PREVALENCE AND RISK FACTORS FOR OBESITY AMONG SCHOOL AGED CHILDREN IN NAIROBI PROVINCE, KENYA

LILLIAN ADHIAMBO ABALLA (B.E.D HONS)

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DECLARATION

I, LILIAN ADHIAMBO ABALLA hereby declare that this thesis is my original work and has not been presented for a degree in any other university for any award

Signed.. Date...................................

SUPERVISORS' APPROVAL

We confirm that the work reported in this thesis was carried out by the candidate under our supervision as university supervisors.

Dr. MICHAEL F. OTIENO

Signed .... Date ....

SENIOR LECTURER
Department of Laboratory Sciences
Kenyatta University

Dr. LUCY W.NGIGE

Signed .... Date ....

SENIOR LECTURER
Department of Community Resource Management and Extension
Kenyatta University

DEDICATION

To my loving parents the late Mr. John B. Aballa and mother Mrs. Christine O. Aballa for their love and support that made this effort worthwhile.

To my cherished brothers and sisters Kevin, Cosmas, Eric, Sherry, Aminah and Pacifica; Only God can reward you for your prayers, love, support and patience.

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ABBREVIATIONS

ADA   American Diabetes Association

AIDS   Acquired Immune Deficiency Syndrome

BMI   Body Mass Index

BMJ   British Medical Journal

BMR   Basal Metabolic Rate

CVD   Cardiovascular Diseases

FAO   Food Programme Organization

JAMA   Journal of American Association

HIV   Human Immune Deficiency Virus

IOTF   International Obesity Task Force

NCD   Non- Communicable Diseases

NGO   Non Governmental Organization

NIDDM   Non Insulin- dependant Diabetes Mellitus

PAL   Physical Activity Lessons

P.E   Physical Education

SES   Socio- Economic Status

SPSS   Statistical Package for Social Science

UNESCO   United Nations Education Science and Cultural Organization

UK   United Kingdom

USA   United States of America

WHO   World Health Organization

ABSTRACT

Obesity is a complex condition that is caused by a mixture of medical, psychological and environmental factors. Childhood obesity is characterized by rise in the number of fat cells. It is one of today's visible yet neglected Public Health problems with serious health implications such as type2 diabetes, hypertension and cardiovascular diseases that affect individuals in all ages and socio-economic groups. This was a crossectional study aimed at investigating the prevalence of obesity and factors that contribute to its occurrence among school-aged children in Nairobi. Objectives of the study were: to establish the prevalence of obesity among school aged-children in Nairobi; to determine the dietary practices of children in the target population; to determine the relationship between dietary practices and obesity; to assess the activity levels of the school aged children. Purposive sampling was used to select the target geographical area, cluster sampling was used to select the eight divisions and gender, simple random sampling was used to identify twenty four schools, stratified sampling was used to select the class levels (1-4) and systematic sampling was used to select the target population (400 pupils). Data were collected by use of Structured questionnaire, anthropometric data sheet and interview schedule. Statistical package for social sciences (version ll), Epi-info, Nutri-Survey were used to analyze data. Pearson's Product moment correlation and chi-square was used to test the hypotheses. Results from the test indicated that there was a significant relationship between type of school and obesity (x^2= 49.626, $p<0.05$), there was no significant relationship between gender and obesity (x^2=2.867, $p>0.05$), there was a significant relationship between leisure activity and obesity (x^2=4.094, $p<0.05$) and there was a significant relationship between meals consumed for dinner and obesity (x^2=71.123, $p<0.05$). Pearson product moment correlation results indicated that there was a significant but very weak negative correlation between time spent on physical activity and obesity. ($r=0.2$, $p=0.038$). Prevalence of obesity among school-aged children was found to be 25.6% with more boys (27%) being obese than girls (26%). Factors that were associated with the development of obesity were low levels of physical activity and consumption of foods that are dense in carbohydrates and fats. In schools studied 58% of the pupils ate three times in a day although majority of the respondents from public schools had fewer meals in a day than those in private schools. Respondents from public schools were found to be more active than those in private schools.40% of the pupils from public schools spent their time playing while 39% spent their leisure time watching television. Fried foods (58.5%) and chocolates (58.3%) were the most highly consumed snacks while fresh juice (4%) was the least consumed snack. This study concludes that prevalence of obesity among school aged children in the city of Nairobi is quite high which compares to rates in most developed countries. There is need to plan for most efficient interventions not only to ensure that we are food secure but also maintain healthy lifestyles and reduce the prevalence of obesity among school-aged children.

CHAPTER ONE: INTRODUCTION

1.1 Background information

Obesity is a condition of abnormal or excessive fat accumulation in the adipose tissue to the extent that health maybe impaired (World Health Organization, 1997). Obesity results when the number or size of fat cells in a person's body increases. A normal sized person has between 30-35 billion fat cells which increase in size and later in number (Wabictsch, 2002). Childhood obesity is rapidly emerging as a global epidemic (World Health Organization, 2002).

Childhood obesity is not only a daily problem for most pediatricians and parents in most economically developed countries but also it is becoming a burden for developing countries as well (Wang, Montein and Popkin, 2000). The increased burden of childhood obesity in this last years involves both its prevalence and development at an earlier ages with increased occurrence of its cormobidities such as diabetes mellitus type2, Cardiovascular diseases and hypertension (Bauer and Maffeis 2002).

Globally it is estimated that 155 million children are obese. The prevalence rate worldwide ranges at 25%, America is 37%, Europe 35%, Middle East 25%, and Asia 15% and in Africa it is estimated to be 8.4%. Studies conducted among the pre-school children from several African countries indicate that South Africa had a prevalence rate of 31.9%, Algeria 21.6%, Seychelles 25%, Malawi 8.4% and Mauritius 5.6%. Kenya 4.6%.

However, there are limited representative data available from African countries for studying the trends on childhood obesity (IOTF, 2002). Prevention is the only feasible option for curbing this epidemic since current treatment practices for obese children and adolescents are largely aimed

at bringing the problem under control rather than effecting a cure (Cole, Paul and Whitehead, 2002).

Thus if this problem is not curbed we will not only prevent the transition of childhood obesity to adulthood but health problems associated with it will be prevented therefore increasing the life expectancy of these children. There is limited evidence of childhood obesity not only in Africa but also in Kenya. This study sought to establish the prevalence of overweight and obesity and risk factors associated with it among school aged children in Nairobi city.

1.2 Statement of the problem

Childhood obesity has become an area of public health concern because children are at an increased risk of carbohydrate intolerance, increased insulin, coronary heart diseases, hypertension and orthopedic problems (Strauss, 2001). Obesity is becoming a public health concern in Kenya especially among the urban population. This is attributed to the changes in lifestyle for example individuals have shifted from active to sedentary, changes in dietary habits; foods consumed are mostly carbohydrates and fats which provide more calories than what is expected. (Malla, 2004).

According to WHO (2002) a modern society is characterized by urban residence with facilitated transport with an decreased levels of physical inactivity poor dietary practices which are some of the risk factors associated with occurrence of obesity. Thus there is need to provide information on prevalence and factors associated with occurrence of overweight and obesity among children in Nairobi. This age group of 7-10 years was chosen because studies have

indicated that obesity management at a younger age may have a greater effect than during adulthood; body fat starts to increase at this age.

1.3 Justification

The increasing problem of childhood obesity poses critical global health crisis. Childhood obesity due to poor nutrition and lack of exercises causes a big threat to the life expectancy levels. It is associated with higher chance of premature death and disability in adulthood (Pinhas-Hamiel and Zeith, 2005). Specialists have observed in Kenya an increasing incidence of obesity amongst Kenyans (Muriuki, 2004). However specific studies had hardly been carried out to establish the prevalence of overweight and obesity in Kenya as at the time this study was conducted.

1.4 OBJECTIVES OF THE STUDY

1.4.1 General Objective

The general objective of the study was to determine prevalence and risk factors   among school aged children attending both private and public schools in Nairobi.

1.4.2 Specific Objectives.

1. To establish the demographic and socio-economic characteristics of children.

2. To determine prevalence of childhood obesity in Nairobi.

3. To assess the physical activity levels of the children.

4. To establish the food consumption patterns of the children.

5. To establish the relationship between social economic variables and obesity.

1.5 Null Hypotheses

a) There is no relationship between the level of physical activity among children and obesity.

b) There is no relationship between gender of the children and obesity.

c) There is no relationship between food consumption patterns of the children and obesity.

d) There is no relationship between school type and obesity

1.6 Significance of the study

The results from this study will contribute a great deal to the study carried out by other researchers in the same field and to policy makers in the entire world more so in countries with a high prevalence of obesity. They will be able to come up with an appropriate nutrition policy which will help mitigate this problem before it reaches epidemic proportions in our country.

1.7 Operational defined terms

a) **Anthropometric measures** It is the measurement of a child's body physical dimensions.

b) **Breakfast** This is the first meal of the day consumed by the children.

c) **Child** It is a young person female or male aged between 7-10 years and is attending school.

d) **Calorie** It is a unit of energy supplied by food.

e) **Dietary intake** Level of calorie, protein, vitamins and minerals in dietary consumption.

f) **Dinner** It is the last meal of the day consumed by the school aged children.

g) **Food consumption patterns** Frequency with which foods are consumed by children in a day.

h) **Malnutrition** Poor health condition among the children caused by lack of the right type of food.

i) **Meal** it is an instance of eating that takes place at a specific time and includes consumption of specific prepared foods by children.

j) **Nutrition** Process by which children receive the food necessary for them to grow up and be healthy.

k) **Obesity** An excessive accumulation of body fat   among children.

l) **Private primary schools** an institution for educating children, which does not receive its financial assistance from the government.

m) **Public primary schools** an institution for educating children, which receives its financial assistance from the government.

n) **Snacks** Small meals usually eaten between meals by the school aged children.

FIGURE 1:1 CONCEPTUAL MODEL: OBESITY AND CVD

Personal factors
- Knowledge; beliefs
- Attitudes; motivation
- Experience; skills
- Expectations
- Taste preference

Environmental, societal, health-care factors
- SES; social and cultural norms
- Home, school, & workplace environments
- Media; advertising
- Food composition; portion size; cost
- Built environment; PA/PE programs
- HC provider advice, counseling & treatment.

Energy Intake>
Energy Output (poor diet, physical inactivity and sedentary behavior)

Obesity

CVD risk factors

CVD

Physiology affecting energy balance
- Appetite & satiety mechanisms
- Metabolic rate; energy balance et-point
- Intrauterine & early life "programming"

Biology affecting RFs & disease
- Genetic predisposition
- Neuronal regulation
- Cellular processes
- Adipose tissue metabolism
- Lipoprotein & glucose

Conceptual framework on overweight and obesity progression adapted from Glanz, Rimer, and Lewis (2002, page 573)

The development of obesity in childhood and subsequently in adulthood involves interactions among multiple factors that may shape daily diet and physical activity behaviors and increase obesity and cardiovascular disease risks. The figure 1.1 above indicates factors such as personal factors, environmental societal and health care factors and physiological which all contribute to the development of obesity and health related complications such as hypertension, certain types of cancers and sleep disorder.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Literature has been reviewed under the following topics: global prevalence of childhood obesity, biology of weight change in childhood, causes of childhood obesity, dietary patterns and eating habits, physical activity, environmental and societal factors, and hereditary factors, physical, psycho-social and economic consequences of obesity and treatment and management of obesity.

2.2 Prevalence rates of childhood obesity

The annual rate of increase in the prevalence of childhood obesity has been growing steadily; the current rate is ten times higher than it was in the 1970's (WHO, 2003). More than 60% of children who are overweight before puberty are likely to be obese by early adulthood. The highest rate of childhood obesity has been observed in developed countries such as the UK and USA. However, the problem is steadily affecting many low-income and middle- income

countries particularly in urban settings. Thus in such settings the prevalence of obesity maybe as high as in industrialized countries.

The WHO predicts that by 2015 approximately 2.3 billion adults will be obese (WHO, 2004). Globally it is estimated that 155 million children are obese. The prevalence rate worldwide ranges at 25%, America is 37%, Europe 35%, Middle East 25%, and Asia 15% and in Africa it is estimated to be 8.4%. Studies conducted among the pre-school children from several African countries indicate that South Africa had a prevalence rate of 31.9%, Algeria 21.6%, Seychelles 25%, Malawi 8.4% and Mauritius 5.6%. However, there are limited representative data available from African countries for studying the trends on childhood obesity (IOTF, 2002).

2.3 Biology of weight change in childhood

Many studies have shown that obesity tends to track across the life course so that once a child becomes overweight it is likely to gain more weight later in life. A normal healthy child grows at a genetically pre-determined rate that can be compromised or accelerated by nutrition imbalance (Pipes, 1994). During the first year of life fat accumulation is largely by means of increased volume of the adipocytes while in the second phase fat accumulates through an increase in the number of adipocytes without a significant change in fat cell volume (Wabitch, 2002). Thus the two mechanisms are involved in fat regulation. One that regulates the breakdown and the other is storage of fat within the cells. Adipose tissue in children generally contains a much higher proportion of smaller fat cells than such tissue does in adults. This indicates a higher formation of new cells during childhood. (Kissen and Peins, 2000).

2.4 Causes of childhood obesity

The global increase in childhood obesity and overweight are attributed to a number of factors. The Fundamental cause of childhood obesity is an energy imbalance between calories consumed and calories expended. These factors can be categorized as easily modifiable and once that cannot be modified.

Genetical related factors cannot be modified however, environmental, behavioral, culture, socio-economic status and industrialization can be modified.

2.4.1 Food Consumption patterns

Food continues to be a major factor in the whole person throughout the growing years. Food becomes a means of communication. It is intimately associated with the emotions and its acceptance or rejection is highly personal. The environment in which the child lives determines its food behavior and quality of nutrition. The family has the responsibility for a child's access to foods and establishes the emotional climate. Over the last decade food has become more affordable to a larger number of people as the price of food has decreased substantially relative to income.

The pattern of obesity is often set in infancy when the mother over feeds the baby in the belief that a fat baby is a healthy baby. Thus sometimes over eating becomes a habit (Wabitsch, 2002). According to Williams (1998) continued nibbling of food between meals is highly associated with obesity. Tasher (1996) further points that a high intake of energy involving consumption of refined foods is a common practice that predisposes the individual to obesity. A regular snacking has been associated with increased overall dietary intake in affluent societies (Jahns, Siega-Riz

and Popkin, 2001). Types of foods consumed as snacks may also influence the impact of snacking on body weight. Majority of the snacks consumed are often high in fat and carbohydrates. Meal patterns vary widely across populations and cultures.

However, in majority of westernized societies they have adapted to having three meals in a day. There is an increasing tendency for more frequent less well-defined eating occasions in both adults and young people. While others may result to dietary restrain and slimming, which may lead to skipping of meals, e.g. breakfast, lunch or supper. Skipping of meals is not advisable especially breakfast which is the first meal of the day since it is associated with increased fat intake and snacking later in the day. Children who skip meals may be at risk of weight gain (Bertone, 2003).

2.4.2 Physical activity

Exercise is a planned and structured subset of leisure time physical activity that is usually undertaken for the purpose of improving or maintaining physical fitness. Obesity is seldom found in those who lead active lives and follow occupations or recreations demanding hard physical exercises. It is common in those whose lives are sedentary. This is because of their low energy expenditure (Eleavior, 1998). According to Barasi there has been major changes in the level of activity in most western countries in the last 40-30 years. The advances in technology have reduced the need for physical activity effort in work, transport and leisure activities. Children play outside much less and are generally transported to school. There is considerable concern about the rapid decrease in activity levels and various initiatives are being introduced to raise awareness about the importance of activity e.g. the physical activity task force was set up as a result of UK governments health of nation white paper report that a minimum of 30 minutes of

moderate activity should be undertaken by everyone. There is need to incorporate more routine activity into people's lifestyle for example; using cars less, walking upstairs and taking of leisure walks. This is often easy to adopt as part of daily duties rather than organized physical activity, which an individual may resign quickly (Tasher, 1996).

2.4.3 Environmental and societal factors

These include: changing societal structures, economic status, food industry, fast foods premises, media, culture and hereditary or genetical factors.

2.4.4 Changing societal structures

The process of modernization and economic transition has seen most countries of the world move towards industrialization and an economy based on trade within a global market. This has brought a number of improvements to the standards of living and services available to people throughout the world. The food system that has emerged today uses an industrial approach to agriculture and food supplies highly processed foods.

While this might have contributed to improved food availability it has not necessarily solved the problem of under nutrition in many of the poorer countries nor has it improved the nutrition quality of the diets of the affluent. Industrialization of food production has contributed to the consumption of a diet higher in protein and fat and lower in complex carbohydrates (Tansy, 1995).

The decline in energy expenditure as seen with modernization and other societal changes is associated with sedentary lives. Examples include:

i Motorized Transport.

Increased use of personal vehicles is a clear indication that many people now travel short distances by car rather than walk or cycle. In Kenya children have organized transport to school

ii In the Work Place and schools

Systems have markedly reduced that need for even moderate activity and only a very small proportion of the population now engages in physically demanding manual work. Elevators escalators and automatic doors are all designed to save substantial amount of energy.

iv Urban Residence.

In urban areas children are dissuaded from going out either alone or at night because of fear of their personal security. Lack of play grounds for children to play both at home and schools.

2.4.5 Economic status

Social economic status is usually presented as a composite index combining income, education and place of residence. However the individual component of SES may have independent and even antagonistic effects on dietary intake and physical activity between relationship of social economic status and obesity. However studies have indicated that high SES negatively correlated with obesity in developed countries but it is positively   related obesity in populations of developing countries (IOTF, 2002). Hence slim individuals are considered poor and obesity as a sign of affluence per the capita income increases the nature of the diet in traditional societies

tends to change to a greater consumption of total fat and consumption of complex and simple carbohydrates and vegetable decreases (Food Agriculture Organization, 1997).

In the developing countries the relationship between obesity and socio-economic status is an inverse one with majority of the individuals from the affluent families. Studies suggest that family's from the lower SES groups engage in much more activity than those in professional groups. Further studies indicate that change in income has little effect on dietary structure in countries where income levels are already quite high in relation to the basic food needs. Increases in income are spent on more elaborate packaging and processing on higher quality foods rather than quantity of food. In low income groups food demand is much more price and income sensitive.

Their diets have a propensity to be energy dense with high fat intakes a prominent feature the more expensive vegetables, fruits and whole grains cereals are eaten more sparingly (Leather, 1996). The higher the economic status the more money one has available to spend, hence overeating of foods rich in fats and carbohydrates. These provide high energy, which is not expended, hence predisposes the individual to obesity. In Britain there is an increased prevalence of obesity and overweight in low socio-economic status. Many factors contribute to this including: food availability and selection, lifestyle factors which include activity levels and motivation to lose weight (Latham, 1997).

2.4.6 Food industry

Advances in food technology product development in cultivating, preserving, producing and storing foods have increased the availability of a wider variety of foods to a larger number of people year round. The increased level of globalization of the process is a clear indication that such trends in food availability are extending from individual societies to developing countries. It has increased the consumption of diets, which are highly processed with advancement in technology. It is possible to produce food products with a variety of combination in taste, texture, quality and nutrient content. Consumers are loosing control over the preparation of the foods, which they eat. Food composition is being placed in the hands of manufacturers (Buisson, 1994).

2.4.7 Fast foods

The fast food industry provides fast access to chosen meals take away services and home delivery services. These foods are normally high in fat, low in complex carbohydrates and energy dense. Fast food places are widely available and intensively advertised; e.g. in UK the number of fast food places has doubled in ten years while the number of restaurants and canteens remained stable. This has contributed to many families turning away from home prepared meals and utilizes more fast foods (Keynote, 2000).

2.4.8 Media

The various modes of communication: television, radio and print play a major role in information dissemination. They are part of informal education and both reflect and influence public attitudes. Money spent on promoting a high fat and energy dense food is more than that spent on promoting healthier foods. For example $50 million was spent on promoting chocolate

consumption in UK in 1992 compared to only $ 30 million spent on promoting fruits and vegetables (Wang-Montein and Popkin, 2000).

The media provides information on new and existing foods to consumers and has a persuasive influence on food choice. They have been influential in changing dietary patterns over recent decades. Television in particular plays a major role in informing and influencing children. This technology may have a negative influence. In USA and UK foods advertised during peak children's viewing time were high in fats, sugar and carbohydrates. This does influence the eating habits and selection of foods in children (Dietz and Grimace, 2000).

2.4.9 Cultural factors

Culture affects both food intake and physical activity patterns. Cultural behaviors and beliefs are learned in children and are often deeply held and are seldom questioned by adults, who pass this knowledge to their offspring's. Cultural factors are among the strongest determinants of food choices. These include peer groups, social conventions, religious practices, and the status value accorded to the different foods, the influence of other members of the household and individual lifestyle. They often adhere to peer pressure by selection of high fat food choices. Throughout all human history an increase in weight has been viewed as a sign of health prosperity. This is still the case in many cultures set-ups especially where conditions make it easy to remain lean (Brown, 1998).

2.4.10 Hereditary/genetical factors

Genetics and inheritance probably influences a person's chance of becoming more obese than other factors. Several genes are responsible for obesity and it is a matter of observation that obesity runs in the families. Study shows that increased fat-cells numbers was better correlated with increased body weight than with age of an individual (Epstain, 2000). Fat cell theory holds that the percentage of body fat an individual carries is determined by the number of fat cells in the body which in turn is partially determined by inheritance and partly by eating habits (Bauer and Maffeis, 2000). Studies carried out on identical and non-identical twins to quantify the genetic component of weight showed clearly that there is a relationship between parents' weight and those of children some of which is inherited. However the contribution of environmental factors cannot be dismissed. It is important to realize that nobody is condemned to be overweight because of their genetics (Flodemark and Lissau, 2000).

2.5 The physical, psychosocial and economic consequences of obesity

The rise in childhood obesity has been accompanied by all higher rates of the correlates and emergence of newly identified health conditions. Complications of childhood obesity were unlikely to be clinically apparent. Clinical studies of obese children have suggested a range of medical conditions for which obese children are at great risk. These conditions are important because they are widely prevalent, potentially serious and carry lifetime consequences for health and well being. Most common health related diseases among children include: CVD, hepatic /gastric complications, orthopedic complications and sleep apnoea (World Health Organization, 2003)

2.5.1 Cardiovascular diseases/hypertension

CVD encompasses CHD, stroke and peripheral vascular disease. CHD and stroke account for a large proportion of deaths in men and women in most industrialized countries and the incidence is increasing in developing countries. The CHD risk associated with obesity is more acute in younger people and it is higher in individuals with abdominal adiposity than in those with excess fat around the hips and thighs. This is because compared to adipose tissue; intra-abdominal adipose tissue has more cells per unit, higher blood flow and more glucorticoid receptors. This structural difference makes intra-abdominal adipose tissue more susceptible to both hormonal stimulation and changes in lipid accumulation and metabolism. Intra- abdominal adipocytes are located upstream for the liver in the portal circulation. The association between increased body weight and blood pressure is unclear. However, there is a possibility that with higher circulating levels of insulin, which enhances renal retention of sodium resulting in, increased blood pressure (Brenner, Garcia and Anderson., 1998).

2.5.2 Certain types of cancers

A number of studies have found a positive association between overweight and the incidence of cancer particularly those cancers which are hormone dependent they include: endometrial, ovarian, breast, cervical and prostate. While the gastrointestinal include: colorectal, liver gallbladder and pancreatic. Greater risks of endometrial, ovarian, cervical and post-menopausal breast cancer have been documented for obese women while there is some evidence for an increased risk of prostate cancer among obese men. The increased incidence of these cancers in the obese is more prominent for those with abdominal fat distribution at lower degrees of obesity and is thought to be a direct consequence of hormonal changes (Bauer and Maffeis, 2000).

2.5.3 Type 2 diabetes

The emergence of NIDDM in youth represents particularly alarming consequences of the obesity epidemic in children; a disease that was only seen in adults in the past decade. The onset of diabetes in youth will increase the risk in early adulthood of the advanced complications of the disorder e.g. CVD, kidney failure, visual impairment and limb amputations. Although factors such as family history and ethnicity are associated with NIDDM in children the most important factor is obesity.

2.5.4 Gallbladder disease

Gallbladder disease is common in women and the elderly. Obesity is a risk factor for gallstones in all age groups. In both men and women gallstones occurs 3 to 4 times more in obese compared to the non-obese individuals and the risk is even greater when excess fat is located around the abdomen. The relative risk of gallstones increases with BMI and data from Nurses Health Study (1996) suggests that even moderate overweight may increase the risk. Super saturation of the bile and reduced motility of the gallbladder both of which are present in the obese are thought to be underlying factors for gallstones formation (Kissban and Peins, 1998).

2.5.6 Pulmonary diseases/sleep apnoea

Obesity impairs respiratory function and structure leading to physiological and pathological impairments. The work of breathing is increased in obesity this is mainly due to the extreme stiffness of the thorax cage resulting from the accumulation of adipose tissue in and around the abdomen and diaphragm. Sleep apnoea is a sleep–associated breathing disorder most clearly seen in severely obese. It refers to a broad spectrum of sleep related conditions including increased

resistance to airflow through the upper airway, heavy snoring, reduction in airflow (hyperpnoea) and cessation of breathing (apnoea) (Donaghue, Watesand and Baur, 2002).

2.5.7 Orthopedic complications

It is well documented that obese children can suffer from orthopedic complications. The more serious of this include: slipped capital femoral and blouts diseases (A born deformity resulting from overgrowth of tibia). The minor abnormalities include: Knock knee, flat feet, and increased susceptibility to ankle sprains (Marmonier, et al 2000).

2.5.8 Psychological and social consequences

Stigmatization of obese children and adolescents has long been recognized in westernized cultures and it is well documented among the children's peer. There is a decrease in self –esteem among obese individuals compared to the non-obese. How self-esteem is measured varies and may include school academic performance, body appearance, athletic ability, social networking behavior and conduct attributes have reported increased suicidal ideas and suicidal attempts among overweight adolescents who reported being teased by peers and family members (Eisenberg, 2003).

2.5.9 The economic cost of obesity

The economic costs of obesity are important issues to health care providers and policy makers. The economic cost of obesity has three components:

Direct costs: It entails the costs to the individuals and service providers associated with treating obesity.

Intangible Costs: The opportunity cost of the disease to the individuals because of the impact on individual ill health.

Indirect Costs: It is usually measured as loss of production due to work related absenteeism and premature death (WHO, 2004). The economic costs of obesity have been assessed from several developed countries and range from 2% to 7% of the total health care costs. This is a clear indication that obesity represents one of the largest expenditures in national health care budgets.

The real costs of therapy in developing countries exceed those in developed countries because of extra burden associated with importing expensive equipment with scarce foreign exchange as well as the need for specialized training of staff. Low-income developing countries do not have any resources to cope with measures other than public health and essential clinical services. Thus it would be more cost effective if money spent on obesity and other non-communicable diseases go towards prevention than on expensive treatment during the advanced stage of the diseases (Levy, 1995).

2.6 Management and treatment of childhood obesity

Public health is based on the principle that promoting and protecting health of the population requires an integrated approach encompassing environmental, education, economical, technical and legislative measures (Flodmark and Lissau, 2002). The successful treatment of obesity in children or adolescents has proved elusive. Pediatric approaches are generally designed to bring weight gain under control and alleviate the co-morbidities. The success of the current obesity treatment programmes in most developed countries over the last ten years has proved

unsatisfactory the achievements appear to be better in the younger pediatric groups than in adults.

Obesity management at a younger age may have a greater effect for several reasons:

Motivation may be easier to generate and maintain for both child and the other family members while the child is young. It is easier to control and modify behavior in younger individuals. There may be less resistance to treatment, stigmatization and greater influence of the family on child. There may be more frequent opportunities for medical observation during earlier childhood compared with later years. Longitudinal growth and increase of lean body mass occur during childhood so that children can grow into their weight compared with younger children and adolescents who are less likely to accept a highly controlled home and school regimen. They may provide greater difficulty as subjects in randomized control trials (Caroli and Burniat 2002).

2.6.1 Diet management

It is recommended that only a small reduction in energy intake should be made to the diet of the obese child as an adequate intake of both energy nutrients is required by children to ensure that normal growth and development are not compromised. The treatment is recommended only for children over 6 years. Limiting portion size of energy dense foods is a useful method of reducing energy intake in obese children. Preparing and serving smaller quantity of such foods or by encouraging free consumption of fruits and vegetables so that energy density is reduced without imposing dietary restrictions can achieve this.

Limiting take away and ready prepared foods which tend to be particularly high in fat and energy dense. They should be encouraged to consume fewer high fat snacks as crisps and biscuits and sweetened beverages (MC kenzie, 1998). Promoting consumption of foods high in complex carbohydrates low in fat and low in energy density is likely to be important in preventing excessive energy consumption in children. Generally it is important to encourage all children to adopt healthy eating habits from an early age and continue with this into adulthood. A reduction of dietary energy intake while maintaining or increasing physical activity will reduce relative body weight in children. Carol and Burniat (2003) conclude that several benefits can be achieved through dietary controls; but several negative consequences may also arise this includes: Loss of lean body mass. Reduced linear growth and lowering of predicted adult height. Increased serum uric acid

Raised risk of gallstones (This problem has been reported among several obese adults on liquid caloric diets but has not been reported for obese children eating normal foods in a managed diet. Thus a low caloric balanced diet should be maintained (Caroli and Burniat, 2003).

2.6.2 Physical activity

A reduction of inactivity and development of an activity programme can increase the effectiveness of obesity therapy. Interventions that target energy expenditure are more successful when reductions in sedentary behavior are targeted rather than increases in the level of exercise. Simple measures such as the reduction of children's television, videotape and video game use can significantly contribute to decreasing overweight in children. Increased physical activity may best result from a change in incidental activity and not necessarily from organized exercise

focused activities. Children should be encouraged to choose activities that they enjoy and which are likely to be more sustainable (Robinson, 2001)

According to Epstein (2000) participation of children in an exercise programme during treatment for obesity is often poor, but those that are most compliant are most likely to maintain long-term weight control. The type of exercise employed include: swimming, dancing, cycling and sports game as opposed to programmed aerobics. The support of schools and family is important in continued success of physical activity programme. It is essential that success is not measured in terms of weight or fat loss but in terms of benefits such as increased skills and capacities for example gaining ball game skills dancing or self-defense skills.

2.6.3 Surgery

Surgical interventions are not recommended for use in children and adolescents with common forms of obesity. The safety and effectiveness of surgical treatments have not been established. Salvatoni (2002) suggests that surgery should be considered only when all else has failed and when severe potentially life threatening complications of obesity are present. The surgical methods are based on two-principle restriction of energy intake and malabsorption of food. Examples of surgical methods include: gastric surgery, vertical banded, gastroplasty and duodenal switch (Salvatoni, 2002).

2.6.4 Drugs

Several drug therapies have been developed. Mode of operation of these drugs can be categorized into four main fields. Suppressing food intake, increasing thermo genesis, inhibiting the absorption of food in the digestive tract and acting on the hormonal system.

Food intake suppressors include: Noradrenergic, benzphetamine, mazindol and phentermine. Food absorption inhibitors: Lipaseinhibotor orlistat® and non digestible fat substitute; olestra®. Hormonal agents: Leptin analogues, neuropeptide and cholecystokinin promoters. Thermogenic agents: Beta-agonists, caffeine and ephedrine. (Molnar, 2002).

2.7 SUMMARY

Obesity is a complex disease that is caused by a mixture of medical, psychological and environmental factors. Childhood obesity is usually characterized by a rise in the number of fat cells unlike the adults whose change by increase in size and number. Literature cited reveals that certain factors immensely influence the development of obesity. They include: feeding habits, energy balance, physical activity, genetics, culture, media and economic status. Once sets in obesity predisposes the individual to serious health complications for instance; diabetes, CVD, certain types of cancer, pulmonary diseases amongst others. Loss of weight through physical exercise and good feeding practices can help alleviate this problem. Most of the research conducted in Kenya focus on under nutrition. Findings from this study will focus on over nutrition; the results will be beneficial to the government in amending policies related to nutrition, NGO'S that focus on health issues and the ministry of Education and Ministry of Health.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter describes the ways in which the study was undertaken and how data were collected. It focuses on the following sectors: study design, study area and population, sampling procedures, data collection instruments and procedures, pre-testing and data analysis.

3.2 Study design

A cross-sectional research design was used in the study. In a cross-sectional research design subjects are assessed at a single time. It is less time consuming since it involves testing several groups at the same point in time hence a large number of subjects can be tested at a little cost (Thomas, Nelson and Silverman, 2005). It was used to determine the prevalence and risk factors for obesity among school aged children in Nairobi Kenya.

3.3 Study area

The Nairobi is the smallest province in Kenya and covers an approximate area of 693 square kilometers. Administratively Nairobi is both a district and province. It is divided into eight administrative divisions (Appendix 6) the city is cosmopolitan and was chosen purposively due to the presence of many people with varied social, cultural, economic and religious backgrounds. The study was conducted in day private and public schools within the city of Nairobi. Day schools were studied because children attending these schools were exposed to different modern lifestyles and indulge in diversified diets.

3.4 Study population

The study population comprised of children from primary schools both female and male attending private and public schools in Nairobi province. Those children aged between 7-10 years formed the target population. It was chosen because studies conducted globally have indicated that obesity management at a tender age may have greater effect than in adulthood. The class teachers of respective classes were also included in the sample.

3.4.1 Inclusion criteria

a. Those children whose parents gave consent

b. Those children who were in the age bracket (7-10 years).

c. Those children who have been in that school for more than a year.

3.4.2 Exclusion criteria

a. Those children whose parents never gave consent.

b. Those children who were not in the age bracket (7-10 years)

c. Those children who were physically challenged.

d. Those children who were sick.

e. Those children attending boarding schools.

3.5 Sample size determination.

The sample size was calculated using the formulae used by Fisher *et al,* (1998),

$$N = \frac{Z^2 pqD}{d^2}$$

Where:

N= The desired sample size

Z= Normal deviate 1.96 which corresponds to 95% confidence interval

P= Proportion of the population estimated to have desired characteristics

Q= 1-P

d = Degrees of freedom = 0.05

D= Design effect

Thus; $N = \dfrac{1.96^2 \times 0.5 \times 0.5 \times 1}{0.05^2}$

The sample size was 384

3.6 Sampling procedure

Simple random sampling was used to pick day schools. This method was appropriate since it allows each member of the population to have an equal chance of being included in the sample (Mugenda and Mugenda, 1999) a list of all day private and public primary schools in Nairobi's Division was drawn from each division four schools were selected using systematic sampling; two private and two public. Nairobi had 8 divisions by the time of data collection; thus a total of 24 schools were picked. Cluster sampling was used to select the eight divisions, two categories of the schools and gender of the school children. While purposive sampling was used to select the study area (Nairobi). Table 3.1 below shows the total number of registered schools in each division.

Table 3.1: Total Number of Registered Schools in Nairobi Province

DIVISION	PIRVATE SCHOOLS	PUBLIC SCHOOLS

1. Kibera	12	15
2. Embakasi	22	40
3. Westlands	12	27
4. Kasarani	18	32
5. Dagoreti	10	26
6. Madaraka	7	25
7. Pumwani	18	32
8. Central /Kamkunji	7	18

Source: *Ministry of Education Science and technology (2005)*

Systematic sampling was used to obtain the number of children from each school. Sampling frame was derived from a list of pupils aged between 7-10 years who were in standard one, two, three, and four respectively. In private schools the average number of pupils per class was 30 while in public schools was 50. Systematic sampling was used to select the respondents where every third respondent who fulfilled the criteria and was willing to participate was selected.

3.7 Ethical consideration

Permission to collect data was sought from Kenyatta University graduate school, Ministry of Education and Nairobi City Council. Participation was voluntary through informed consent from the respondents. The researcher explained the purpose of the study and assured the respondent that there were no ill motives and confidentiality of their responses was assured.

3.8 Data collection instruments

The data were collected through an interactive process between the respondents and the researcher using questionnaires which had both structured and unstructured questions, observation checklist and more information was obtained from interview schedules.

3.8.1 Questionnaire

Data were collected by use of a questionnaire administered to the children. It contained both structured and unstructured questions in order to get in-depth responses with clarity to meet the designed objectives for the study. English language was used during the interview though Kiswahili was used where clarity was required. Information sought included: Types of foods consumed by children, dietary patterns, level of physical activity, and factors influencing eating habits.

3.8.2 Observation checklist

This instrument gathered information on types of foods consumed by the children in school, types of snacks sold in school, types of activities they performed while in school and presence of field and any playing equipment. This was done during break-time, lunch and during physical activity lessons.

3.8.3 Interview schedule

It consisted of a list of questions that the interviewer read out to the respondents and wrote the responses. It was used to collect descriptive data about the children.

The information sought included: general behavior and involvement of pupils in class and physical activity lessons and eating habits.

3.8.4 Anthropometric data sheet

The height and weight of children were taken and recorded on the anthropometric data sheet. Each child's height was taken using a height board. The child removed shoes and excessive

clothing stood on a flat surface against the wall and the measurement was read. The weight measurements were taken by use of bathroom scale. Where each child removed their shoes and excessive clothing stood on the bathroom scale. The researcher would take the measurements while the research assistant would record. Each measurement was entered twice in order to cater for any errors and ensure accuracy.

3.9 Pre-testing

The data collection instruments were pre-tested using an identical sample of respondents who did not feature in the main study. In this case respondents were selected randomly for the activities in each class level (1-4) six pupils were selected. Pre-testing was done to appraise the instruments, check whether the questions were clear to the respondents and that they tested what they were meant to test. Pre-testing was conducted at Kenyatta University Primary School and reviewed in order to make the necessary corrections.

3.10   Data collection procedures

Questionnaire was administered to pupils on appointment by the researcher to various schools. During this period weights of the pupils were taken by use of bathroom scale while their heights were taken using a height board. Interviews for class teachers were conducted during ten o'clock break, lunch break and four o'clock break. Two teachers were interviewed per day.

3.11   Data analysis

Data analysis was done using Epi-info statistical package, Nutri-survey and statistical packages for social sciences. Nutri- survey statistical package was used to analyze the 24-hour recall results. Epi-info was used to analyze the anthropometric data in order to determine the BMI, which was graded according to (IOTF, 2002) age specific cut-off points for children; the children were classified as either normal, underweight, overweight or obese. The BMI values were transferred to SPSS for analysis of the relationship between obesity, which was the dependent variable, and independent variables, which included: children's socio-demographic characteristics, types of foods consumed and level of physical activity. Relationships between the variables were tested using chi-square, T-test and Pearson's product moment correlation. All relationships were tested at 0.05 level of significance. Descriptive statistics such as mean and percentages were used to describe data in this study. The results obtained after analysis were presented by use of pie charts, tables and bar graphs.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 Introduction

The purpose of this study was to investigate the prevalence of obesity and factors that contribute to its occurrence among school-aged children in Nairobi. This chapter presents the findings of the study and discussed and possible explanations provided in regard to the findings. The results were reported under the following headings: Demographic characteristics of the respondents, dietary practices of the respondents, level of physical activity of the respondents, body mass index and results on hypotheses testing expounded.

4.2 Results

4.2.1 Socio-Demographic Characteristics of the Respondents

The total sample was 400 as presented in Table 4.2 below. The sample saw a parity of selection in gender and school type.

Table 4.2: Number of Respondents by Gender and School Type

Type of school	Gender		Total
	Male	Female	
Private school	100(50 %)	100 (50 %)	200
Public school	100(50 %)	100 (50 %)	200
Total	200(50 %)	200 (50%)	400

4.2.1.1 Weight of the Respondents

Weight is one of the anthropometric measures that was taken .It is used to ascertain how heavy an individual is. The highest recorded weight was 90kg while the minimum was 18kg.   The mean weight of the total population was 31.7kg. The results of table 3 below show that (42.5%) of the respondents fell in the category of 30-39kg while (39%) belonged to 50-59kg category. the least number of respondents 0.5% fell in the category of 60-69kg and 0.3% were in the category of 70-79 and 90kg and above respectively as indicated in table 4.3 below.

Table 4.3: Weights of Respondents

Weight Category	Frequency	Percentage
10-19	6	1.5
20-29	58	14.5
30-39	170	42.5
40-49	6	1.5
50-59	156	39.0
60-69	2	0.5
70-79	1	0.3
80-89	0	0
Above 90	1	0.3
TOTAL	400	100

4.2.1.2 Respondents Age

The age of the respondents was very important in order to be able to categorize individuals in their respective BMI cut- off points. The age category of the respondents ranged between 7-10 years.

4.2.2 Dietary Practices of the Respondents

According to Wabitsch (2002), food continues to be a major factor in the development of the whole person throughout the growing years. The environment in which the child's lives determine the food behaviour and quality of nutrition. School aged children require three meals and consume snacks twice in a day. Majority of the respondents (58%) consumed food three times in a day while (25.3%) consumed food two times in a day, 14.8% ate any time of the day and 2% ate once in a day as indicated in table 4.4 below.

This is in agreement with Bertone (2003) who pointed out that majority of westernized societies have adapted having three meals a day however there is an increasing tendency in those industrialized societies for more frequent less well defined eating occasions.

Table 4.4: Number of Times Respondents Ate in a Day

Eating occasions	Male	Female	TOTAL	Percentage
Once	4(2.0%)	4 (2%)	8	2.0
Twice	44 (22%)	57 (28.5%)	101	25.25
Thrice	119 (59.5%)	113 (56.5%)	232	58.0
Anytime	33 (16.5%)	26 (13%)	59	14.75
TOTAL	200	200	400	100.0

4.2.2.1 Meals Skipped by Respondents

Skipping meals can largely affect the eating habits of an individual, which could result in less food intake or excessive food consumption. Table 4.5 shows that (45%) did not eat supper while (42.3%) skipped breakfast. The results also showed that (9%) skipped lunch while only (3.8%) did not skip any meal as indicated in table 8 below. The reasons that were given for skipping meals included: No time for eating, lack of appetite, illness, eating of late night snacks and consumption of snacks in between meals. According to Barton (2003), meals are important and all meals of the day should be consumed however breakfast being the first meal of the day should not be skipped since it is associated with decreased fat intake and decreased snacking later in the day.

Table   4.5: Meals Skipped in a day by school aged children

Type of meal	Male	Female	Total	Percentage
Breakfast	80(40%)	89(42.3%)	169	42.25
Lunch	17(8.5%)	19(9.0%)	36	9.0
Supper	99(49.5%)	81(45%)	180	45.0
None	4(2.0%)	11(3.8%)	15	3.75
TOTAL	200	200	400	100.0

4.2.2.2 Types of Snacks Consumed by Respondents

According to Barasi (1997), snacking and consumption of foods dense in fat are the common practices that predispose the children to obesity. Thus it was necessary to find out the type of snacks consumed by respondents in order to determine whether there is any association between snacking and increased BMI The most predominant consumed snack type were sweets (14.6%), followed by (11.5%)   chocolates (8.8%), mandazi (8.4%), crisps (8.2%), whole fresh fruits (7.9%), refined fruit juice and soda (6.5%),sausages (5.2%), popcorns (4.8%), biscuits (4.2%), peanuts (4.1%), sandwich (4.0%),fresh fruit juice (3.2%) milk and (2.7%) yoghurt as indicated in table 4.6 below.

This findings differ with Malla's (2004) study in Kenya where the highly consumed snack were sausages and 95% of her respondents did not consume fruit salad or fruit juices because her area of study was predominantly children from private schools. The findings of this study however revealed that decision making on snacks to be carried is mainly made by the parents (57.5%) and few of the respondents (25.5%) made decision.

This indicated that majority of the parents were not keen on the nutritive value of snacks that their children carried to school. In both school types, majority of snacks sold were mainly carbohydrates, fat, refined foods, sweets and sugar in nature.

Table 4.6: Types of Snacks Consumed by Respondents in the last 24-hrs

TYPE OF SNACK	FREQUENCY	PRECENTAGE
Chocolate	210	11.5
Sausage	118	6.5
Juice/soda	144	7.9
Crisps	153	8.4
Popcorns	95	5.2
Yoghurt	49	2.7
Mandazi/doughnuts	161	8.8
Cakes/bread	108	5.9
Peanuts	76	4.2
Sweets/gum	265	14.6
Sandwiches	75	4.1
Fruits	149	5.2
Biscuits	87	4.8
Milk	59	3.2
Fresh juice	72	4.0

4.2.2.3 Frequency of Food Consumption

Nutrition is concerned with how food is produced, processed, handled, sold, prepared and eaten; how food is taken, digested, absorbed and used in the body. Nutrients are parts of the food that the body uses the common sources of food nutrients include: carbohydrates, proteins, minerals and vitamins.

4.2.2.4 Recommended Daily Allowance

Proteins build tissues, produce fluids and repair tissues while carbohydrates aide in growth and production of energy which is required for the chemical processes i.e. breathing, digesting food, excrete waste, keeping body warm, secrete fluids and pumping of blood; sources include: starches, sugars and fat while energy is generally measured in kilocalories. Vitamins and minerals protect the body from diseases and infections. Results from Table 4.7 below shows that the frequency of consumption of foods from the four food sources was good. The frequency levels were as follows: (81%) for cereals, (64%) vegetables, (75%), fruits (83.7%) for pulses.

This is a clear indication that most parents are employed therefore are in a position to purchase food for their family members. The frequency of animal product and tuber consumption was low (23% and 9.5%) respectively. This can be attributed to the cost of animal product which are normally expensive and not all the individuals can afford on a daily basis especially individuals low socio-economic groups. Tubers such as arrowroots yams and cassavas are not common foods as compared to other food sources that are easily available in all the regions countrywide.

Table 4.7: Frequency of Consumption of Foods by School Aged Children in Nairobi

Food types	Frequency		Frequency of food consumed daily
	N	%	
Cereals	324	81	Frequent
	76	19	Not frequent
Vegetables	256	64	Frequent
	144	36	Not frequent
Fruits	302	75.5	Frequent
	98	24.5	Not frequent
Pulses	335	83.7	Frequent
	65	16.3	Not Frequent
Animal products	92	23	Frequent
	308	77	Not frequent
Tubers	38	9.5	Frequent
	362	90.5	Not frequent

4.2.2.5 Types of Foods Consumed by Respondents the Last 24-hours

The foods that were highly consumed included: chips (50%) for lunch, porridge (25%) for ten o'clock break, tea (28.8%) for four o'clock and rice and stew for dinner as indicated on table 4.8 below. The high consumption of chips can be attributed to the palatability nature of chips. According to Anderson (1995), presence of fat in food is particularly enjoyable and is associated with a pleasurable mouth feel. It increases both rate of eating and sense of hunger however the ability of proteins and carbohydrates to bring eating to an end and suppress hunger is very high. There is an increase in the number of fast foods shops that provide a variety of snacks that are pocket friendly thus both individuals from low and high socio-economic backgrounds can afford.

For example in Nairobi in every street there are at least five fast food places thus making the demand for fast food high unlike the rest of foods. The increased levels of technology and modernization have enabled most of the women to be employed. Thus majority of the women have neglected their role of being home makers as result food choice at home is left for the children or house help who in most cases are not knowledgeable on nutrition matters. As a result the family in most cases will consume meals that are low in nutritive value.

Table 4.8: Types of Foods Consumed by Respondents the Previous Day

Type of food	Breakfast N	%	Mid-break N %	Lunch N	%	4 o'clock N %	Supper N %
Tea	99	24				115 28.8	10 2.5
Milo/bread	34	8.5					
Cocoa/bread	62	15.5					
Milk	17	4.3					15 3.8
Cereals	19	4.8					
Yogurt						15 3.8	
Soda						13 3.3	
Porridge			100 25				14 3.5
Fruit/juice	12	3	60 15			47 11.8	
Tea/bread			75 18.3			12 15.5	
Potato Crisps			45 11.3				
Sweets/chocolates			53 13.3				
Beans/maize				45	11.3		
Ugali/vegetables				11	2.8		
Ugali/stew							23 5.8
Rice				80	20		
Rice/stew							105 26.3
Chapati/stew				21	5.3		
Chips/chicken							9 2.3
Chips/sausages				50	12.5		
Burger							33 8.3
Pizza							12 3
Spaghetti/stew				25	6.3		
Tea/cake						85 21.3	
Chips				220	50		23 5.8

4.2.3 Amount of Pocket Money Given to Respondents (per day)

The amount of pocket money given to the pupils was ranging from 10kshs-300kshs. Most of the respondents (56.7%) were given pocket money ranging between 10 Kshs.-50 Kshs. a fifth of the total sample (22.2%) were given pocket money between 101 kshs.-200 Kshs. only a few (6.7%) were given pocket money between 201kshs-300kshs as indicated in table 4.9 below. A cross tabulation indicated that the pupils attending private schools were given more pocket money to carry to school compared to the children attending public schools.

Majority of the respondents' parents were employed thus could afford to give their children money to spend. However, children attending private schools came from affluent families whose parents could afford to give them large amounts of money unlike children from public schools majority of whose parents depended on meager salaries for their survival. Thus they were given just what the parents could afford while others were not given any money.

Table 4.9 Amount of Pocket Money Given to the Respondents (per day)

GENDER	AMOUNT OF POCKET MONEY				Total
	10-50 Kshs.	51-100 kshs.	101-200 kshs.	201-300 Kshs.	
Male	65(59.1%)	24(21.8%)	14(12.7%)	7(6.4%)	110
Female	49(53.8%)	22(24.2%)	15(16.5%)	5(5.5%)	91
Total	114(56.7%)	46(22.9%)	29(14.4%)	12(6.0%)	201

4.2.3.1 How Pupils Spent Pocket Money

It is clear in figure 4.1 that most (50%) of the pupils spend their pocket money on snacks, others (28%) spent it on transport while (17%) spent it on a combination of transport and meals. The remaining (4.5%) saved their pocket money. The largest number of respondents spent their money on buying snacks. This is because 70% of the schools visited had canteens in the schools

while (30%) did not have. Snacks sold in these canteens included: Cakes, bread, chips, sausages, popcorns, crisps, samosa, smokies, buns, burgers, biscuits, soda, ice-cream, sweets and yogurt.
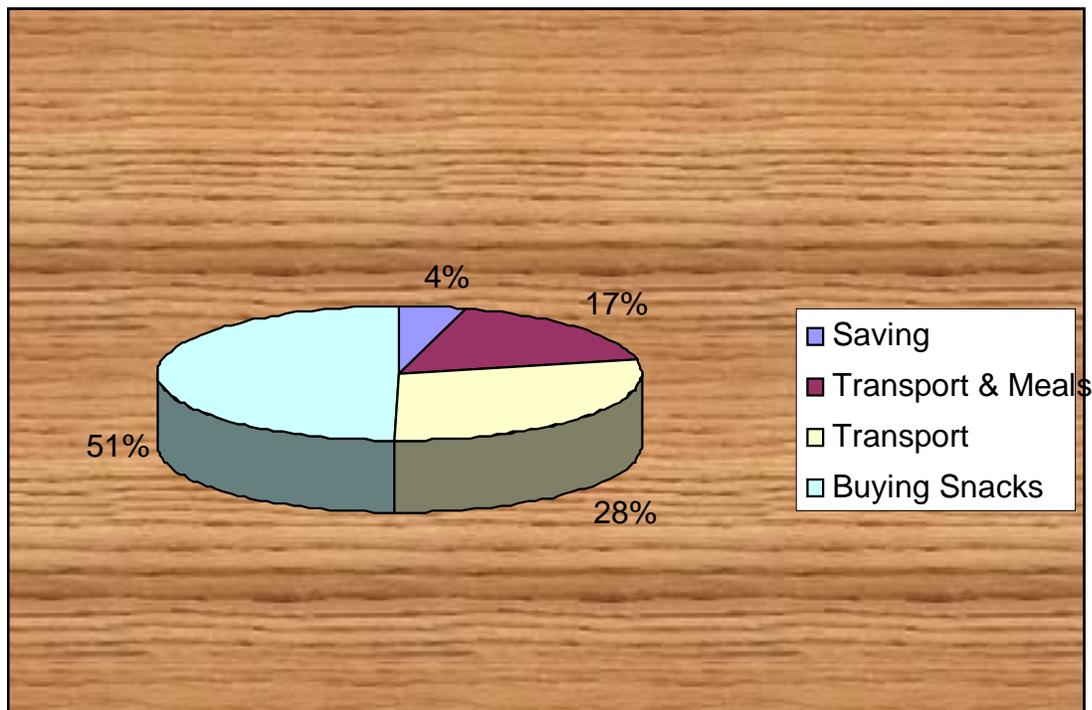
Figure 4.1: How pupils spent pocket money

4.2.4 Level of physical activity of respondents

Energy expenditure like energy intake is an important factor in the development or protection against obesity. The level of participation in various activities may affect food consumption and basal metabolic rate of an individual. In this study activity a standard measure of level of physical activity was not deployed however the particular key aspects were used: means to school, number of times children attended   physical exercise lessons and how children spent their leisure time.

4.2.4.1 Pupils Favorite Sports

The most favorite sport was football (32.8%) Running as sport came second (9.5%) balling (7.5) volleyball (4.5%) and table tennis (2.3%). In a day the children would play more than one sport and learn more about the sport as they grow. According to Murray (1995), it is important to nurture skills in organized sports especially at tender age as they are easily mastered at a younger age than in adulthood. He further reckons that sport should not be gender specific.

4.2.4.2 Number of Times Pupils Attended Physical Activity Lessons

Figure 4.2 below indicates the number of times the pupils had physical activity in a week. A majority (42.5%) attended physical exercise lessons once a week slightly above a third (35%) stated twice, while the most times physical exercise were mentioned by only (15.0%) of the respondents. Lastly (7.5%) stated that they attended the physical exercise lessons three times. Private schools had fewer reports on attendance of physical exercise lessons. This was because the students had many extracurricular activities incorporated in their school programme thus time slotted for physical activity was less. While in other schools they had to hire grounds thus limiting the number of times the children attended the lessons.
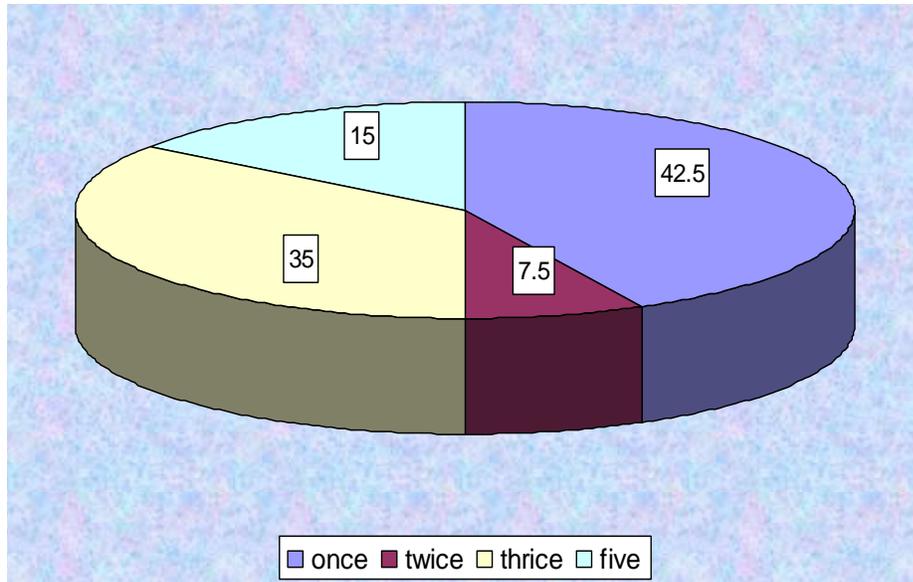
Figure 4.2: Number of times pupils attend physical activity lessons

4.2.4.3 Mode of transport to school

The pupils were asked to state their means of transport to school as shown in Figure 4.3 below. Most pupils used school transport (30.3%), followed by those who walked to school (29.5%) and those who used public transport were (23.7%) while (16.5%) used private means to school. A cross tabulation between school type and mode of transport indicates that majority of children (55%) from public schools walked to school while those attending private schools were only (3%) who walked to school. Majorities (96.1%) of children attending private schools used either school bus or were dropped to school by their parents. Most of the pupils in public schools came from poor socio-economic backgrounds. Thus they could not afford to pay school transport or public transport. They had to succumb to the long distances and harsh weather conditions to school.
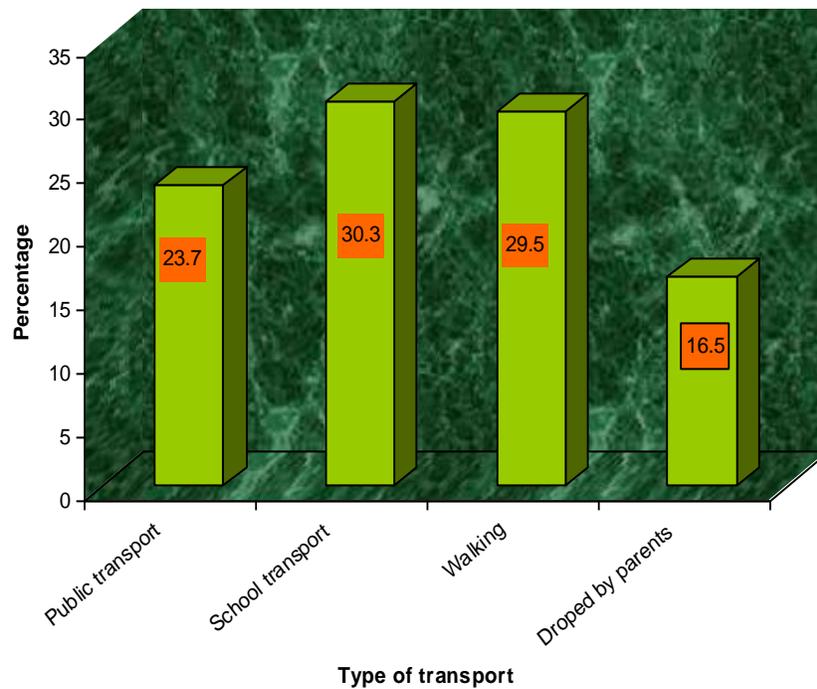
Figure 4.3: Mode of transport to school

The main reasons given for preference to be dropped to school were: increases in the level of insecurity, harsh weather conditions, enjoy the ride to school, to avoid being tired by the time they arrive in school and distance between school and home was quite long. Reasons given for preference to walk to school: To be physically fit, distance between home and schools were short and enjoyed each others company as they walked to school. Most of the children who watched television were taken to school by bus (38.5%) or dropped by parents to school (36.1%).Only 25% walked to school while those who engaged in household chores mainly walked to school (44%) While those who played a majority were taken by bus (39%) or walked (36%). There was

a significant relationship between means of transport and type of leisure activity. (x^2 = 18.690;df = 6; p<0.002)

4.2.4.4 How the respondents spent their leisure time

Figure 4.4 below indicates that majority of the pupils (34%) spent their time watching television, while (27%) played, playing computer games was represented by (22.2%) and only (16%) assisted in household chores. Majority of children from public schools spent their leisure time assisting in household chores (76.1%) and playing (67.8%). While children from private schools majority spent their time watching television (83%) and playing computer games (86.2%). Most of the children attending private schools came from affluent families, who can afford to employ a house help; who does all the household chores while they sit and watch television or playing computer games while snacking this predisposes them to gradual increment of body weight and eventually develop obesity or overweight due to consumption of empty calories.

There was a significant relationship between leisure activity and school type (x^2 = 90.178; df = 3; p<0.001).Males dominated computer games (52.3%), watching television (54.9%) and playing (57%).Household chores were mainly undertaken by females (68.5%).In the African culture girls are trained and brought up knowing their roles as home makers while boys are taught to learn their responsibility as providers. There was a significant relationship between how leisure was spent and gender of the school aged children. (x^2 = 16.263; df = 3; p < 0.001).This was further supported by the significant relationships that occurred between various leisure activities and type of snacks consumed.

TYPE OF LEISURE ACTIVITIES

PERCENTAGE

- Playing
- Playing computer games
- Watching TV
- Assisting in HH chores
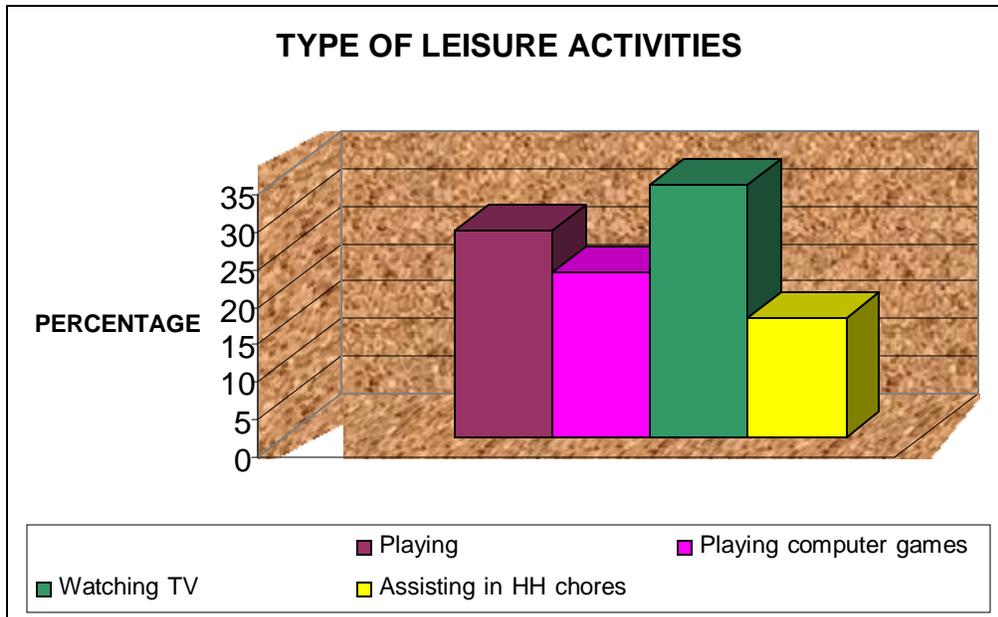
Figure 4.4 How children spent their leisure time

4.2.5 ATITTUDE ASSESEMENT

Issues studied in this section include: how children rated physical activity lessons, preference on means of transport to school, decision on snack to be carried to school and their participation in meal preparation.

4.2.5.1 Rating on physical activity lessons

Majority of the students in public schools (95%) valued their P. E while 5% did not. The main reason stated was that; they would have a chance to play their favorite game while others saw it as an opportunity to interact with their friends and a good proportion appreciated the fact that it would enable them to be physically fit.

The (5%) children who did not enjoy P.E lessons admitted they did not have passion for it. In private schools (75%) of the pupils sampled enjoyed P.E lessons because it gave them an opportunity to engage in their favorite sport and maintain physical fitness. The once who did not enjoy (25%) did not like P. E lessons since it made them tire very fast.

4.2.5.2 School children participation in meal preparation

Most children did not participate in meal preparation (60%) while (30%) occasionally assisted in meal preparation in their homes. Only (10%) participated sufficiently in meal preparation.

4.2.5.3 Decision on choice of snack to be carried to school

Among the children who made an independent decision on snack to be carried to school (71.6%) were from private schools (28.4%) from public schools. However for those whose decision on snack to be carried to school was made by their parents 75.6% were from public schools and (24.4%) cam from private schools.
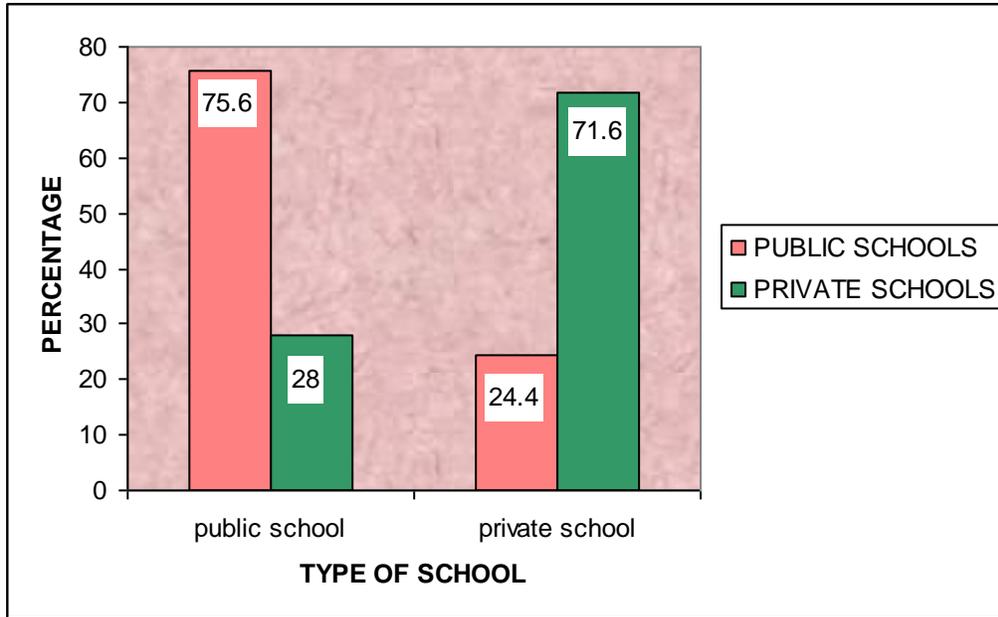
Figure 4.5: Decision making for food types to be carried to school

4.2.6. Prevalence of overweight and obesity

Table 4.10: Age Specific Cut-off Points for Overweight and Obesity

AGE (in years)	BMI cut of points for overweight		BMI cut off points for obese	
	Boys	**Girls**	**Boys**	**Girls**
5	17.2	17.15	19.30	19.17
6	17.55	17.34	19.78	19.65
7	19.92	17.75	20.63	20.51

8	18.44	18.35	21.60	21.57
9	19.10	19.07	22.77	22.81
10	19.84	19.86	24.00	24.11

Source: IOTF (2002) recommended cut-off points for overweight and obesity

BMI is an indicator of obesity, which is calculated using the following formula:

BMI = Weight in kg

    Height in meters (squared)

BMI it is the accepted standard of measure for overweight and obesity among children it has a strong association with body fatness and health risks (WHO, 2000)

It was calculated using the Epi-info computer package. The results were then categorized according to the accepted age specific cut-off points for children (IOTF, 2000) as indicated in table 4.13 above. In all categories of weight status there was almost an equal distribution of both male and female as indicated in table 4.3 below (27%) of the boys were obese while (26%) of the girls were obese. However there were more girls (27%) who were overweight than boys (20%) as indicated in table 4.4 below. A study conducted by (Malla, 2004) among pre-adolescent in private schools in one division in Nairobi Province Kenya indicated that the prevalence was 38.1% with more girls being obese than boys. (Sample of 120 was used).

The results concur well with (IOTF, 2002) results that indicate obesity is rising significantly in developing nations more so among the urban populations. This finding differs with IOTF study in Africa, America, Europe, and Asia indicated that the prevalence rate of overweight and obesity were the same. However in this study boys were found to be more obese than girls

especially those who were aged between 9-10 years though girls were more overweight than boys. This can be attributed to their eating habits as majority of the children consumed snacks that were dense in fats and carbohydrates and exhibited lesser levels of physical activity.

Table 4.11: Gender and Weight Status of School aged Children

SEX	BODY MASS INDEX						TOTAL	
	obese		overweight		normal/underweight			
	count	percent	count	percent	count	percent	count	percent
Boy	54	27	40	20	106	53	200	100
Girl	52	26	54	27	94	47	200	100
Total	106	26.5	94	23.5	200	50	400	100

4.2.6.1 BMI and school type

Table 4.15 below indicates that most of the children who were obese came from private schools (40.5%) same case to overweight (24.5%). Those attending public schools majority were in the category of normal or underweight (65%).While those who were obese were (12%) with (22.5%)

being overweight. However, the distribution of overweight students was almost similar by school type.

Table 4.12: Comparison on School type and BMI

BMI	SCHOOL TYPE				TOTAL
	PUBLIC		PRIVATE		
	Count	Percent	Count	Percent	
Obese	24	12	81	40.5	105
Overweight	45	22.5	49	24.5	94
Normal/underweight	131	65.5	70	35	201
TOTAL	200	100	200	100	400

4.2.6.2 BMI across the Various Class Levels

Most of the children were either normal or underweight consequently they dominated all the classes. The proportion of normal and under weight reduced from 56% in class 1 to 53% in class 2, 48% in class 3 and 43% in class 4. While those who were overweight most of them were in class 3 (32%), class 4 (28%) and class 2 (28%) and class on had the least with (19%). The proportion of children who were obese was consistent in class 1 and 2 (20%) while in class three t was 32% and in class4 it was 30%.

4.2.7 Relationship between obesity and independent variables

4.2.7.1 Relationship between leisure activity and obesity.

There was a significant relationship between leisure activity and obesity (x^2 = 4.094, df = 6, p<0.001). The findings of this study are similar to what (WHO, 2004) sited adoption of a sedentary type of lifestyle as among the major contributes that has led to the rise in the levels of obesity. It was observed that (42%) of children who spent their time watching television were obese and (37%) who played video games were also obese. The children who participated in household chores were normal or underweight. There was also a significant relationship between leisure time and school type (x^2 = 90.178, df = 3, p<0.001). Among children who played computer games (86.2%) and (83%) watched television attended private schools. Most children who attended public schools (76.1%) participated in household chores and (67.8%) spent their free time playing.

4.2.7.2 Relationship between mode of transport and obesity.

A chi-square indicated that there was a significant relationship between mode of transport and obesity (x^2 = 14.689, df =, 3, p<0.002). Majority of the children used either school bus or were dropped by their parents to school; a minority preferred to walk to school.

It predisposes the children further to weight gain for those who were using either the school bus or parents' car. In addition there was a significant relationship between leisure activity and mode of transport (x^2 =18.690, df = 6, p<0.003).

Most of those children who watched television or played computer games most of their free time were either using school bus or being dropped by their parent to school they were overweight or obese; while those who spent their free time engaged in household chores, mainly walked to school fell in the category of normal and underweight..

4.2.7.3 Relationship between physical activity and obesity

Pearson's product moment correlation was used. It shows that there was a significant but weak correlation between time spent on physical activity and obesity ($r = - 0.012$, $p < 0.048$) Obesity levels decreased with the increase in the amount of time spent on physical activity.

4.2.7.4 Relationship between food consumption patterns and obesity.

Nutrition is essential to health and quality of life at every age. A normal healthy child grows at a genetically pre-determined rate that can be compromised or accelerated by nutrition imbalance, over nutrition or under nutrition. The results of this study indicate that there was a significant relationship between dietary practices and obesity. There was a significant relationship between weight status and meal consumed for dinner ($x^2 = 71.123$, $df = 6$, $p<0.001$). Majority of the children (46%) who were obese took a balanced dinner; (38%) consumed meals for dinner that were high in calories, while those who were overweight (44%) consumed meals for dinner that were not balanced and (38%) and those who were in the underweight and normal category majority consumed balanced meals for dinner. There was a further significant relationship between weight status and meals consumed at break time ($x^2 = 62.82$, $df = 4$, $p<0.001$). The

children who were obese (85%) consumed foods that had a high caloric content; (51%) of those who were overweight also consumed foods that were dense in calories; while those who were normal or underweight majority did not carry or consume any food at break time.

It indicated that majority of the obese children (85.7%) consumed foods that were dense in calories and (51.0%) who were overweight also carried meals that were dense in calories. (47.3%) who fell in the category of underweight and normal, majority did not carry meals for break-time. There was a significant relationship between obesity and consumption of chocolates, baked items and fried items (x^2 = 25.280; df = 2, p = 0.001, x^2 = 52.603; df = 2, p = 0.001 and x^2 = 64.839, df = 2; p = 0.001) respectively. There was a significant relationship between meals consumed for breakfast and weight status (x^2 = 60.286, df = 6, p<0.001). (34%) of the children who were obese consumed breakfast meal that was high in caloric content; (61%) of the children who were obese consumed breakfast meal that were dense in calories and (69.7%) of the children who fell in the category of normal/underweight consumed meals for breakfast that was not balanced however, (15%) of them took breakfast that were dense in caloric content. Pearson correlation results indicated a positive correlation between number of meals consumed and obesity (r=0.5, p<0.038) Obesity levels were high with the increase in the number of meals consumed.There was a further positive correlation between amount of carbohydrates consumed and obesity (r = 0.4, p<0.003). Obesity levels increased with an increase in the amount of carbohydrates consumed.

4.2.7.5 Relationship between gender and obesity

There was no significant relationship between gender and obesity ($x^2 = 2.687$, df = 2, p>0.260). Thus alternative hypothesis was rejected.

4.2.7.6 Relationship between Socio- Economic Status and Obesity

T- test was used to test the relationship between socio-economic variable and obesity. There is a relationship between socio-economic status and obesity (p<0.003).This is indicated by number of pupils who obese majority were being from private schools. This was also clearly indicated by their dietary habits and levels of physical activity.

They consumed foods that were dense in empty calories and fats and engaged. Less in physical activity therefore easily succumbed to development of obesity. The findings of this study are not in agreement with (Latham, 1997), who states that in industrialized countries the prevalence of obesity is higher in individuals in low socio-economic groups.

This is in contrast with the situation in developing countries where the lesser obese rates are observed in low SES populations. However, further studies have indicated that high SES is positively correlated with obesity in developing countries. The higher the economic status the more money one has available to spend hence over eating of foods rich in fats and carbohydrates.

Chi-square test indicated a significant relationship between obesity and school type (x^2=49.626, df=2,p<0.001). Majority of the children who were obese came from private schools (41%) and

12% were from public schools. Children who attended public schools a significant number came from low income class

4.3 DISCUSSION

4.3.1 Introduction

Excess body weight has been viewed as signs of health and prosperity in most human history. Today however as standards of living continue to rise, obesity continues to pose greater threat to health of habitants of countries globally. Urban areas are experiencing higher rates of obesity. This can be attributed mainly to nutrition transition; for instance theirs more food prepared away from home and at lower price, use of private transport has increased, portion size of energy dense foods and drinks have increased and are more readily available Women are to busy working such that they do not have time to plan and prepare meals for their families, supervise their children eat and have a good time with their family. In general a good proportion of them have delegated the responsibility to their caregivers whom in most cases do not have any knowledge on nutrition. It is against this background that this study sought to find out the prevalence of childhood obesity and factors that influence its occurrence among children in Nairobi.

4.3.2 Factors that associated with occurrence of obesity

4.3.2.1 Consumption of foods that are dense in caloric content

Children gain more weight than height; body proportions begin to change as they get ready for the final growth spurt during adolescence, respondents in this study fell in the age category of seven and ten years. These shows that the children are still in the stage of growth and development. They require nutrients from all the five groups of food sources. However they require more energy sources to aide not only their growth and development but also to replace

the energy lost during physical activity. In most of private schools they did a commendable thing by offering a variety of foods from which the children could choose. 80% of the meals offered in schools were balanced however; certain foods offered were high in fats for example chips and sausages, burgers and pizzas such meals should be discouraged from schools. In public schools they did not have a range of food choices being offered at lunch hour. It mainly consisted of carbohydrate and protein nutrients though majority of the children took their lunch at home and a few bought from food vendors who came at lunch hour. It is estimated that each additional can or glass of sugars-sweetened drink that they consume everyday increases the risk of being obese by 60% (Wilson, 2000). Consumption of too much calories increases the chances of having excess body weight. Carbohydrates are the only fuel source for many vital organs. Digestive system breaks down carbohydrates and aides in its absorption in bloodstream through to the body cells.

Consumption of low carbohydrate diet does not help in loosing weight instead it deprives the body essential nutrients. It is more difficult to become obese by eating a very high carbohydrate diet than eating a very high fat diet. There are effective feedback and control mechanisms for regulating and balancing carbohydrate intake and oxidation. Whatever diet an individual chooses to adapt carbohydrates should not be eliminated it is required to metabolize fat. Individuals should choose carbohydrates that are unrefined or unprocessed i.e. whole grains, cereals, fruits and vegetables (Lissener,Levistly and Stropp,1998)

Proteins choose once that are low in saturated fat i.e. lean cuts of red meat, fish, lean chicken and pork or plant sources e.g. Soya and its products, legumes and tissue found on skin surface. It was found that women who have lowered fat intake have reduced body weight providing further

evidence of a positive association between fat intake and body weight (Salvaton, 2002). Protein consumed in excess of what is needed is converted to carbohydrate.

4.3.2.2 Poor eating habits among children

In this study the most highly consumed snacks was fried items which included: crisps, doughnuts, chips, sausages, smokies and samosa all this food items are dense in fat content which if consumed in excess will have a negative impact on health. 80% of the children from private school consumed them and 36.5% of children from public schools consumed fried items this is because children from private schools could easily afford those snacks unlike their counter parts from public schools whom majority could not due to financial constraints.

Chocolates were second most consumed snack was the same case as for baked items. Sweets were ranked third with majority being in public schools 62% and 28% were from public schools. This was the most affordable form of snack that children from public schools could easily afford to buy. Baked items were ranked fourth still a greater proportion coming from the private schools. Biscuits came last in the list and it was not commonly enjoyed in both the private and public schools with the increased rate of industrialization there are many brands of snacks that have been introduced in the market thus giving them a wide range from which they can choose. Majority of the children who were obese and overweight consumed highly chocolates, fried items and baked items. While those who were had normal weight and underweight mostly consumed biscuits and sweets. An analysis done on the diet of pre-school children in USA confirmed a positive relationship between dietary fat and energy density and the reciprocal relationship with carbohydrate (Gibson, 2000).

The frequency with which this snacks were consumed by these school children was rated as three times in a day or frequently. 60% of the schools visited had canteens in their compounds. Those found in private schools had a variety of snacks available unlike those once in public schools, which had limited food items. 40% of the schools that did not have canteens were very strict also on the type of snacks that the children carried it was common only in private schools. A study of snacking carried out by (Tiegge and Amersbury, 2000) found irregular snacking to be correlated with a raised risk of obesity among children in Japan.

The impact of snacking on body weight may also be influenced by type of food consumed as snack. Outside home most of the foods consumed, as snacks are often high in fat or high in carbohydrates, which can be in the form of sugars or starch. According to Marmoneir, isocaloric snacks were effective in delaying a request for a subsequent meal according to the principal macro nutrient in the snack: High fat and carbohydrate snacks delayed meal by about thirty five minutes while protein snacks delayed meals by about sixty minutes (Marmoneir, *et al* 2000). Good habits are best started early. Guardians should encourage their children to consume healthy snacks. Pack for their children healthy snacks such as: whole fruits, fresh vegetables, milk and its products, sandwiches, fresh fruit juices and sugar free biscuits. Consumption of water should highly be encouraged.

Let children adapt to a regular eating pattern and avoid random eating as this makes them to consume large amounts of junk foods and soft drinks that are dense in sugars and fat. In many countries worldwide individuals are used to taking three meals in a day. There is an increasing

habit emerging mainly in industrialized societies for more frequent and less well defined eating occasions in both adults and young people with increased snack consumption at more frequent or irregular intervals (Jahnsl, Siega and Popkin 2001). Children who were aged between nine and ten years most of them said that they ate frequently and it included both the snacks and meals. For example at 4p.m on their way home they would take a snack and on arriving home they would take a meal and during dinner they would also take whatever meal that was served.

This is an indication of very poor dietary practices. 47% of the children in both public and private schools consumed meals for dinner that was balanced but higher proportion were from the private schools. While majority from private schools took dinner that was high in calories and majority from public schools took meals that were not balanced. Dinner is the main meal of the day and should not be skipped. It gives an opportunity to share and talk about activities and events of the day. However children at this age are very choosy thus parents should ensure that they not only provide a variety of meals but also prepare and serve in an attractive manner to heighten their appetite. In most cases children may refuse to take the meals thus ensure that the afternoon meal is nutritious. 76% of the children in public schools consumed breakfast that was not balanced and 11% did not take breakfast while those in private schools 41% took a breakfast meal that was not balanced. 28% took breakfast meal that was balanced and 22% took one that was dense in energy.

Breakfast is a very important meal, which should not be skipped since it is the first meal of the day. Studies have shown that eating breakfast maybe associated with decreased snacking and fat intake later in the day (Wolfe, 1995). There was a significant relationship between meals

consumed for dinner, breakfast and school type. Breakfast is very important meal should not be skipped. It helps a child to stay active and concentrate at school. Thus parents should ensure that this first meal of the day is balanced.

Several factors influence children's food choice: High availability of a variety of foods this is indicated by the increased vending machines and canteens in schools, fast foods are located everywhere providing a variety of food choices at low prices. Routine: children and adults who eat regular meals tent to have better diets than those who eat randomly.

Marketing: there is an increased advertisement and marketing of snacks and other foods and also eating-places mainly put in an attractive manner to capture people's attention thus luring them to purchase. Emotions: Depression, anxiety, boredom and stress often lead to unhealthy eating habits in which an individual can resort to anorexia nervosa or bulimia. Knowledge of nutrition: Most children are not enlightened on matters regarding nutrition and their health (Westanhoefer, 2001).

The children made an independent decision on what snacks they would carry to school with (72%) and 28% of the children from private and public schools respectively. This is a clear indication of negligence among parents. They live their children to learn and make wrong food choices, which later will impact on their health. Sixty percent of the children never participated in meal preparation while thirty percent occasionally participated in meal preparation and only 10% participated in meal preparation.

Most of the parents are not being good role models to their children. Repeated exposure to certain foods influences a child's preference for that food. Thus if parents like buying ice-creams chances are high that a child will make the same choice. According to a Cornell University study indicates that children who ate sweets most likely parents to like consuming sweets. A young child's preference for snacks is related to what parents do or do not allow. There is a marked improvement in standards of living; both parents are working thus most of the roles for the woman is delegated to the house helps whom in most cases might not be relating well with the children. The food choices made in most cases may not meet the nutritional standards. Despite mothers having a busy schedules they should try and at least have time for their children: plan and prepare meals together go for shopping together with their children let them make choices of food with guidance, eliminate unhealthy foods from the house and avoid preparing high fat convenience foods. This will not only enable them to attain knowledge but also skills. This enables them to grow up into responsible individuals who value a healthy lifestyle.

4.3.4 Physical activity and leisure time activities

Energy expenditure like energy intake is an important factor in the development or protection against obesity. Physical activity not only uses up stored energy but also helps to stimulate muscle development. The more muscles one has the more kilojoules you can burn. Children in both the public and private schools had physical education lessons at least once in a week (period of 35 minutes).

However in public schools the frequency in attendance was quite higher compared to that in private schools most of them attended at least three times in a week. 98.3% of the children had a

positive attitude towards physical activity major reason being enjoyment of the activities they indulged in during the lessons while others it gave a break to that monotony of being in class for long hours. 38.2% of the respondents used school bus to school 33.3% were dropped by their parents and 28.5% walked to school. This high rate of motorized means of transport was attributed to several factors which include: increased cases of insecurity distance between school and home is quite long and most children did not want to get tired while walking to school. 80% of the children given an option preferred to be dropped than walking to school main reason; they did not want to get tired while waking to school. This is a clear indication of poor attitude or lack of motivation and emphasis of always being physically fit.

Parents and teachers have the duty to encourage and help their children develop a positive attitude towards engaging in physical exercises; for example: They as guardians should be role models by exercising regularly, watch their child/children as they play sports, involve them in a joint family outing where everybody participates in physical activity and assist them nature their favorite or identified sport talent in them if possible take them to professional matches so that they can get inspired by watching their sporting heroes in action.

Majority of the children from public schools walked to school mainly because the could not afford to pay for school bus or normal means of transport they had no option but to brave the weather conditions and insecurity cases and walk to school. Children should be taught both at home and in school the benefits of being physically fit. 31% of the children spend their leisure time watching television and playing (30%). Majority were boys while girls spent there time carrying out household tasks. This can be associated to the proportion of girls who were obese

being low. There was a significant association between those who watched television; played computer games and those who were obese. There was also a significant relationship between leisure and consumption of snacks for example fried items. Results from this study indicate that children who spent their time playing computer or video games and watching television highly consumed snacks. This was shown by the frequency in which they took the snacks which was rated as thrice or frequently. However children whom were actively involved in household chores consumed snacks less.

Multivariate studies have found that television viewing and playing video games for longer periods of time or not participating in sports outside of school promotes obesity (O'Loughin, *et al* 2001). The links between television viewing and weight gain may also be affected by other social factors for example the use of television as a child care substitute (Shannon, 1995.) The children complained on lack of field where they could play comfortably while others did not just like to interact with other children in the neighborhood this was a common response from the female respondents.

While others were restricted by their parents not to leave the house so they just resorted to watching television or played computer games. When children concentrate in television for long hours they not only get to learn of food stores but also they learn of the new products in the market. In most cases heavy marketing of energy dense foods often target children who are unable to distinguish between programme content and persuasive intent of advertisements. Parents should discourage eating and watching television as this increases chances of taking more calories than what the body requires. Furthermore they should restrict time spent on

sedentary activities and involve them in physical activity in the house e.g. cleaning windows, gardening, cleaning the car and tidying up their room. This particular stage in a child's life provides a perfect time for children to learn about healthy foods as they start a busy social life, being responsible and accountable for their actions and begin to choose their own lifestyle. They learn quickly therefore good habits are best nurtured at this level.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The purpose of this study was to investigate prevalence of obesity and factors that contribute to obesity among school aged children attending day private schools and public schools in Nairobi.

5.2 Summary of findings

The respondents were aged between 7-10 years of age a sample of four hundred was used. The number of times the pupils attended physical activity lessons varied. A good number of the respondents attended the lessons once in a week with a large proportion observed in private schools. The reasons given for this trend were: teachers had a lot to cover from the schools syllabus while others hired play ground thus limiting the number of times pupils attended physical activity lessons.

Teachers in public schools appreciated the importance of P.E lessons to children, since they were still young and growing thus they required enough time to relax and play. It was observed that in public schools they had big fields where children could play however they had few equipment and sports facilities. In most private schools that were visited they did not have field in the school compound however for those who did they were well equipped.

The respondents spent their leisure time indulging in varied activities. Children from affluent families in most cases are enclosed in their homes and are not allowed to mingle with the rest and play while it is the reverse for the children attending public schools.

The food consumption patterns of the children were found to be fairly good since majority of the pupils consumed food three times in a day while a third of the pupils consumed food once in a day: which constituted the three major food sources. However it was observed the snacks sold in the school canteen contained empty calories.

Overweight and obesity was prevalent among the children from affluent families unlike their counter parts from low- socio economic class whom fell in the category of underweight or normal. The prevalence of overweight was 23.5% while obesity was 26.5%.

5.3 Conclusions

On the basis of the outlined findings the following conclusions were drawn:

The incidence of childhood obesity has gone high which predisposes the child to certain chronic such as type 2 diabetes whose incidence among children is going up. Therefore as the prevalence of obesity increases and so does the prevalence of cormobidities associated with obesity.

The prevalence of obesity was significantly high among the low income class. Boys are at high risk of being obese and overweight compared to the girls. The more the amount of time spent on exercises the lower were obesity levels. The more the meals consumed in a day the higher the levels of obesity and the more the amount of carbohydrates and fats consumed the higher the levels of obesity.

5.4 RECOMMENDATIONS

Two sets of recommendations were drawn from the results of the study. It included recommendation for: practice and further studies.

5.4.1 Recommendation for Practice

In order to improve on healthy eating habits of children the study made the following recommendations:

1. Nutrition education should be provided to both parents and children on good nutrition i.e. wise choices when selecting meals and snacks.

2. Schools should promote physical activity by incorporating a variety of recreational activity and more time.

3. Schools should encourage healthy eating through training in practical food skills, adapting healthy nutrition standards for school meals and foods sold in their canteens.

5.4.2 Recommendation for Further Research

Similar study should be conducted both in rural and urban settings so as to offer a basis for comparison.

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APPENDICES

APPENDIX1: INTERVIEW CONSENT FORM.

This consent form must be signed by the clients to show willingness to participate in the study.

I am a student at Kenyatta University from the school of Health Sciences. I am carrying out a

Research on: **Prevalence and Risk Factors for obesity among school aged-children in**

Nairobi Province, Kenya. You have been chosen as one of the participants of this study. Please

assist me by answering the questions as accurately as possible. There will be confidentiality in

the information given. The information will be used for academic purposes only.

Thanks for your cooperation

I agree to participate in the study.

Signature……………………….

Date……………………………

Serial Number of the respondent

…………………………………….

APPENDIX 2. QUESTIONNAIRE FOR THE CHILDREN

(Prevalence and risk factors for obesity among school aged children in Nairobi Province)

I am LILLIAN A. ABALLA from Kenyatta University, pursuing a Master's Degree in Public Health. I'm interested in learning more about nutrition among children. I will ask you several questions about yourself. Thus am requesting you to answer these questions to the best of your ability. Whatever information you provide will be kept strictly confidential.

DEMOGRAPHIC INFORMATION

SCHOOL CODE…………………

Division in which the school is located………………………

1. Gender
    1. Male ☐

    2. Female ☐

2. Month and year of birth (   ) (   )

3. In which class are you?

4. What is your parents' occupation?

i. Father

ii. Mother

PHYSICAL ACTIVITY

5. Does the school offer time for physical activity? YES (   )   NO (   )

If yes how many times in a week?

Once   (   )

Twice (   )

Thrice (   )

6. What means do you use to school?

Public school (   )

Private transport (   )

School transport (   )

Walking (   )

7. What do you do at home during your free time /weekends /holidays?

Playing with computer (   )

Watching television (   )

Assisting in household chores   (   )

Playing (   )

8. Which is your favorite sport?

9. Are you given any pocket money? YES (   ) NO (   )

If yes how much pocket money are you given in a day?

10. How do you spend the pocket money?

11. Which type of snacks do you consume in a day?

Type	Quantity

1.	

12. Do you eat snacks in between meals? YES ( )   NO ( )

13. How many times do you eat in a day?

Once (   )

Twice (   )

Three (   )

Anytime   ( )

14. Are there times you go without a meal in a day? YES (   ) NO (   )

If yes which one.

ATTITUDE ASSESSMENT DATA

15. Do you enjoy your physical activity lessons? YES ( ) NO (   )

16. Given an option would you prefer to walk to school or to be dropped?

Give reasons for your answer.

17. Who makes the choice of snack to be carried to school?

Child (   )   Parent/Guardian (   )

APPENDIX 3

Observation Checklist Part II

The researcher will make the following observation.

1 (a) Presence of a school canteen

YES (   )

NO (   )

b) Items sold at the canteen.

2. Types of snacks children prefer buying.

3. Other sources of food e.g. outside catering.

4. Activities the children indulge in when in school.

5. Food preparation methods if school prepares food.

6. Quantity of food eaten by children.

7. Facilities the school has for the children to play with.

APPENDIX 4

Anthropometric Data Sheet

MEASUREMENTS	I^{ST} READING	2ND READING	AVERAGE
HEIGHT (CM)			
WEIGHT (KG)			

APPENDIX 5

Interview Schedule for Class Teacher's

 Instructions

 The interviewer will fill in or tick the appropriate answer

      1.   Gender

      2.   Teaching Experience

      3.   What subjects do you teach?

      4.   Which extra-curricular activity is majority of the class members involved in?

      ----

      5.   Are your pupils active in P.E

Yes (   )

No (   )

6. If No suggest reasons why they are not active.

7. Do pupils carry food and nibble in between lessons

Yes (   )

No (   )

b) If yes what kind of foods do they carry?

8. Physical activities who guides the pupils

Class tutor (   )

Games master (   )

Class prefect (   )

Nobody (   )