)

Overweight and obesity		Diabetes (increased sugar level in blood)	
Skin cancer		High blood pressure	
Pain in joints		Kidney stones	
Weak eye vision		Darkening of skin	
Dental (tooth) decay		Addiction	
Weak bones		Fracture of bones	

5.3 When comparing health benefits of fresh juices and soft drinks (Please tick *one appropriate box*)

Fresh juices are the same as soft drinks	
Fresh juices are better than soft drinks	
Soft drinks are better than fresh juices	
Not sure	

5.4 Which nutrients are provided by soft drinks? (Please tick *all appropriate boxes*)

Water	
Carbohydrates	
Proteins	
Fats	
Vitamins	
Minerals	

5.5 Out of the above, which nutrient is found <u>the most</u> in soft drinks? (Please *write appropriate answer* in the provided box)

THANK YOU FOR TAKING THE TIME TO FILL AND RETURN THE QUESTIONNAIRE! YOU WILL BE KEPT POSTED ON THE RESULTS.