DIETARY HABITS AND NUTRITIONAL STATUS OF UPPER PRIMARY SCHOOL CHILDREN IN PUBLIC SCHOOLS IN URBAN SLUM COMMUNITIES IBADAN NORTH WEST LOCAL GOVERNMENT AREA

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CERTIFICATION

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ABSTRACT

The growing trend in the prevalence of malnutrition among school children has been associated with inadequate and improper dietary habit(s). Increasing evidence suggests that lifestyle and dietary habits have a lifelong correlation with the high propensity for contraction of chronic diseases such as obesity, coronary heart disease, hypertension, diabetes, certain types of cancer and death. There are few data available on the dietary habits and nutritional status of upper primary school children in public schools in urban slum communities in Ibadan. This study was undertaken to assess the dietary habits of Upper primary school children in Public schools in urban slum communities in Ibadan North West Local Government Area.

This study was a descriptive cross sectional study. A total of 422 primary school children in upper classes were recruited from fourteen schools in the four wards of the urban slums communities of IBNWLG using multi-stage sampling technique. A validated semi-structured interviewer's questionnaire with an in-built dietary diversity which was scored as low (1-3), medium (4-5) and high (≥6), food frequency questionnaire, anthropometric measurements were used to collect socio-economic data, eating habits, factors influencing eating habits, food frequency intake and physical observation, respectively. The WHO's Anthro-plus (2005) was used to determine the nutritional status of the school children. Descriptive and inferential statistics were employed in data analysis. Level of significance was placed at $p<0.05$.

The respondents' mean age was 11.47 ±1.25 years; 33.7% of the respondents were in primary six, 33.5% in primary five and 32.8% were in primary four. A total of 73.6% of the respondents had breakfast on the day of interview. 26.1% of those who have not had breakfast attributed it to having no money to eat. Hundred percent and (81.3%) of the respondents occasionally consumed snacks and soft drinks respectively The dietary diversity score in the group of the respondents were 40.1%, 53.8% and 5.2% as low, medium and good dietary diversity score respectively. There was a significant relationship between the respondents' socio-economic status and their dietary diversity. The Height-for-Age of the respondents revealed that a greater proportion (56.4%) of the respondents were stunted while (84.4%) of the respondents had normal nutritional status (BMI for age) and a few were undernourished (severely thin (3.1%), and thin (3.3%)

respectively). However, only a few were overweight (9.0%), and obese (0.2%) respectively. There was a significant relationship between the socio-demographic status age of the respondents and their nutritional status.

Poor dietary habit involved skipping of breakfast, high consumption of starchy staples and soft drinks and low consumption of fruits is common among the study respondents. Comprehensive nutritional interventions for students and their parents should be implemented in the primary schools in the study area.

Keywords: Nutritional status, dietary diversity, upper primary school, urban slum, environmental sustainability.

Word count: 457

DEDICATION

This project work is dedicated to the Almighty God for His unfailing love, infinite mercies, grace towards, and sustenance of me throughout this programme, I worship You, Lord. It is also dedicated to my beloved parents, Mr and Mrs Martin Ogbu and sister who stood by me through consistent prayers, support and encouragement.

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TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ACRONYMS

AI :	Adequate intake
BMI :	Body Mass Index
CBOs:	Community Based Organisation
DALY:	Global disability-adjusted life-years
DRIs:	Dietary Reference Intake
EAR:	Estimated Average Requirement
FAO:	Food Agricultural Organisation
FBDGs:	Food Based Dietary Guidelines
FF:	Food fortification
GDP:	Gross Domestic Product
HDL:	High-density lipoprotein
IDA:	Iron deficiency Anaemia
IDD:	Iodine deficiency disease
IMCI:	Integrated Management of Childhood Illness
INP:	Integrated Nutrition Programme
NAR:	Nutrient Average Requirements
NCDs :	Non Communicable Diseases
NFSC:	National Food Consumption Survey
NNSDP:	National Nutrition and Social Development Programme
NSNP:	National School Nutrition Programme
NSP:	Nutrition Supplementation Programme
MUAC:	Mid-Upper-Arm circumference
PEM:	Protein Energy Malnutrition
PSNP	Primary School Nutrition Programme
PUFAs:	Polyunsaturated fatty acid
RDA:	Recommended Dietary Allowance
RDI:	Recommended Dietary Intake
UL :	Upper intake level
UNDP :	United Nations Development Programme
UNICEF:	United Nations International Children's Fund
USAID:	United States Agency for International Development
WC:	Waist circumference

DEFINITION OF TERMS

Urban Slum: A densely populated usually urban area marked by crowding, dirty run-down housing, poverty, and social disorganization.

Upper Primary School: Middle Basic Education (class 4-6).

Body Mass Index (BMI): Body weight in kilograms divided by height in meters squared (kg/m2). This is used as an index of "fatness" among adults. Both high BMI (overweight, BMI greater than 25) and low BMI (thinness, BMI less than 18.5) are considered as malnutrition.

Malnutrition: Various forms of poor nutrition caused by a complex array of factors including dietary inadequacy, infections and socio-cultural factors. Both underweight or stunting and overweight are forms of malnutrition.

Obesity: Excessive body fat content; commonly measured by BMI. The international reference for classifying an individual as obese is a BMI greater than 30.

Overweight: Defined as weight for height above two standard deviations from the median weight for height of the reference population.

Stunting: Defined as height for age below minus two standard deviations from the median height for age of the reference population.

Underweight: Low weight-for-age is two standard deviations below the international reference for weight-for-age.

Wasting: Weight divided by height that is two standard deviations below the international reference. It describes a recent or current severe process leading to significant in emergency situations such as famine.

Z-score: The number of standard deviations (SD) below or above the reference median value

CHAPTER ONE

Introduction

1.1 Background tothe study

Nutrition plays a key role in health and development of an individual. Good nutrition protects the infants, children and mothers, strengthens the immune system and reduces the risk of non-communicable diseases related to foods. It also enhances the productivity of the population and can extinguish to a considerable extent the vicious circle of poverty and hunger (UNICEF, 2011). The nutritional needs of an individual require the consumption of an adequate diet. However, not everyone has access to optimal feeding. Inappropriate food habits linked to poor nutrients intakes are unable to cover nutritional needs of the body, thereby leading to malnutrition (Baneko, 2008).

Malnutrition remains the largest global disease burden among children in Nigeria (Ndukwu *et al.*, 2013). Early malnutrition can adversely affect the physical, mental, and social aspects of a child's health. This leads to underweight, stunted growth, lowered immunity, and mortality (FAO 2008). Malnutrition as a nutritional disorder occurs in humans and can cause destruction to one's health. It is caused by a lack, surplus or imbalance of nutrients in the body (Hasan and Zulkifle, 2010). According to Leenstra, *et al.,* (2005), malnutrition is a global and daunting health challenge and its warning signs are only visible during the advanced stage. Confirmation about severity also needs to be detected by suitable (biochemical) indicators (Faber and Wenhold, 2007).

The term malnutrition refers both to undernutrition and overnutrition. Undernutrition is perceived as stunting (short-for-age), wasting (thin-for height), and underweight (low weight-for-age), which is a consequence of consuming too few essential nutrients or using up and excreting them more rapidly than they can be replaced. Over nutrition which includes overweight and obesity results from high food intake, consumption of too much of the wrong things, lack of adequate exercise, high intake of vitamins or other dietary replacements. Both undernutrition and overnutrition are prevalent in low income countries and are associated to dire factors such as food paucity and unequal distribution of wealth throughout the world. The causes of malnutrition are diverse and particularly

interrelated to political, social, cultural and economic factors (Fotso, 2006). According to FAO (2006), more than 3.5 billion people in the world are suffering from malnutrition and hunger. Each year, estimated from 33 to 56% and lesser than five years, almost 9 million of the deaths of children are attributable to malnutrition (UNICEF, 2011). According to the World Health Organization, by 2015 prevalence of malnutrition worldwide will be 17.6% and a large number of the malnourished population will be from developing countries in southern Asia and sub-saharan Africa. In addition, 29% of the population will have stunted growth due to poor nutrition.

School children are also one of those severely affected by malnutrition, after infants and young children. The school-aged child is likely to spend a greater part of the day at school; therefore, increase in the number of meals eaten away from home, often at establishments where adherence to food safety measures is difficult may affect good nutrition (Shills *et al.,* 2006). Long term poor eating habits affect lifestyle and cause related chronic diseases including obesity, diabetes, cardiovascular diseases and some, cancers (Kobayassi *et al.,* 2010). The nutritional needs of the school-aged child are high because he/she participates in school group activities such as sports and recreational programs. When children are overweight, they are more likely to develop metabolic syndrome later in life (Vanhaha *et al.,* 1998). Various factors that contribute to obesity include physical inactivity, irregular and unbalanced diet and over-eating (Sugiura *et al.,* 2007).

Habitual dietary intake among children should be assessed to evaluate childhood dietary problems, thus enabling the correction of any bad dietary habits and consequences of malnutrition comprising essentially, the impairment of cognitive and learning capacities resulting in the quick and early drop out from school (Alaimo *et al.,* 2001; Sanokho, 2005, Victoria *et al.,* 2008). However, in young children, lifestyles and food habits change, which affects both nutritional needs and intake. There is also a high susceptibility to nutrition deficiencies. This is partially due to the fact that the development of eating disorders is very prominent during this time. Overweight and obese children are likely to stay obese into adulthood and more likely to develop non communicable diseases like Type 2 diabetes and cardio vascular disease. Adequate nutrition and healthy eating and

physical exercise habits at this age are fundamentals for good health in adulthood (WHO, 2011b)

1.2 Statement of the problem

According to the report given by the World Health Organization, in 2011 over 101 million school children were underweight (low weight for age), 165 million were stunted (low height for age), and approximately 52 million were wasted (low weight for height) (WHO, 2012). Consequently, estimates of the prevalence of malnutrition among school-aged children suggest that these indicators do not improve much with age. In 2010, according to the Growth and Assessment Surveillance Unit of the WHO, the global prevalence rate of malnutrition among school-age children (5-14 years old) as indicated by the prevalence of stunting, was approximately 28% (171 million children), with Eastern Africa suffering a higher rate of 45% (De Onis, 2011).

A major study of school-age children from developing countries found the overall prevalence of stunting to range between 48-52% with an overall prevalence of instances of underweight between 34-62%; the Standing Committee on Nutrition (SCN) notes that among school-age children stunting and underweight are more prevalent than wasting (Standing Committee on Nutrition, 2002). In addition, among this age group, the most significant micronutrient deficiencies include Vitamin A and Iron deficiencies (Standing Committee on Nutrition, 2002). Focusing on improving the nutritional well being of school-age children has the potential to reduce the severity of stunting, increase in weight and support cognitive function and possibly prevent the severe consequences discussed below (Acham, 2012; Standing Committee on Nutrition, 2002).

The consequences of malnutrition are severe and can have affects well into adulthood. A child suffering from malnutrition will undergo more frequent, long lasting, and severe illness than a child receiving proper nutrition. (Barrientos, 2011) In addition researchers attribute higher mortality (Barrientos, 2011, Olwedo, 2008) and an increased prevalence of stunting and wasting to the existence of malnutrition during childhood (Setboonsamg, 2002). Without proper nutrition during a child's development, he or she can experience delayed motor skills, lower cognition and school performance and detrimental effects on intelligence (Setboonsamg, 2002).

An adult, who suffered from malnutrition as a child, will have reproductive difficulties, diminished work performance and potentially unhealthy offspring. Also, being deficient in specific micronutrients or proteins can result in serious illness and disability, for example Kwashiorkor and Marasmus- both protein deficiency diseases can result in oedema, decreased muscle mass, change in skin colour, lactose intolerance and severe wasting of both muscle and tissue (Barrientos, 2011).

The menace of malnutrition among school children in Nigeria is high. According to Olumakaye (2008), the prevalence of instances of underweight among school children and early adolescents in Osun State is 20.1%. The findings of the study among school children in Makurdi by Daniel *et al.* (2011), reflects a seemingly high prevalence of malnutrition (31.3%) among the school children living in Makurdi. Undernutrition is the primary cause of specific nutrition deficiency that can result in muscle wasting, exophthalmia, scurvy, pellagra, beriberi, anaemia, rickets, goitre and a host of other nutritional problems among school children.

The most critical micro-nutrients missing from school children diets worldwide are iron, vitamin A, and iodine and more than one billion children mostly in developing countries are affected (Wardlaw, 2002). Household food insecurity is a situation of limited or uncertain availability of nutritionally adequate and safe foods (Bickel *et al.*, 2000). But, individuals in food-secure households may still have deficient or unbalanced diets.

School children's food choices, nutrient intake and overall nutritional status have been reported to be affected by factors such as the quest for independence and acceptance by peers, increased mobility, greater time spent at school and/or work activities, and preoccupation with self-image (Jenkins and Horner 2005).

Poor feeding practices with coarse foods and infrequent household foods in infancy and early childhood affect growth through adolescence resulting in malnutrition contribute to impaired cognitive and social development, poor school performance and reduced productivity in later life (WHO, 2006). Consequently, school children have a trend of skipping breakfast, thereby increasing their craving for snacking during the day (Mullie *et al.*, 2006). Lack of time to prepare food, lack of parental guidance on what to eat and

laziness are all reported as reasons for skipping breakfast (Mullie *et al.*, 2006) thus resulting in malnutrition.

Snack consumption between meals, with no consideration of the quality and nutrient content of the food is a common practice amongst teenagers (Klonaridou *et al.*, 2006). The most favourite snacks are food rich in sugar and fat (Oogarah-Pratap, 2007 and Klonaridou *et al.*, 2006) and this leads to poor balanced diet consumption (Hamilton-Ekeke and Thomas, 2007). Bassett *et al.* (2007) agreed with Mullie *et al.* (2006) that school children's diet lacks fruit and vegetables. Oogarah-Pratap (2007) and Casazza and Ciccazo (2006) confirm that little is known about diets rich in fruit and vegetables and their effect on reducing the perpetuation of non communicable diseases (NCDs), which according to WHO Global for the Prevention and Control of non-communicable diseases 2013- 2020, non-communicable diseases which are mainly cardiovascular diseases, cancers, chronic respiratory diseases and diabetes are the world's biggest killers.

To enhance the cognitive as well as the physical development of school children, the right quantity and quality of nourishment is needed because school age is a period of rapid development which requires increase ingestion of essential nutrients from foods to catch up with the developmental needs. Failure to fulfil this demand often results in varying degrees of malnutrition which have implication both on the health and academic performance (Ogunsile, 2012).

1.3 Justification of the study

The rate of morbidity and mortality of primary school age children will be drastically reduced with adequate nutrition (Feigelman *et al.*, 2011; Wardle *et al.*, 2002). The nutritional status of school-aged children impacts their health, cognition, and subsequently impacts the society. When a school-aged child is adequately fed the society's future is thus referred to be adequately secured because there will be reduction in the rate of morbidity and mortality measure of the society.

The Upper primary school pupils are usually between the ages of 9-12, some may be older due to late start of school. Thus, most of these pupils may be classified as early adolescents. The adolescent is considered especially vulnerable nutritionally because

there is an increased demand for nutrients related to the dramatic increase in physical growth, psychosocial and cognitive development. Moreover, the changes in their lifestyle and food habits affect both nutrient intakes and needs. There arealso special nutrient needs with participation in sports, useof drugs, development of an eating disorder and excessive dieting which are associated with adolescence (Mahan, (2000). (Williams and Schlenker (2003). asserted that both food and nutrition security promote optimum nutritional status and that both sexes of adolescents can be at risk of dietary excesses and deficiencies.

Additionally, healthy nutrition improves a child's well-being and learning ability, leading to better academic performance. Evidence shows positive links between children who are well nourished and improved learning, attendance, behaviour and consequently child-teacher relationships (The Food and nutrition policy for schools and Food Commission, 2001). Good nutrition also fosters mental, social and physical well-being, contributing to increased self esteem and positive body image.

In light of the above, this study will shed more light on the dietary habits and nutritional status of upper primary school children in urban slum communities. This study will also contribute to the growing literature on dietary habits and nutritional status since the studies examining Dietary habits and nutritional status of upper primary school children in urban slum communities in Nigeria is scarce.

This study will add value to the field of health promotion and education on dietary habits and nutrition and thus provide intervention through effectively communicating key health messages to large population groups, including youth, school staff, families and community members.

The research work will be an eye opener to the public on the immense effects of poor feeding habits among school children. The findings will aid the government to better understand the occurrence and undertake a policy reform support of the multiple benefits of healthy food and nutrition in school children and reinforces the need for these issues to be a high priority on school agendas.

1.4 General Objective of the Study

To investigate the dietary pattern and nutritional status of Primary school children in Public schools in the Urban –slum communities in Ibadan North West LGA of Oyo State, Ibadan, Nigeria.

1.5 Specific Objectives

The specific objectives of this study are:

- To assess the eating habits of the primary school children.
- To identify the factors that may influence poor dietary habits and nutritional status
- To determine the frequency of food intake and dietary diversity of the children.
- To describe the nutritional status of the respondents.

1.6Research Questions:

1. What are the eating habits of the primary school children?
2. What factors promote poor dietary habits and nutritional status primary school children?
3. What are the foods frequently consumed by the primary school children?
4. What is the nutritional status of the primary school children in selected schools?

1.7 Research Hypotheses

$H_0$1: There will be no significant association between the respondent's socio-demographic status and nutritional status.

$H_0$2: There will be no significant relationship between respondents eating habits and their nutritional status

$H_0$3: There will be no significant relationship between factors influencing poor dietary habits of the respondents and their nutritional status.

$H_0$4: There is no significant relationship between the frequency of food intake of the respondents and their nutritional status.

$H_0$5: There will be no significant association between the respondent's socio-demographic status and dietary diversity score.

CHAPTER TWO

Literature Review

2.1 Nutritional Needs of Primary School Age Children

Children need to eat a variety of foods within each group. Variety is important because nutrients need one another to function appropriately. Children also need a variety of nutrients for good health. Some key nutrients include: protein, thiamine, carbohydrates, riboflavin, fat, and calcium, Vitamin A, Niacin, Iron and Vitamin C (Kids Health Works, 2006). Escott-Stump and Earl (2008) described a proper balanced and adequate diet as a diet containing all essential nutrients in the correct amounts to meet the nutritional needs required for a person's life, maintenance, repairing, physical and mental development.

Energy or caloric needs vary depending on the child's current rate of growth, the amount of physical activity, and the child's metabolic rate. It is important children consume enough calories to ensure proper growth and spare protein from being used for energy. Children between ages 2 and 10 years require approximately 1300, 1800 and 2000 calories respectively (Burgess, 2000). School children therefore require combined protein from plant and animal product to supply daily protein needs e.g. beans and grains, beans and cheese, milk and grain. Table 1 shows the recommended daily dietary allowances for children at age 6 to 12years. The maximum level of daily nutrient intake that is likely to pose no risk of undesirable health effects for almost all individuals in the general population. However, as intake increases above the Upper Intake Level, the potential risks of adverse effects may increase (Story and Stang, 2005).

2.2 Macronutrient Requirements for School Children

Nutritional deficiencies have far reaching consequences, especially in school children and adolescent girls. To sustain life and maintain health, humans require different nutrients. Carbohydrates, proteins fats and fibre are known as macronutrients and are required in large amounts as they are energy giving foods (Story and Stang, 2005). Anyika *et al.*, (2009) noted that adolescents remain a neglected population; consequently, the needs of this group are often ignored. To ensure proper growth, development and maturation, adolescents need an adequate energy intake (Petrie *et al*., 2004). Story and Stang (2005)

referred to teenagers' basal metabolic rate, physical activity and pubertal growth as the factors influencing their energy needs.

2.2.1 Carbohydrates (CHO)

CHO (sugars, starches, dietary fibres) are the main sources of energy. CHO are found in abundance in foods of plant origin such as cereals, vegetables, legumes and fruits (Salas-Salvadó *et al.*, 2006). The adolescence period requires a higher energy intake owing to the rapid physical growth (Story, *et al.*, 2002; Elmo, 2009). Skeletal development, sexual maturation and growth spurts increase the demand for energy requirements, as well as replacing energy lost in physical and mental activities (De Sousa *et al.*, 2008). Physically active adolescents require additional energy to meet the daily caloric needs. The teenager's source of CHO includes soft drinks, milk, ready-to-eat cereal and sugary foods such as cakes, cookies, doughnuts, sugars, syrups and jams (Story and Stang, 2005). Adolescents' source of CHO and preference is energy foods high in saturated fat and salts with no nutritional value resulting in minimum consumption of balanced diet from all food groups (Goldberg *et al.*, 2009). Elmo (2009) recommended that family meals should be an opportunity for parents to demonstrate healthful choices and be an example of healthy eating.

2.2.2 Proteins

Proteins are building block of amino acids and are classified as complete (animal protein) and incomplete (plant origin) protein. The incomplete proteins lack one or more amino acids, therefore need to be complemented (two plant type proteins eaten together), when eaten to provide function necessary to perform. Protein sources from plants are legumes, nuts, grains and certain types of vegetables. Animal sources of protein are red meat, poultry, fish, eggs and milk. Protein is needed to maintain and build muscles, skin, bones, blood and repair worn out tissues to support growth, especially for the maintenance and development of lean body mass (Petrie *et al.*, 2004). School age children also use protein to build new tissues and fluids, replace lost amino acids, and protect the body against infection as fuel for energy.

School age children therefore require a combination of protein from plant and animal product to supply daily protein needs e.g. beans and grains, beans and cheese, milk and grain (Patarson, 1990). The national data as revealed by Story and Stang (2005) suggest that on average, teenagers consume twice as much the recommended intake of protein. According to (Institute of Medicine, 2003), 46g/d is the sufficient dietary requirement intake (DRI) necessary for growth and physique development.

2.2.3 Fat

School children's fat and sugar intake is a concern in many countries as it appears to exceed the recommended amount which can lead to excessive consumption and weight gain (Story and Stang, 2005). As a result, nutrition expert believes that by the age of 5 children should follow adult recommendations for the consumption of fat. These recommendations suggest that total fat intake for school age children should not exceed 30% of calories and saturated fat should account for no more than 10% of total calories. Cholesterol intake should not exceed 300mg/day (The world's healthiest food, 2006). School age children need fat especially essential fatty acids as it helps the absorption of some vitamins and makes meat less bulky. Gibbons (2002) recommends that 25% to 30% of total daily fat (kilojoules) should be derived from unsaturated fat and less than 10% of saturated fat. There is no Adequate Intake or Recommended Dietary Allowance set for total fat (Petrie *et al.,* 2004).

Dietary fat plays a significant role as an energy source and a significant cell structural component during the adolescent period. Relationships between fat and obesity have been reported, however, fruit and vegetable rich dietary intakes may have compound nutritional benefits (Gibbons, 2002). According to Nishida *et al.* (2004), 6-10% of daily energy intake should come from polyunsaturated fatty acids (PUFAs) as this type of fat has the ability to reduce the incidence of cardiovascular diseases (Joyce, *et al.,* 2008) have confirmed the existing relationship between dietary fat intake and cardiovascular diseases (CVD). The sources of saturated fat intakes mostly consumed by adolescents include milk, beef, cheese, margarine and foods such as cakes, cookies, doughnuts and ice cream (Story and Stang, 2005). High intake of saturated fat and cholesterol increases the risk of atherosclerosis and ischemic heart disease (Hu, 2010).

2.2.4 Dietary Fibre

The insufficient dietary fibre intake contributes to non-communicable diseases (Anderson, *et al.,* 2009). Adequate amounts of fibre not only lessen the possibility of the Non-Communicable Diseases (NCDs) but aids in maintaining normal blood glucose as well as bowel movement. There are two types of dietary fibre, defined by their physical behaviour in water. They include: Insoluble fibre and Soluble fibre, Cellulose, lignin and some hemicelluloses, abundant in wholegrain cereals gums, mucilage and pectin, contained especially in fresh vegetables, legumes and fruit, and the beta-glucans, present in oats, barley and some yeasts. Evidence has confirmed that ample fibre intakes have potential health benefits, in preventing Non-Communicable Diseases (NCDs) (Nishida *et al.,* 2004). A total of 14g/1000kcal is the Adequate Intake recommended for school children and adolescents (Institute of Medicine, 2003).

2.2.5 Water

Water is an essential nutrient and critical for the function of all organs for all ages and for maintaining good health in general (Kant and Graubard, 2010). Therefore, water intake should not rely on thirst alone. According to UNICEF (2006), water is a scarce resource which is subject to abuse and pollution, the most likely pollutant is human faeces that have not been disposed correctly. However, water is a necessity as the body cannot generate enough itself to fulfil its need and many metabolic reactions that occur in the body are dependent on it (Kondracki and Collins, 2009). Maintaining adequate water intake is necessary to replace water lost during perspiration especially in hot weather and during physical training (Negoianu and Goldfarb, 2008).

Insufficient water intake can cost lives and children need to be hydrated frequently, especially when there is an outbreak of fever or diarrhoea accompanied with vomiting. Severe dehydration of about 20% water loss in the body may lead to death (Kant and Graubard, 2010). Bourne, *et al.,* (2007) concludes that water is a healthy alternative compared to artificial and soft drinks, which are likely to add more and unnecessary kilojoules. Other researchers argue that water intake is not only referred to tap or bottled water but any fluids consumed as beverages and high water content food such fruits and vegetables.

2.3 Micronutrient requirements and food sources for school children

The nutritional status is often poor during early life and gets worse as growth spurt occurs. Micronutrients are vital for general wellbeing and each nutrient is essential as the deficiency of one nutrient may cause the dysfunction of the body. The micronutrients are required in smaller amounts compared to macro nutrients; they do not provide energy but are essential for good quality life (NICUS, 2003). Steyn *et al.* (2007) highlighted that the alarming (two billion) number of people suffering from micronutrient deficiencies in developing countries are mostly women and children.

The global progress reported 35% of people lacking adequate iodine in the world, 40% iron sufferers in the developing countries and more than 40% of children with vitamin A deficiency (World Bank, 2006). Micronutrient deficiency as articulated by Ma *et al.* (2007) does not only negatively affect the health of people, but also delays the social and economic development of the countries. The common nutrition problems affecting the youth population worldwide as stipulated by Shahid *et al.* (2009) include under nutrition, iron deficiency anaemia, iodine deficiency and vitamin A.

2.3.1 Vitamin A

The body tissues require vitamin A for growth and for repairing worn out tissue, as well as appropriate functioning of the immune system (Weingärtner, 2004). Rotondi and Khobzi (2010) reported vitamin A deficiency as a global health concern affecting about 250 million preschool children and many of these children go blind every year (Rotondi and Khobzi, 2010). Vitamin A is necessary for reproduction, growth and immune function (Story and Stang, 2005). The estimated average requirement for adolescents is 485 µg per day (Institute of Medicine, 2003).

Sufficient consumption is important for the prevention of night blindness, loss of appetite, measles and diarrhoea. Parasitic infections, for example, *Ascarislumbricoides* and *Giardialamblia* may interfere with the absorption thus affecting the status and the effectiveness of vitamin A (Nojilana *et al.*, 2007b). The best sources of vitamin A are animal source foods, in particular, liver, eggs and dairy products, which contain vitamin A in the form of retinol that can be readily used by the body. Fruits and vegetables

contain vitamin A in the form of carotenoids, the most important of which is carotene (Gopalan, 2008).

2.3.2 Vitamin B

Vitamin B such as thiamine, niacin and riboflavin help the body to burn nutrients to release energy, while foliate helps the body to grow and make healthy red blood cells. Food sources of these vitamins are meat, fish, liver, groundnut, milk, legumes, eggs, oil seeds, grain cereals, leafy vegetables, meal wheat, millet, bean etc. (King, 2000). The Estimated Average Requirement for vitamin B6 in this age group is 1.0mg per day (Institute of Medicine, 2003). The rich sources of vitamin B6 are fortified cereals, dried beans, liver, chicken, pork, fish, organ meats, milk, eggs, avocados, bananas and potatoes (Perveen *et al.*, 2009). 2µg per day is the dietary requirement of vitamin B12 (Cobalamin) for school children and adolescents (Institute of Medicine, 2003). Vegetarians as cited by Perveen *et al.* (2009) should consider other means for supplementation since vitamin B12 is not naturally present in plant food. Therefore, dietary deficiencies are likely to occur in individuals on a strict vegetarian diet. However, vitamin B12 is essential for red blood cell formation and nervous system function. They can be gotten from organ meats, meat, fish, eggs, poultry and milk etc.

2.3.3 Vitamin C

Vitamin C is crucial to produce connective tissue which binds the body cells together. The crucial role of vitamin C is the absorption of iron and in haemoglobin formation (Kabir *et al.*, 2010). The estimated average requirement is 56mg per day for vitamin C and 45µg per day for 9-13 year olds and 65mg per day for girls' ages 14-18 years. However, 10mg per day of vitamin C is known as a preventative dose for scurvy (Lykkesfeld and Poulsen, 2009). The readily available sources (90%) of vitamin C are fruit and vegetables such as guavas, citrus fruits, pawpaw, tomatoes, green and red peppers, spinach, cauliflower, bean sprouts. At most, school children' intake of vitamin C comes from ready-to-eat cereals, oranges and grapefruit juices (Story and Stang, 2005).

2.3.4 Vitamin D (Calciferol)

Shortage of vitamin D during teenage years may hinder bone mineralization and absorption of calcium in the small intestines (Sullivan *et al*., 2005). The intake of Vitamin D is recommended for calcium absorption and bone growth during childhood and the adolescent period (Gordon *et al*., 2004). Vitamin D is also essential as it helps the body to absorb and use calcium and phosphorus to build healthy bones and teeth (Burgess, 2000). Lehtonen-Veromaa *et al.* (2008) comment on the prevalence of vitamin D insufficiency in winter as compared to other seasons. The average intake of vitamin B12 for school children especially adolescent girls required is 5µg per day. Vitamin D plays a vital role in the maintenance of skin and membranes.

2.3.5 Minerals

School age children need minerals such as phosphorus (P) and calcium (Ca). Phosphorus and calcium are both essential for metabolism and formation of bones. Calcium is helpful in bones and teeth to help chemical processes and build tissues and fluids. Calcium is a mineral necessary for proper bone growth and maintenance of bone is between 500 – 1300mg/day of calcium for increasing bone density, which can help to prevent osteoporosis later in life. Although many foods contain calcium, milk is the primary source of calcium in the diet of children. Others include beans, peas, dark green leaves, finger millet etc. In addition, phosphorus is important for cellular function and in cellular structure. Shortage of calcium can be detrimental to life owing to the number of functions it performs in the body. The estimated average requirement of phosphorus required for adolescents is 1055mg per day (Institute of Medicine, 2003). They are found in egg yolk, meat, cheese milk wholegrain and cereals.

2.3.6 Iodine

The estimated average requirement for iodine is 95µg per day (Institute of Medicine, 2003). In countries like the USA and Europe, a considerable amount of salt is used during bread making to improve iodine status (Jooste and Zimmermann, 2008). Seafood is the most important source of dietary iodine, thus populations further away from the sea are likely to develop Iron Deficiency Disease, identified as the presence of goitre. In the

SAVACG survey, results indicated that at least 10.6% of the rural schools were iodine deficient (Witten *et al.,* 2004). The sources are iodised salt, seafood.

2.3.7 Zinc

The 7.5mg per day is the Estimated Average Requirement for school children and adolescents aged 13-18 years (Institute of Medicine, 2003). Zinc is fundamental in the normal functioning of the immune system, essential for cellular division and growth. During pregnancy zinc is required for optimal growth and development of the foetus and for maternal tissue expansion (Chandyo *et al.,* 2009). Zinc deficiency is not receiving immediate attention, however, it contributes to high mortality rate in developing countries most probably because measuring zinc status is problematic as it is referred to as 'hidden hunger' (Stein, *et al.,* 2006).

2.3.8 Iron

Iron is also an important mineral needed by children to make haemoglobin for red cells, help other cells, replace lost red blood cells, build new tissue especially red cells. School age children have the highest needs per k body weight, because they are growing and building new blood and other tissues. The amount of iron that a child needs each day depends on the availability of the iron in their food (Burgess 2000).

Table 1: The recommended daily dietary allowances for children from age 6 to 12

Nutrients	**6 – 8**	**8 – 10**	**10 – 12**	**10 – 12**
Kilocalories	2000	2200	2500	2250
Protein (g)	35	40	45	50
Vitamin A (µg)	400	400	500	500
Vitamin D (µg)	50	50	50	50
Ascorbic Acid (mg)	40	40	40	40
Folacin (mg)	1.3	1.3	1.4	1.4
Niacin(mg.equiv)	13	15	17	15
Riboflavin (mg)	1.3	1.3	1.6	1.16
Thiamin (mg)	1	1.1	1.3	1.1
Vitamin B6 (mg)	1	1.2	1.4	1.4
VitaminB12 (mg)	4	5	5	5
Calcium (g)	0.9	1	1.2	1.2
Phosphorus (g)	0.9	1	1.2	1.2
Iodine (mg)	100	110	125	110
Iron (mg)	10	10	12	18
Magnesium	250	250	300	300

Source: Food and Nutrition Board, National Academy of Sciences. National Research Council, Recommended Daily Allowances Revised 2000

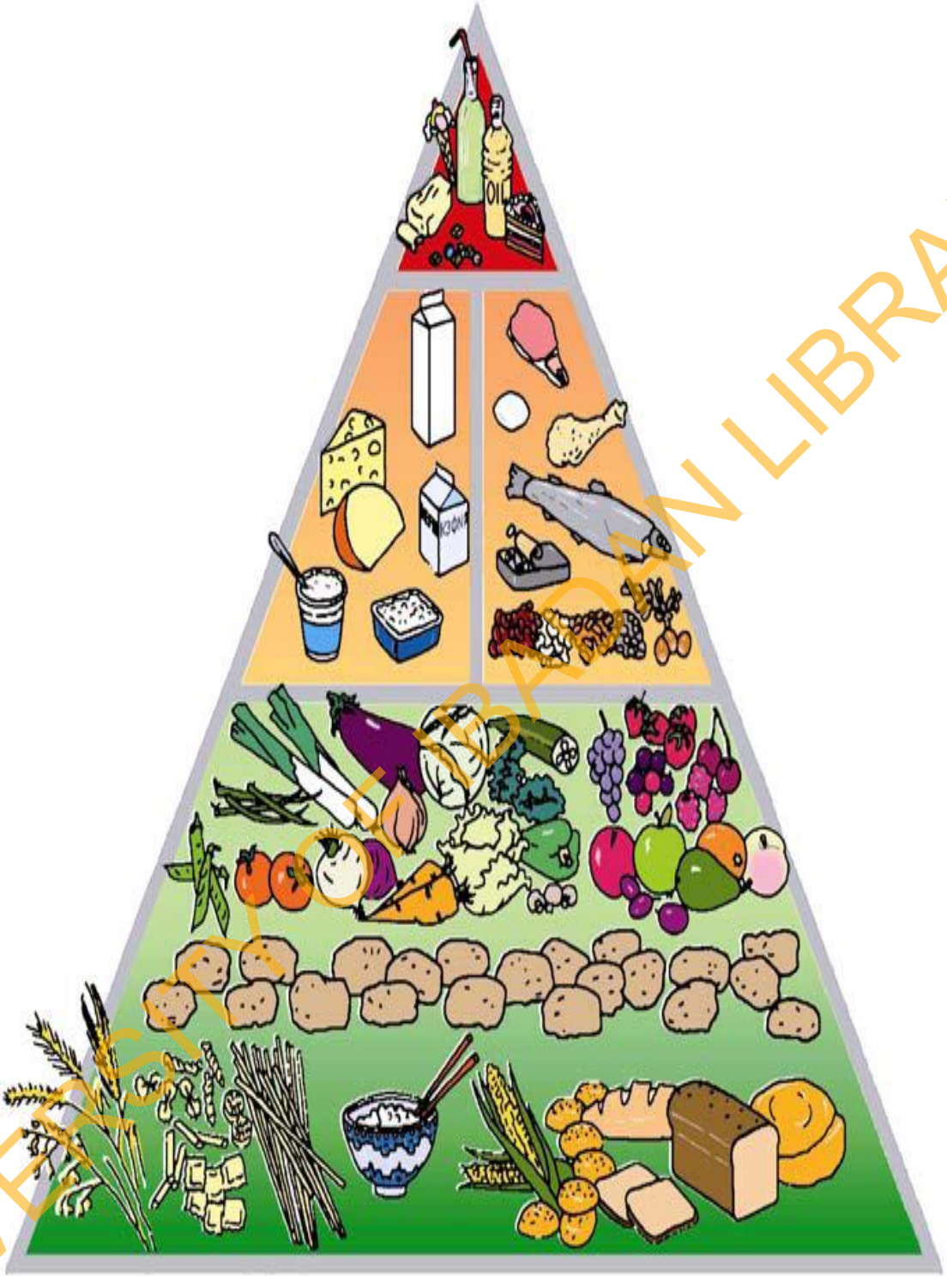

Figure 1: **T**he food pyramid adapted from Food and Nutrition Policy for schools (2011)

2.4 The Food Pyramid

A practical tool useful in the design of children's diets is the Countrywide Integrated Non-communicable Disease Intervention (CINDI) food pyramid, developed to assist in managing nutrient intake and food habits. The pyramid acts as a visual aid towards meeting the overall objective of the CINDI programme "to improve health by reducing mortality and morbidity from the major non communicable diseases (NCD) through interrelated collaborative interventions that prevent disease and promote health" (WHO, 2000). Incorporating the principles of Health, the CINDI pyramid is designed to guide food purchase and consumption rather than focusing directly on nutrients.

The pyramid uses a coloured traffic light scheme to aid the selection of food groups; green, orange and red representing 'proceeding', 'caution' and 'consider before eating respectively. It clearly illustrates the range of foods from the different food groups required by individuals of all ages, including children and adolescents. The different food groups ensure optimal nutrient intake. It divides food into four major categories:

1. Bread and cereal
2. Fruit and vegetables
3. Meat fish, poultry and alternatives
4. Milk and dairy products

An additional group indicated in the red section at the top of the pyramid, includes foods high in fat, sugar and salt, which should be minimized. Illustrating the variety and proportion of foods needed for a healthy diet, the CINDI guide not only helps individual food choices but also aids local, regional and national authorities in developing healthy eating strategies for mass catering institutions especially children's diets. Furthermore, it can provide a framework for educational activities and curriculum development that form an important component of any school food and nutrition policy.

Table 2.0: Recommended number of daily servings and portion sizes for ages 7-18years.

S/N	Bread and Cereals (Examples of one serving)		Meat, fish, poultry and alternatives (Example of one serving)		Milk and Milk products (Examples of one serving)	
	(Examples of one serving)	Portion size (grams)	(Examples of one serving)	Portion size (grams)	(Examples of one serving)	Portion size (grams)
1	Mashed, boiled, croquettes	84-98	Red meat(roasted): lamb, beef, pork and vegetarian meat substitute	42-56	Low fat milk	200ml
2	Jacket	112-170	Sausages	120-170	Custard	84-98
3	Chips, roast, other potatoes cooked in fat	70-84	Liver	70	Low fat yogurt	175ml(3/4 cup)
4	Sliced bread, rolls, baguettes	56-70	Cooked fish	90-160	Cheese	45
5	Pizza	84-98	Cooked dried peas, beans or lentils	250ml(1 cup)		
6	Cracker biscuits	42-64	Nuts or seeds	125ml (1 cup)		
6	Macaroni, spaghetti or noodles	100-180(cooked weight)				

Adapted from: Department for Education and Employment, 2000

Table 2.1: Recommended number of daily servings and portion sizes for ages 7-18years

Vegetables and fruits (Examples of one serving)	Portion size (grams)
Peas, green beans, sweet corn, carrots, cauliflower, broccoli	56-70
Cabbage, spinach, spring greens and other leafy vegetables	42-56
Baked beans, tinned tomatoes	70-84
Coleslaw	28-42
Vegetable soup	200-300
Fruits	50-100 (1/2 fruit)
Nectarines, mandarins, etc	100-200
Soft fruits, plums, strawberries	56-70
Stewed fruit: apples, rhubarb, gooseberries	56-100
Fruit salads	40-70
Fruit tinned in juice	70-115
Fruit Juice	100ml
Dried fruit	28-42

Adapted from: Department for Education and Employment, 2000

Providing children with a wide variety of food products throughout the week and offering portion sizes to match their energy needs, will ensure all the required nutrients are obtained. Offering a range of foods with different tastes, textures and colours will assist in satisfying small appetites. From age five to adolescence is a period of slow but steady growth. More active children and young people should be encouraged to have larger portions of bread, potatoes, pasta, rice or milky drinks in order to meet the extra energy need resulting from additional physical activity (The Caroline Walker Trust, 2001). Dietary recommendations maintain that at least 400 grams of fruit and vegetables per person per day are beneficial to health, protecting against chronic disease, illness and premature death. This translates to approximately five (5) portions per day – regardless of whether fruit and vegetables are frozen, fresh, chilled, canned or dried.

The WHO (2003) recommendation to reduce the intake of meat and animal products has given rise to concern about the possible risk of protein deficiency. This concern is unfounded, as protein recommendations (especially those agreed just after the Second World War) are now considered far too high; in some cases, nearly two to three times higher than current WHO recommendations. International recommendations now advise eating less meat than in the past, approximately two servings per day. Diets high in protein offer no benefits and can have a number of adverse effects. High circulating blood levels of amino acids may exceed the capacity of the liver and kidneys to metabolize and excrete excess nitrogen. This may lead to acidosis, diarrhoea and elevated levels of blood ammonia and urea. The high renal solute load associated with diets rich in protein reduces the margin of safety in maintaining water balance. High-protein diets are also associated with reduced kidney function (Knight *et al.*, 2003; Goldfarb and Coe, 1999). Over time, individuals who consume very large amounts of animal protein risk permanent loss of kidney function. The kidney-damaging effect is seen only with animal protein.

High protein intake is particularly dangerous for infants, as the kidneys are forced to excrete excessive solute loads. Excess protein intake in infancy could also be linked to the risk of developing obesity and high blood pressure later in life (Parizkova& Rolland- Cachera, 19973). The form of iron in legumes, including beans, peas and canned baked beans is not absorbed as easily as the one found in meat and fish.

Serving liver, once per week is a relatively inexpensive, effective way of preventing iron deficiency anaemia. However, despite being a good source of iron liver is not always attractive choice to children. To prevent iron deficiency, foods fortified with iron may be a more appropriate option, for example; breakfast cereals and bread. Care must be taken however regarding the added sugar and salt content of these items.

According to Food and Nutrition Policy (2011), depending on age, milk and milk-based products should be consumed between 2–4 times daily. Milk and products such as yogurt and cheese are valuable sources of calcium. In addition to dairy products, calcium can also be obtained from foods such as canned fish, which contain small bones that contribute calcium to the diet, and dark green leafy vegetables. Whole-grain or fortified cereals are also sources of small amounts of calcium. Calcium is particularly important for bone development during adolescence and reduce the risk of osteoporosis in adulthood.

The consumption of excessive amounts of food products high in fat, salt and sugar should be minimised to ensure the risk of chronic disease and development of dental caries is minimised. For instance, the use of sugar in food preparation as a preservative, thickener and baking aid results in many processed foods containing "hidden sugars. It is also important that soft drinks, i.e. soda, should not be excessively available at home or widely accessible to school children at schools (Kassem *et al.*, 2003). The 2003 WHO Technical Report recommended that no more than 10% of daily energy come from sugar. This recommendation is easily exceeded if high-sugar products are consumed on a daily basis.

Sugar substitutes, such as saccharin and aspartame, are artificial sweeteners are also added to foods to help them taste sweet. Most sugar substitutes neither promote tooth decay nor provide energy, and may be useful in diabetic or low-energy diets. However, they do contribute to a "sweet tooth" or liking for foods containing sugar. Not all substitutes, however, are low in energy (such as sorbitol).

Table 2.2: The Centre for Nutrition Policy and Promotion Suggestions for healthy snacks

S/N	7-18 YEARS
1	Any type of bread including white, brown, or wholemeal bread, fruit bread, crumpets, tea cakes, muffins, fruit buns, malt loaf, bagels, pita bread, cheese, scones, toast.
2	Sandwiches (also toasted) made with any type of bread
3	Plain biscuits such as rich tea, oat cakes, breadsticks, cream crackers, matzoz, rice, waffles, melba toast, crisp bread.
4	Home made plain popcorn, homemade oven baked potato crisps or sweet potato crisps.
5	Raw vegetables, e.g carrots, celery, cucumbers, and pepper, served with dips ie soft cheese, humus, yoghurt and cucumber, taramasalata, avocado, salsa and olive paste.
6	Fresh or dried fruit such as raisins, sultanas, apricot, dates and figs.
7	Dairy foods such as yoghurts, cheese, cubes, frozen yoghurt
8	Breakfast cereals (without added sugar)

Adapted: Centre for Nutrition Policy and Promotion, 1999

2.5 Dietary Habits and Nutritional Status of Primary School Children

Dietary Habits are habitual decisions individuals and culture makes when choosing what to eat. Increasing evidence suggests that diet and lifestyle in childhood and adolescence have a potential lifelong effect for risks of many chronic diseases such as obesity, coronary heart disease, hypertension, diabetes and certain types of cancer (Berenson *et al.*, 1998). The types of diet linked with chronic diseases are found to prevail before pubertal maturation, and children's dietary patterns change only marginally during pubertal development (Clavien *et al.*, 1996).

Childhood and adolescence are critical periods for health and development as the physiological need for nutrients increases and the consumption of a diet of high nutritional quality is particularly important. Eating habits, lifestyle and behaviour patterns are established during this period that may persist throughout adulthood. Patterns of eating have a significant influence on health and well-being. A healthy diet during childhood and adolescence reduces the risk of immediate nutrition related health problem and thus be at reduced risk of chronic ailments such as cardiovascular diseases, cancer, type II diabetes and osteoporosis in adulthood (Food and Nutrition policy for schools.,2006). Globally, most of the 20 million severely malnourished children are in South Asia and in sub-Saharan Africa, about 1 million of which die every year, the majority is never brought to health facilities (http://www.who.int/child_adolescent_health, 2009)

Research has shown that such diets have contributed to increased energy intake and consequently to increasing obesity in children and adults in this region (Sendi *et al.*, 2003). The dietary habits of school children and adolescents are characterized by low intake of fresh fruits, vegetables and milk and a high intake of carbonated beverages and empty calorie foods.(Flegal *et al.*, 2000). Musaiger and Gregory reported that Bahraini teenagers are a group most susceptible to unsound food habits which places them at risk of an adverse nutritional status (Musaiger *et al.*, 1998). Research from the findings conducted in Mauritius by Aurisinkala-Appadoo *et al.*, (2013) about breakfast consumption revealed that the majority of children took breakfast (92.1%) before coming to school. The most favourite snacks brought to school were found to be unhealthy foods, such as junk foods (salty corn-based snacks and chocolates) and

sweets. Only a small percentage of children brought healthy snacks such as dairy products (yoghurt/drinking yoghurt/cheese) or fresh fruits.

A study conducted in the United States by Wang *et al.,* (2010) to determine the dietary intake pattern of low income urban African American adolescents described their dietary patterns based on caloric intake, nutrients, food groups and diet quality. 382 African American school children were included in the study. The study revealed that there was a high energy intake among the participants with most of the participants consuming calorie dense foods as well as foods that are low in nutrients such as snacks, fried foods and sweetened beverage. They found out that more than half of the participants consumed one or more servings of sweetened beverage and fried food per day. Dietary patterns just like snacking often on energy dense foods are known to be common among adolescents of the developed countries (Dennison and Shepherd, 1995, Spear, 2002). The results also revealed that snacking rates were high with three quarters of the participants consuming snacks thrice or more times per day. Dietary patterns among the African American adolescents were unhealthy.

Jahns *et al.,* (1996) stated in his study conducted in United States that snacking is extremely prevalent among children and snacks play a vital role in fulfilling children's dietary requirements. Whereas the term “snack” may remind us of foods which are not eaten at regular times and makes a minor contribution to the daily intake. A recent study reveals that snacks play a vital role in provision of energy and nutrients needs (Sebastian *et al.,* 2008). In a recent study among Canadian school children, 13% of energy was provided by after school snacks and majority of school children snacked at least once daily (Gilbert*et al.,* 2012). In other studies, conducted in Scotland among school children revealed that 25%, 22% and 21% of daily energy requirements of children was provided by snacks, respectively (Skinner*et al.,* 2004; Macdiarmid*et al.,* 2009). In another word the part snacks play in dietary intake seems to be more important than providing only “empty calories” and therefore needs to be studied precisely.

In a study conducted among primary school children in Tehran by Amini *et al.,* (2014), it was discovered that snacks provided as much as 38% of total energy intake of the children. The overall contribution of snacks to total energy intake of the children was even higher than that of main meals such as lunch. The findings stated

that the role of snacks in supplying daily energy is much (almost twice) higher than other studies. Hereby, the importance of snacks as food items which provide about 40% of energy intake in primary school children is confirmed. Other data on the part of snacks in fulfilling the daily energy intake of children indicate percentages such as 1%, 16%, 20%, 23% and 25% (Adair *et al.*, 2005; Skinner*et al.*, 2004; Decarli*et al.*, 2000). A study in Canada snacks provided 597 out of 2624kcal of total energy.

In a study conducted in Jamaica by Vaughan *et al.* (2000), to determine the nutritional status of a cohort of 11-12-year-old school children and to ascertain social and demographic factors associated with under and overweight in early adolescence, results revealed that 10% of the participants had body mass index values below 5th percentile and were thus considered to be low as compared to other developing countries. A decline in the prevalence of undernutrition in developing countries has also been identified (Olumaikaiye *et al.*, 2010). The prevalence of underweight was rather high (19.3). In Nigeria, a study conducted by Olumaikaiye *et al.*, (2010) on food consumption patterns and the effects on body weight to determine the association between nutritional status and consumption patterns of adolescents in primary and secondary schools showed that more than half of the participants ate three meals daily. They realized that the rate of underweight was higher among those who did not take snacks twice a day in addition to their three main meals. They concluded that snacking was important in improving nutritional status.

Nutritional status is defined as the evident state of nutrition of an individual. A person is said to have a good nutritional status if he shows no evidence of malnutrition, whether open or latent. Nutrition is the aspect of science that interprets the relationship of food to the functioning of living organisms. It includes the uptake of food, liberation of energy, elimination of wastes and the biochemical synthesis that are essential for maintenance of normal growth and development (Laditan, 1998).

The nutritional status of any person is his/her health as dictated by the quality of nutrients consumed, and the body's ability to utilize them for its metabolic needs. This is due to their easy susceptibility to malnutrition and infection (Uppal *et al.*, 2005). Children in this age group require a high supply of nutrients since they are usually very active and their growth is rapid. Also during this period, under-nutrition in the form of kwashiorkor, marasmus, anaemia and xerophthalmia are not

uncommon (Ene-Obong, 2001). It has been estimated that approximately one out of every three school children is chronically malnourished and thereby subjected to a pattern of ill health and poor development in early life (UNICEF, 1998), with malnutrition being associated with more than half of all deaths of children worldwide (Sobo and Oguntona, 2006).

The nutritional status of children is an important determinate of child health (Okola *et al.*, 2003). Its assessment in groups of children is necessary in monitoring the health of a community, planning and implementing programmes to reduce malnutrition associated morbidity and mortality (Rabasa *et al.*, 1998; Osibogun, 1998). Primary school children form a sizeable proportion of our population (Federal Ministry of Health, 1991). So it is important to access nutritional status of school children. The nutritional assessment of these school children when they start school will help in detecting those various forms of malnutrition or the late effects of malnutrition. Ideally, every child should undergo routine medical examination while at school first at school entry, midway through school and at completion of school (Akani and Nkanginieme, 1999).

In a study conducted in Egypt, it was revealed that underweight is most commonly used as a composite indicator to reflect both acute and chronic undernutrition (Bose *et al.*, (2008). The results of the present study indicated that 10% of the children are underweight in comparison to (WHO/NCHS) reference population the percent of WAZ < −2SD for boys and girls less than 10 years was respectively and the prevalence of under nutrition particularly stunting is higher than underweight. Collectively, 53.2% of the students were <−2SD in comparison to WHO reference curves (Blössner *et al.*, 2010). The figure is similar to the findings of other studies on nutritional status of school children (Goon *et al.*, 2011; Som, *et al.*, 2007) but high when compared with others (Bamji, 2003; Gür, (2006).

Stunting measures cumulative deficient growth associated with the long-term factors, including insufficient dietary intake, frequent infections and low socioeconomic status. The relationship between stunting and gender varied while some studies demonstrated a higher prevalence among males (Senbanjol, 2011; Oninla, 2007). Others demonstrated a higher prevalence among females (Chowdhury, 2008). Consistent with other previous studies in sub-Saharan Africa (Semproli, *et*

al.,2007;Shaimaa *et al.*, 2013) in a study conducted among primary school children in Egypt showed stunting to be higher in male than in female children expect for the age group from 10 - 14 years. Boys from 5 - 10 years are more stunted. This has been explained by sex differences in genetic and biological makeup, with boys being biologically weaker and more susceptible to diseases than girls (Mikki, 2009). Also Shaimaa*et al.,* (2013)in a study conducted in Egypt discovered a decline in height compared to the NCHS reference peaked at the age group of (10 -14) years for both boys and girls, and this is similar to the finding among Zanzibari children. Pongou, (2013) and Shaimaa *et al.,* (2013**)** showed that the contribution of the milk/milk products, vegetables, fruits food groups fell far below the recommendation of food based dietary guidelines (World Food Programme, 2010). However, the findings are similar to a study done in the Eastern Mediterranean Region [EMR] (Chowdhury, 2008) which reported a relatively low consumption of vegetables and fruits in most of the developing countries and also another one done in Kenya (Ministry of Health., 2011; UNICEF, 2001). Children stunted at school age are likely to be exposed to poor nutrition since early childhood (World Food Programme (WFP) (2004). The high levels of stunting among boys could have been contributed to inadequate red meat intake among the malnourished children. Consumption of animal source foods was found to be associated with a decreased risk of stunting and underweight. A study that was conducted by Dror and Allen, (2011) reported that consuming animal source foods not only decreased stunting but also improved other anthropometric indices toward the reduction of morbidity and mortality among undernourished children (Dror, 2011). In this regard, the nutritional status of children in the developing countries should be emphasised not only for the improvement of health of children in the coming generation, but also for the overall development of the concerned region in the future.

2.6Factors Influencing Dietary Habits

School age is the time to learn and adopt healthy habits to avoid many health and nutritional problems later in life. Social factors influencing dietary habits especially in school children include, eating habits, food choice and meal patterns of young people reflect the weakening influence of the family and increasing Changes in eating habits can be associated with the need to express freedom from parental control and the

forging of identity. Independence can be expressed through increased consumption of meals (often take-away fast foods) outside the home or school setting. The various psychological, social and environmental factors that influence food preferences increases with age as children and adolescents are subject to an increasing array of developmental changes and influences outside the home (NHMRC, 2003). Several studies confirmed that NCDs are generally diseases of a lifestyle and kill more people than any other disease each year and can easily be avoided by the adoption of a healthy lifestyle (Keller and Lang, 2007).

Furthermore, the lifestyle diseases are expensive to treat and place a heavy burden on a country's health budget. Hossain *et al.* (2007) stated that 1.56 billion people are expected to have hypertension by 2025. Findings quoted by Naidoo *et al.* (2009) indicated that physical inactivity was the cause of non-insulin depended diabetes mellitus in the Western Cape.

According to Brown and Ogden (2004), eating habits acquired in childhood continue through to adulthood. The recommendations made by Etelson *et al.* (2003)encourage that parents play a role in shaping and monitoring dietary preferences and physically activity patterns of children at an early age for a future healthy lifestyle. According to Naidoo *et al.*, (2009), only 40% of SA children and youth engaging in little to moderate physical activity, less than 60% of high school learners participate in vigorous exercise and more than 30% are totally inactive. Rapid urbanisation as it happens in African countries caused the paradigm shift. As the lifestyle and eating patterns changes, the NCDs increase as high fat and sugar diet intake increases (Senekal *et al.*, 2008).

Children and adolescents experience peer pressure in many areas, including eating, and group behaviour becomes a norm (NHMRC, 2003). Important influences on children's attitudes and food choices include taste, parental attitudes (Brown and Ogden, 2004; Cullen *et al.*, 2001), schooling and the media marketing. Moreover, eating habits are strongly affected by cultural pressures. Many adolescents andchildren feel pressured into having an "ideal" body shape. The desire to be thin and the stigma of obesity may have a significant effect on body image and self-esteem in young people (WHO, 2004a).

Consequently, school children and adolescents at this stage; begin to gain some amount of control in decisions concerning their lives especially in their choice of friends and the kind of foods they eat outside their homes. Though they have the right to choose what they want to eat, there are other factors that family income has an adverse effect on child's health influence their choices, many of which can improve their choices or adversely affect them. Some of these factors that influence their choices of food include socioeconomic status of parents (specifically income and educational level of parents), peer pressure, cultural practices and advertisement. Based on WHO description (2001), one might consider the factors such as famine, starvation, fasting, economic instability, skipping of meals as potent reasons why one would not have enough food or eat less which will thus lead to bad nourishment and under nutrition specially. During such times, dietary patterns change.

Research over the past 30 years has shown that the cultural influences of slimness and dieting have become more influential in school children and adolescent populations. Dieting and other weight control methods have become well-known features of adolescent behaviour. Adolescents often find it difficult to classify themselves appropriately in terms of weight; the perception of overweight, rather than actual weight, appears to be a potent force behind weight concerns and dieting. Major gender differences are apparent in how female and male adolescents evaluate their bodies.

For many girls, the goal may not be normal weight, but underweight; whereas boys more likely to perceive themselves as underweight engage in weight-gaining (muscle-enhancing) activities. The HBSC report shows clear gender differences in young people with 36% of girls and 22% of boys reporting dissatisfaction with body weight. Girls' dissatisfaction increases with age from 28% in 11-year-olds to 42% in 15-year-olds, whereas the boys' remains static at 20% to 24% respectively.

2.6.1 Eating habit and disorders

The fundamental issues behind public health concerns for School children are the changes in food habits that have developed as a result of the globalisation of food. Over the past few decades' significant changes have taken place in eating habits and home environments. The increase in families with two working parents and time

limitations has led to the 'convenience revolution' with pre-packed processed products forming the basis of the majority of meals prepared in the home. The tendency to 'eat out' has also risen (St Onge, *et al.,* 2003). This was demonstrated in Finland where approximately one third of the population consume one meal per day outside of the home (Finnish National Nutrition Surveillance System, 1999).

The opportunity for children to learn and develop basic food skills at home are declining at the same time as cooking skills are being removed from school curriculum due to increasing time and cost factors. Many children and adolescents grow up without learning the basic skills of how to provide for a healthy diet. Eating out may be the only option for feeding themselves with which they are familiar, encouraging the consumption of large portions of meals and snacks with unknown calorific and nutrient content (James, 2002).

Mould *et al.* (2011) revealed that in a study in South Africa eating disorders were predominantly perceived to be a White, Western higher socio-economic phenomenon. However, as Western cultural values have been embraced, eating disorders appear to have become prevalent across racial, ethnic and socio-economic groups. The aforementioned authors further noted that black female school children are becoming more dissatisfied with the appearance of their bodies and have started to adopt unhealthy attitudes about being thin.

The consequence of food behaviour characterised with insufficient nutrient intake results in eating disorders such as anorexia and bulimia nervosa. An individual with anorexia nervosa has a relentless preoccupation with dieting and weight loss that results in severe emaciation and sometimes death (Gowers and Bryant-Waugh, 2004). Typically eating disorders begin during school age years, which progress to an out-of-control stage (Mould *et al.* 2011). It is a serious problem associated with premature death or life-long medical and psychosocial morbidity. More often, anorexic people avoid treatment and are unable to see the truth of the medical consequences of the disorder (Kaye *et al.,* 2009).

Also, snacking is often associated with skipping breakfast. Research has shown that skipping breakfast increases impulsive snacking on foods high in sugar and fat (Schlundt *et al.,* 1992), so the fact that on average only 69% of boys and 60% of girls

have breakfast every morning on school days might contribute to the extensive consumption of high sugar foods (WHO, 2004a). In addition, skipping breakfast leads to mid-morning fatigue and may interfere with learning (WHO, 2004a). The consumption of snack products high in energy, fat, sugar and salt may be responsible for the decline in fruit and vegetable consumption evidenced in recent research. Results from the WHO international study Health behaviour in school-aged children(2004) showed that on average fruit and vegetable consumption in children and adolescents is very low: only 30% of boys and 37% of girls reported eating fruit daily and less than 50% of all young people report eating vegetables daily (28% of boys and 34% of girls). In 16 countries and regions, over 25% of young people only consume fruit once a week or less. Moreover, the proportion of pupils eating fruit and vegetables on a regular basis decreases further with age.

In Israel, the Netherlands, Malta, Scotland and Slovenia, more than 40% of school-aged children consume soft drinks daily. Daily consumption is lowest in Scandinavia, the Baltic countries, Greece and Ukraine, but is still as high as 10–20%. Furthermore, almost one third of pupils eat sweets or chocolates once or more than once a day, with the highest percentages in Ireland, Malta and Scotland (WHO, 2004a). According to Food and Nutrition Policy (2011), dental caries are highly prevalent in school children. The most important dietary cause is sugar, particularly sucrose – found in confectionary, soft drinks, biscuits, cake, fruit juices, honey and added sugar.

The frequency of consumption as well as the total amount of the sugars consumed is important in the aetiology of caries (Sheiham, 2001). Furthermore, the rates of dental erosion, related to extrinsic and intrinsic acids, appear to be rising. This increase is mainly thought to be due to an increased consumption of acidic soft drinks (Moynihan and Petersen, 2004). Oral health is closely linked to diet and nutrition as poor dietary practices increase the risk of oral disease. Schools, by taking part in healthy nutrition initiatives which enforce healthy snacks or “no sugar” policies, can thereby at the same time promote children’s oral health (WHO, 2003a).

French (2005) commented that food most students purchased outside the school other than school meals are high in fat than food eaten at home. A related problem is that meals eaten outside the home tend to have a higher energy density with poorer nutritional quality and are served in larger portion sizes than food prepared at home

(Rodrıguez and Moreno, 2006; Story *et al.,* 2008). An increase of soft drinks consumption hugely contributes to daily energy intake and contributes to obesity (Wenhold *et al.,* 2008). Popkin (2006) commented that water and milk appear to be substituted by calorically sweetened beverages such as fizzy drinks. Wenhold *et al.,* (2008) associated long term low milk intake with shorter physique and poor bone structure. Presently, Story *et al.,* (2008) reported that Americans consume about 32% of their calories from food away from home and almost half (47.9%) of all food expenditures are spent eating out.

2.6.2 Food choice

According to Anderson *et al.* (2004), bad dietary practice in childhood will negatively impact on growth, development and diet related diseases. Individual behaviour to make healthy choices can occur only in a supportive environment with accessible and affordable healthy food choices. According to Alam *et al.* (2010), adolescents are not the sole decision-makers in choosing what is to beaten but parents, particularly mothers, often make decisions. Children need to be sensitized about diet and nutritional needs at an early age. Li and Wang (2008) described childhood and adolescence as a vital stage for the formation and attainment of dietary habits throughout life.

Adolescents eating choices have been known to be unhealthy with not much care on the effect it has on life (Bassett *et al.,* 2008). Story *et al.,* (2002) like many authors, consented that school children and adolescents' food choices are not meeting dietary guidelines, it consists of low fruits and vegetables, calcium rich food, yet rich in fat. Breakfast on mission and irregular meal consumption is another common habit among adolescents, consequently promoting inadequate energy and nutrient intake (De Chermont *et al.,* 2009). Mostly, Raschke and Cheema (2007) affirmed that dietary choices are dependent on the socio-economic status of the family, thus financial deficient populations have less access to high quality food.

The escape from traditional eating patterns has a negative impact on the economy and health considering the high level of fat and portion sizes served nowadays (Koletzo *et al.,* 2004). Parents as cited by Hamilton-Ekeke and Thomas (2007) as having a responsibility to cultivate eating habits which will form the basis for adult eating

patterns. However, the increasing demand of the labour force makes it difficult for mothers to monitor their children's eating habits (Bassett *et al.,* 2008). Parents may directly influence child behaviour towards eating by having control of what food should be offered (Jones and Fabrianesi, 2007). Neumark-Sztainer *et al.* (2004) recommend fruit and vegetables for children, however, that choice may restrict energy intake and adequate nutrition which is vital during the childhood phase for a well-developed physique.

2.6.3Socio economic factors

Socio economic status is known to be a great determinant of health and nutritional status as cited by Chen (1979) in his explanation of the factors that account for adequate nutrition and buttressed by WHO (2006a). According to him, the first factor is the adequate availability of food in terms of quantity as well as quality, which depends on socioeconomic status, food practices, cultural traditions and allocation of the food in the household. He stated the second factor to be physiologically related in terms of digestion, absorption and utilization the food. The main settings that influences the way children and adolescents grow up include families, neighbourhoods and schools.

The quality of these settings and whether they are supportive and nurturing or dangerous and destructive, have a profound influence on adolescents' chances for leading successful adult lives. Family income is perhaps the single most important factor in determining the quality of these settings (National Research Council, 1995) and the nutritional and health status of both children and adolescents. What is eaten by the family is solely dependent on the income of the parents. The socio-economic variables influence the school children' eating habits, lifestyle and social behaviour (Goldberg *et al.,* 2009).

Adamu *et al.,* 2013 stated that low income families tend to either purchase less nutritious cheap food items as a means to cope with the situation or reduce intake of food. The less nutritious cheap food items will certainly not meet the nutritional requirement of the household particularly the vulnerable groups of which adolescents are included. Therefore adolescents from low income families are more likely to have nutritional deficiencies than their peers. Moreover, children from poor and low

income families are more likely to have emotional problems, face both financial and non-financial barriers to adequate food, medical care and have limited care from their parent since much of their time is focused on earning income for the family.

Therefore, socioeconomic status of parent specifically income, have an adverse effect on children's health. This is supported by an updated study in the United States on the association between socioeconomic status (income) on health care and health status of school children (Newacheck*et al.*, 2003) which is in consistence with the findings of a study conducted by (Montgomery *et al.*, 1996; Bearman and Moody, 1999), which unveiled the effect of socio economic factors especially in the early childhood since it is a crucial stage of development, where a deficiency or any health problem that occurs is carried on to adulthood. Children from low income families suffer from worse health with different nutritional deficiencies and metabolic dysfunctions than children from high income families.

Case *et al.* (2002) findings on the relationship between family income and health status among toddlers in the U.S showed a positive association. Poverty is considered the prime factor determining food consumption; however, some researchers suggest that cultural factors play a stronger role than socioeconomic conditions in determining allocation of food and nutritional adequacy (WHO, 2006a) especially in countries where gender discrimination plays an important role in intra household food allocation. Parental educational level, in particular the mothers, showed the highest impact on the adolescents' health related dietary habits since they cook family meal. Mostly educated mothers are cautious of what the family eats than uneducated mothers.

2.6.4 Cultural beliefs, traditions and religion

Globalisation allows inhabitants to interact with different cultures and religions from all over the world. According to Mitchell (2004), culture is dynamic, continually changing and a difficult concept to define. Every culture has its own food preferences, eating patterns and style of cooking. Cultural groups often socialize teenagers to adopt certain types of eating habits. What people eat is determined by many factors, especially locally available foods. The cultural beliefs and nutritional related behaviours are intertwined and people automatically partake in purchasing and

preparing food in a traditional way in order to preserve traditions (James, 2004). Culture also influences when, how and which foods to be prepared. Special foods for special occasions are important to a culture's identity. Often, food choices and food habits are embedded in culture and religion. The cultural and religious beliefs determine what should be eaten in communities; however, the food chosen in a cultural perspective does not always provide the optimum nutrient intake required (Mbhenyane *et al.*, 2008).

Each tradition performs its own rituals that often involve food in terms of fasting, feasting or observing certain religious days. Food taboos exist in many cultural groups that prescribe what is to be eaten (Mbhenyane *et al.*, 2008). Culture is known to have both positive and negative influences on the kinds of food people consume. Many societies in Indonesia and parts of Africa partly ferment foods before consumption. Scientifically, fermentation is known to improve nutritional quality of food as well as reduce bacterial contamination (Marquis, 2007). Religious beliefs have great influence in many people. Some religions forbid certain foods, such as food of animal origin. In such instances, children are often socialised in a way to follow the belief system of the family. Other religious groups have certain superstitions and taboos about food such as the belief that fertilised eggs are more nutritious. So children growing up with such a belief will continue with this in their choice of food. Some churches forbid church members to eat certain traditional foods; others persuade members not to eat breakfast on Sundays in preparation for the Holy Communion (Viljoen *et al.*, 2005).

According to Kim (2007), religious teachings encourage healthy diet habits and an increase in physical activity as a form of worshiping God. Somehow people need to be encouraged and convinced that African traditional foods remain the best diet for good health and lowers the risk of food related diseases (Vorster and Bourne, 2008). Social and gender discrimination in countries like Pakistan shows that girls are served smaller amounts of food than boys and are completely deprived when there is insufficiency, whereas boys are served special and quality food. In addition to that, girls' health is often ignored and less money is spent on health (Anwer and Awan, 2003).

2.6.5 Lack of physical activity

The WHO Global Strategy on Diet, Physical Activity and Health recognises physical activity as one of the main risk factors for non-communicable diseases and consequently the burden of overweight and obesity. Particular attention is given to concerns regarding the unhealthy diet, lack of physical activity and energy imbalances in children and adolescents (WHO, 2004b). Physical activity is believed to be an important factor determining the weight of children.

Activity levels among children and adolescents are low. Sedentary behaviours, i.e. playing electronic games, are the general norm and are believed to be directly associated with obesity (Stettler *et al.,* 2004). In addition, inactive children and adolescents who consume small amounts of food may compromise the range of nutrients they consume and fail to meet requirements. To maintain a healthy weight, children and adolescents need to balance energy intake and expenditure. Increase in dietary fat intake and lower levels of physical activity have been attributed to the increasing levels of obesity, television viewing was associated with an increased risk for obesity, a 12% greater risk for each additional hour of daily.

2.6.6 Peer pressure

Food consumption in the school children and adolescent stage of life is influenced by many factors including media, financial feasibility, gaining new body image and many more. Adolescent years are a time when the adolescent tries to establish their own identity yet desperately seeks to be socially accepted by peers (Anyika *et al.,* 2009). Peers and friends can also play a role influencing each other's' food selection and behaviour or types of foods children and adolescents prefer to consume (Elmo, 2009). Basset *et al.,* (2008) said peer pressure, acceptance and conformity accelerate as teenagers assume independence in purchasing food away from home. Peer approval and identity compel teenagers to conform to the standard approved and acceptable to peers (Story *et al.,* 2002).

2.6.7Urbanisation

Urbanisation as described by Kimani-Murage *et al.,* (2010) is an episode that leads to nutrition transition that brings significant dietary changes from a traditional diet rich

in fibre and low in fat which originate from plant sources, to Western diets which are highly refined. Leon (2008) found, similar to Stamoulis *et al.* (2004), that urbanisation is associated with diet and lifestyle changes characterized by increased consumption of high calorie and low nutrient diet, ready-to-eat-food, high sugar and salt content food items which subsequently increases the risk of obesity and other NCDs as compared to rural diets. Currently, the world is undergoing the largest wave of urban growth in history as the level of urbanization is increasing in both developed and developing countries.

For the first time in history, in 2008 more than 50% of the world's population lived in the urban area and by 2030, it is estimated that the number of urban dwellers will reach 5 billion with urban growth concentrated in Africa and Asia (UNFPA, 2007) and it is projected that by 2050, 70% of the world population will be living in towns and cities. The scale and pace of urbanisation in Nigeria is not different as she is the Africa's most populous country with a population of about 162 million as at 2011 (World Bank Group, 2012). With such a large and quickly growing population, Nigeria may face different and perhaps greater challenges in dealing with rapid urbanisation and its associated adverse health outcomes including obesity than her neighbours (United Nations, 2008) as she experiences an upsurge of more large cities (i.e. those with over one million people) than any other country in Africa.

A well-established body of literature documents a strong link between urbanisation and obesity epidemic in Nigeria (Ekezie *et al.*, 2011) at four pivotal points. Namely: physical activity level, Social-Economic Status, nutritional and psychosocial factors etc. According to the WHO (2002), the societal change and nutritional transition are driving the high prevalence of obesity worldwide. Economic growth, modernisation, urbanisation and the globalisation of the food market are just some of the forces thought to underline the increasing trend of obesity (Drewnowski and Popkin, 1997; WHO, 2002).

Obesity has reached an epidemic proportion globally with more than 1.6 billion adults being overweight and at least 400 million of them clinically obese. This is a major contributor to the global burden of chronic diseases and disability (WHO, 2002; WHO, 2006). At the other end of malnutrition scale, obesity is one of today's most blatantly visible, yet most neglected public health problems (WHO, 2002). The

scourge of obesity is not restricted to developed societies alone, in developing countries, it is estimated that over 775 million people suffer from obesity related problems. Obesity contributes about 2.8 million deaths each year, risk of heart diseases, strokes and diabetes increase steadily with increasing body mass index (WHO, 2011).

For instance, in Nigeria, presently about eight million people are suffering from hypertension, 4 million are diabetic and 100,000 new cases of cancer are diagnosed each year (Chukwu, 2011). According to HERFON, about five million Nigerians may die of non-communicable disease (NCDs) by the year 2015, and diabetes alone is projected to cause about 52% of the mortality. Also, the economic cost of obesity related diseases in Nigeria is enormous. In 2005, it was about 400 million dollars, and by 2015, it is estimated to rise to eight billion dollars (HERFON, 2011).

The trend is almost the same in other developing countries of the world. In Indonesia and china, the incidence of obesity in cities is doubled than in country side, while in Congo, it is six times higher (Popkin, 2000) and in western Africa, it is estimated to be 10%, with the rates of obesity among women three times those found in men. In urban West Africa, rates of obesity have more doubled in the last 15 years (Abubakari *et al.*, 2008).

2.6.8 Food Insecurity

Food is an essential commodity for people to live sustainable and healthy lives. Food security is defined as access to nutritionally adequate and safe food for a healthy and active life. Food insecurity exists when the availability of nutritionally adequate and safe foods, or the ability to acquire foods in a socially acceptable way, is limited or uncertain (Life Sciences Research Office 1990). There is a direct relationship between food insecurity, hunger, and poverty. Also, studies have shown a direct relationship between food insecurity and malnutrition (Huet, 2012; Sean, 2012; Nalty, 2013). One of the contributing factors to food insecurity is socio-economic status. Limited income causes people to restrict the number and quality of meals they eat, reduce dietary variety, and look for inexpensively processed food. These options are usually low in essential nutrients and high in fats with empty calories (Nagataab, 2012; Sharkey, 2012).

Consequently, food insecurity can also be caused by a global crisis of high food costs which is devastating for the working population and has led to a reduction in the quality and the quantity of food. The rising food prices, particularly of maize, a staple diet of the poor South Africans, pose serious problems for the urban and rural poor habitants (Altman, 2009). In general, higher food prices have nutritional implications and are associated with increased the risk of malnutrition, especially among children (WHO, 2010). The 2007 financial crisis deepened the challenge of poverty and made poor and needy households poorer by further lowering the income and many lost jobs (Von Braun, 2009).

The UN Secretary General, Ban Ki-Moon, stated that economic hardship has made millions of people settle in vulnerable employment and increased the number of employed people who though employed cannot afford to provide for themselves and the families. Such populations rather buy cheaper food to eat without considering the impact it has health wise. Shortages of food due to food price increase may lead to reduced portion size and number of meals and reduced variety of food, poor nutrient intake and favouring certain household members over others for food consumption (Bhutta *et al.*, 2009).

The consequences of high food prices, is that when the basic human nutritional needs are not met, people become vulnerable to illness, schoolchildren's performance becomes poor and people become less productive (Brinkman *et al.*, 2009). In 2008, world prices of wheat, maize and milk tripled that of the beginning of 2003, and rice was a staggering five times higher, while beef and poultry prices doubled. In such circumstances families can reduce food expenditures by eating less, skipping meals; or switch to lower-quality food or less diversity diets (Cohen and Garrett, 2009). Between October 2010 and January 2011 the food price index increased by 15%. This crisis posed an increase in the undernourished population from 848 million to 963 million between 2003-2005 and 2008 (Von Braun, 2009).

Studies on the consequences of food insecurity show an association between food insecurity and lower cognitive performance, poor health, obesity, cardiovascular disease, and depression (Gao, 2009; Seligman, 2012; Derek, 2013; Lyles, 2013; Rahul, 2013). Therefore, food insecurity research helps characterise the impact of malnutrition on the quality of life. Increased food prices have made the situation

worse. Studies in Nigeria show prices for millet, maize, and sorghum have increased by about 100% to 200% since 2007, and, consequently, led to an increase in malnutrition, poverty, and threats to peace and stability (Cleaver, 2006; Monty, 2008; Olanike, 2007).

In Nigeria, few studies measure food security status of households, despite general beliefs that many Nigerians are food insecure (Sanusi, 2006; Olanike, 2007). Other studies have demonstrated that daily eating frequency was directly related to adequate carbohydrates, folic acids, vitamin C, calcium, magnesium, iron, potassium, and fibre intakes, while irregular eating was related to protein, total fat, cholesterol, and sodium intakes.

Reports also show that high intake of these nutrients could cause chronic health conditions (Dava, 2009; Liping, 2012; Mohamadpour, 2012; Popkin, 2012; Albertsona, 2013). The international covenant on Economic, Social, and Cultural Rights, adopted by the United Nations in 1966, formalized the right to food as a basic human right (Food and Agriculture Organization of the United Nations (FAO) 1996; Mamadou, 2006). A study in Lagos and Ibadan, Nigeria shows that household food insecurity is over 70 % (Sanusi, 2006).

2.6.9 Climate change

Theoretically, climate change such as floods and heavy rains, tsunamis and natural disasters are increasing and cause panic to populations to such an extent that people leave homes. Apart from disastrous effects, climate change has long term consequences on environment and agriculture (University of KwaZulu-Natal, 2011) thus the onset of famine. Climate change may cause a fall in agricultural yields by 50% in 2020 if no precautionary measures are taken (Rasouli, 2010). As climate change further increases climate variability, temperature and the risk of droughts and floods and threatens the agricultural productivity, and, production costs will rise (von Braun, 2009).

Climate change has led to displacement of homes which has resulted to the effect of dietary habits globally. For instance, South Africa as stated in the Situational Analysis of Children is still recovering from the effects of apartheid where black children were left without food, shelter and health services while families were destroyed by

political violence (UNICEF, 2009b). The shortage of food compels the population to wonder in search of greener pastures. Many of the very poorest people live in areas so remote that it was impossible to reach out to national and world food markets. Similar situations occurred for most Zimbabweans due to political and economic crisis (Carver, 2002).

2.7 Effects of Dietary Habits on the Health of School Children

The effect of dietary habits on the health of school children include:

2.7.1Malnutrition

As described by WHO (2001), malnutrition essentially means bad nourishment. It concerns not enough, as too much food, the wrong types of food and the body's response to a wide range of infections that result in mal absorption of nutrients or the inability to use nutrients properly to maintain health". In school age, there is high incidence of nutrition deficiencies and poor eating habits which expose them to many risk factors leading to the development of chronic diseases such as diabetes, osteoporosis, hypertension, heart diseases, chronic kidney failure, cancer and many others. The leading causes of mortality and disease burden include risk factors for communicable, maternal, perinatal and nutritional conditions such as under nutrition. They also include risk factors for non-communicable diseases and injuries such as high blood pressure and cholesterol, smoking, alcohol use and overweight and obesity which affect most regions (Lopez *et al.*, 2006).

They continue to further state that, "the ten leading causes of death in people between the ages of 15-59 are: diabetes mellitus, breast cancer, colon and rectal cancers, stomach cancers, cirrhosis of the liver, cerebrovascular disease, ischemic heart disease, trachea, bronchus and lung cancer, road traffic accidents and self-inflicted injuries" (Adamu *et al.*, 2011). From this it can be deduced that seven out of these leading causes of death can be directly or indirectly associated with diet.

Shih (2007) described malnutrition as the overall term encompassing undernutrition and overnutrition which is either shortage, excess or imbalance of body building and energy giving nutrients. When these nutrients are not consumed sufficiently, the body's ability to function efficiently is compromised, while the immune system

becomes weaker, resulting in the victim being vulnerable to diseases that may eventually lead to a premature death (Chesire, *et al.*, 2008). People suffer from secondary malnutrition, an illness that prevents proper absorption or digestion of food (Weingärtner, 2004). The DBSA (2008) stated that South Africa, like many other developing countries, is experiencing the double burden of disease as both under and over nutrition prevail.

2.7.1.1 Overnutrition

Overnutrition is the direct result of a high kilojoules intake together with a lack of physical activity (Kuzwayo, 2008) and the leading cause of overweight and obesity with serious implications of non-communicable diseases, such as type 2 diabetes, heart disease (HD) and hypertension (Kruger *et al*., 2005b). In countries experiencing 'nutrition transition', overweight and obesity are increasing problems in school-age child. Malnutrition is a major health problem in developing countries affecting 20% of all in the developing world, causing 50% of all child deaths globally. The main nutritional problems faced by a school-age child include wasting, stunting, underweight, anaemia, iodine deficiency and vitamin A deficiency (Khuwaja *et al.*,2005).

2.7.1.2 Obesity

Overweight and obesity have increased drastically among children and adolescents and are considered major public health concerns. Obesity has been described by the WHO (2006) as a global epidemic due to its high and increasing prevalence. Overweight and obesity is becoming increasingly prevalent in low income countries where improvements in socio-economic conditions and rapid urbanisation are causing a 'nutrition transition'. A rapid shift in the composition of diet (higher fat and lower carbohydrate), reduced activity patterns and a subsequent shift in body composition characterise this transition. Countries undergoing a 'nutrition transition' have high levels of stunting, which is believed to be a risk factor for obesity. This may be explained by the relationship of stunting to undernutrition.

In Europe, according to the International Obesity Task Force (IOTF), the prevalence of overweight and obese children rose from 9% in1980 to 24% in 2002, five points higher than expected based on trends from the 1980s. At present, it is estimated that

14 million school children in Europe are overweight, 3 million of who are obese (IOTF, 2004). Obesity has long term negative consequences on the health of children and adolescents (WHO, 2004a). Childhood obesity increases the risk of type Π diabetes, hypertension, cardiovascular diseases, certain cancers, arthritis and other disorders in adult life. Although considered adult diseases, type Π diabetes has recently been found in children, highlighting warranted concern over the need for preventative action. It is suggested that the increased risk of obesity among stunted children will lead to considerable problems with obesity in children in low income countries over the coming decades (Sawaya *et al.*, 1998).

In Sub- Saharan Africa and in South Asia obesity is rare. However, in the more developed countries of Latin America, the Middle East, Central Eastern Europe, the Commonwealth Independent States and North Africa, obesity is as prevalent as in the United States. Northern Africa and Central America, areas undergoing rapid nutrition transitions, have both problems of stunting and overweight among children. In school-age children, the following has been observed: in Chile, 20.7% of school-age children were reported to be overweight and 13.5% obese in 1995. (Kain *et al.*, 1998).

A representative study of 10 to 13-year-old school children from both private and public schools in the urban area of San Jose, Costa Rica found that the prevalence of overweight was similar in both groups; with 31% overweight (85th to 94th percentile BMI reference curves). These findings suggest that overweight is equally a problem among children from lower income families as among children from families with higher incomes (Monge *et al.*, 2000). In a cross sectional study of school children 9 to 16 years old from a low to middle income town in the Mexico City area, found that 24% of the children were obese i.e. obesity was defined as greater than 85th percentile BMI reference curves (Hernandez *et al.*, 1999).

A longitudinal study of 2,252 primary and secondary school children in Hat Yai, an urban area in Thailand, found that overweight in males increased from 12.4% in 1992 to 21% in 1997, however, the percentage of overweight in females decreased from 15.2% to 12.6%. Over the 5- year period of the study, children who were overweight during childhood were 12 times more likely to be overweight during adolescence than their non- overweight classmates (Mo-suwan, *et al.*, 2000). The most important long-term consequence of childhood obesity is its persistence into adulthood. It is

estimated that 50–80% of obese teenagers will remain obese adulthood (Guo *et al.*, 2002; Lissau *et al.*, 2004). Overweight and obesity in young people have been shown to be significantly associated with long-term morbidity and mortality, especially in the development of chronic illnesses, i.e. cardiovascular disease, cancer and type II diabetes.

2.7.2. Undernutrition

Also according to de Onis *et al.* (2004) as cited by Lopez *et al.* (2006), "Undernutrition is the single leading global cause of health loss, as it was in 1990 (the 2001 results disaggregate under nutrition into underweight and micronutrient deficiencies)". They continue to state that even though the prevalence of underweight has decreased in most regions in the past decade, it has increased in Sub Saharan Africa. From their research conducted in Sub Saharan Africa to determine the leading causes of death in the region.

Chalapati *et al.* (2006) also buttress this point in their statement that "the results suggested that malaria, diarrhoeal diseases and malnutrition were the leading causes of death among school-age children". Undernutrition has been an inherent characteristic of impoverished populations throughout the world. Extensive research clearly indicates that diet plays an important role in the prevention of chronic diseases. Undernutrition is a condition where there is insufficient food intake to meet energy and nutrient needs (Reddy *et al.*, 2008). Undernutrition as explained by Shekar *et al.* (2007) exists as a result of food deficit and lack of dietary diversity. The most recent report by U.N. Food and Agriculture Organisation is that 925 million people are undernourished (Halweil and Nierenberg, 2011). Factors associated with undernutrition have serious effects on child brain development and intelligence level (World Bank, 2006). The outcomes of undernutrition can include irreversible changes in child development (Altman *et al.*, 2009). Other researchers described undernutrition as a 'hidden hunger' indicating that most of the time the sickness is undetected (Faber and Wenhold, 2007).

According to Vieira, do Carmo Castro Fransceschini, Fisberg and Priore (2007), poor nutrition compromises the functioning of the immune system making the sufferer vulnerable to infectious diseases and limiting the body's ability to absorb nutrients

appropriately. The consequences of undernutrition are perceived in premature death of children due to malfunctioning of the body system (Halweil and Nierenberg, 2011). Thus De Onis *et al.* (2004) made an announcement for quick reaction to be taken in reducing children's death. Worldwide, undernutrition prevalence is perpetuated by political violence, food insecurity, diseases and provincial and national government failure to deliver basic human needs (Hoffman and Lee, 2005). In the years 2000-2002, approximately 852 million people were undernourished globally (Müller and Krawinkel, 2005).

Undernutrition is defined as a Z score value below -2SD and severe undernutrition as a Z score value below -3SD. Child undernutrition can manifest itself in different ways, depending on the cause, severity, and duration. The three main measures of child under nutrition are stunting, wasting, underweight (Von Grebmer *et al.*, 2010)

2.7.2.1 Stunting, Underweight and Wasting

Stunting and underweight are widely believed to occur mainly in early childhood (mostly by three years of age and above), and through a cumulative process. Children stunted at school-age are likely to have been exposed to poor nutrition since early childhood and the degree of stunting tends to increase throughout the school-age years. However, children can exhibit catch up growth if their environment improves (Frongillo, 1999). This suggests that interventions in school-age children can supplement efforts in the preschool years to reduce levels of stunting and related effects on children's health and education. The prevalence of stunting, underweight and wasting varies by region and sub region throughout low income countries. The Africa region has the highest estimated prevalence of stunting (20.2-48.1%) and has the lowest rate of improvement. In East Africa sub-region, rates of stunting are increasing.

The prevalence of stunting in Asia (32.8-43.7%) is also high, particularly in South Central Asia, although rates of stunting continue to improve throughout this region. In Latin America and the Caribbean, the prevalence of stunting is significantly lower (9.3- 24%) than the other two regions and is improving, except in the Central America sub-region (Frongillo, 1999). Stunting is also common in these countries (Russia, China, Brazil, and South Africa) affecting between 9% and 30% of all children and a

significant association was found between stunting and overweight status in all four countries (Popkin *et al.*, (1996).

Stunting has declined overall in Africa, from 34% to38%, however this progress is clearly not enough (UNICEF 2009). When looking at absolute numbers, the number of school children five years of age and above who are stunted has increased by nine million, largely due to the continent's population growth. Between 1990 and 2008, stunting rates declined significantly in the following countries: Mauritania (27% to 57%), Uganda (32% to 45%), Mozambique (44% to 55%), Ethiopia (47% to 64%) and Eritrea (38% to 66%) (Sanchez *et al.*, 2010). One study in Ghana compared the health of enrolled and non-enrolled children in primary school and showed that there were considerable differences between enrolled and non-enrolled children. Non-enrolled children of both sexes were significantly smaller in height than enrolled children of the same age range.

Just over half (51%) of children aged six to seven years who were not enrolled in primary school were stunted in comparison with only 19% who were enrolled in school. It is likely that many of the chronic health problems encountered in the six to seven-year-old children studied are the product of disease and poor nutrition before they enrolled in school (Fentiman *et al.*, 2001). However stunting is not just a rural phenomenon amongst urban school children, stunting is a significant issue in selected African countries with a high burden of undernutrition, although levels are not as severe as in rural areas (Demographic and health Surveys 2003-2008).

This is not just an issue of rich versus poor either; data collected from the survey carried out indicates that although undernutrition rates in sub-Saharan Africa are higher among poorer households, rates remain relatively high among the non-poor. In many countries in the region, more than 15% of the children in the highest wealth quintile are underweight. Improved household welfare in itself is not sufficient to eliminate undernutrition. The higher level of nutritional resources available to wealthier households must be used effectively through proper care if undernutrition is to be eliminated in such households.

In Africa, wasting rates are high and have not shown significant improvement overall. As Africa currently estimates 10% of children who are moderate to severely wasted,

whereas, South Asia rates rise above 15%. Nigeria (14%), Ethiopia (12%), Sudan (16%), the DRC (10%) and Egypt (7%) are among the ten countries with the largest number of school children with wasting globally (Sanchez-M, *et al.*, (2010). Of the top 20 countries with the highest prevalence of stunting, nine (9) are in Africa, ten (10) are in Asia, and one (1) is in the Middle East (UNICEF, 2002; UNSCN, 2009). Of the 36 countries with the highest burden of stunting amongst school children of under two years of age and above, 21 are in Africa and most of those have a prevalence of 40% or more children stunted (UNSCN, 2009). Wasting, which reflects acute malnutrition, is not as common as either stunting or underweight in school-age children. Nevertheless, wasting rates can change rapidly in situations of acute food crisis, with school-age children, adolescents in particular, becoming severely malnourished in such situations.

Recent studies on school-age children have shed new information on stunting, wasting and underweight for this age group. One of the largest studies of anthropometric status of rural school children in low income countries (Ghana, Tanzania, Indonesia, Vietnam and India) found the overall prevalence of stunting and underweight to be high in all five countries, ranging from 48 to 56% for stunting and from 34% to 62% for underweight. Second, in all countries there was a trend for z-scores for height-for-age and weight-for-age to decrease with age, thus as children got older they became progressively shorter relative to the reference population.

Third, the boys in most countries tended to be more stunted than girls and in all countries boys were more underweight than girls longitudinal study of changes in height and weight of school-age children on Pemba Island, Zanzibar showed the prevalence of stunting increased with age (14% prevalence in seven year olds increasing to 83% in 13 year olds) and peaked in girls at age 12 then declined when they entered their pubertal growth spurt. In boys, however, the prevalence of stunting rose steadily up to age 13 years and then slowly declined. Boys accumulated a height deficit of 11.9cm and girls a height deficit of 8.5cm compared to the reference population (Partnership for Child Development (1998).

2.7.3 Protein Energy Malnutrition (PEM)

The most life threatening form of malnutrition is severe protein energy malnutrition which is further broken down into three categories: kwashiorkor, marasmus and marasmic kwashiorkor (Beck, 2007). While poor growth can be due to a variety of nutritional deficiencies and underlying diseases, an insufficient intake of protein is thought to be the most important cause. As described by Müller and Krawinkel (2005), PEM is the imbalance of nutrients supplied and nutrients requirement needed to support growth. A diet lacking in macronutrients (energy rich foods) carbohydrates, protein and fats (which are required in large quantities by the body) leads to PEM (Shih, 2007). PEM is a problem particularly existing between the ages of six months and two years, and coincides with the period of most rapid growth and mental development in children.

Most children suffering from energy malnutrition are likely to be stunted or wasted teenagers (Anwer and Awan, 2003). The school aged children are the vulnerable group mostly affected by PEM and physical retardation and mental development are often reported with either non-enrolment or inability to finish school (Chesire *et al.*, 2008). To maintain a healthy balanced diet, the energy giving nutrients should be consumed in correct proportion. The symptoms of PEM manifest itself in children younger than 2 years old as a result of early weaning practices, absence or a low protein diet (Müller and Krawinkel, 2005). Protein energy malnutrition can result in marasmas and kwashiorkor, hence, in Burkino Faso, misola and spirulina have been used to improve the status of undernourished children (Simpore *et al*., 2006).

Kwashiorkor (oedematous malnutrition) is defined as protein energy malnutrition with the presence of oedema due to a diet deficient in protein (Beck, 2007). Oedematous malnutrition is not easily detected due to swelling as a result of water retention under the skin (Nyeko *et al.*, 2010). The victim will be irritable, withdrawn and have a poor appetite. The skin will have patches and later crack and peel off (WHO, 2008b). Marasmus **(**non-oedematous malnutrition), the child's body is severely wasted to the extent that the internal organs are too weak to function, bones and skin become visible as a result of muscle and fatty tissues loss. Body weight may be reduced to less than 80% of the normal weight for the height (WHO, 2008b). Diagnosis is seen through subcutaneous fat and muscle loss. Children with marasmus

have a thin, wasted appearance with minimal body fat and a WHZ below -3SD and tend to have a good appetite when offered food (Beck, 2007). Marasmus is different from kwashiorkor; however, in cases of severe undernutrition features of both are apparent (WHO, 2008b). The marasmic kwashiorkor is characterised by wasting and oedema, hair and skin changes, triangular face and an extended abdomen (Müller and Krawinkel, 2005). PEM is also prevalent amongst women at child bearing stage; the effect is seen in low birth weight as a result of maternal undernutrition (Shekar *et al.*, 2007).

2.7.4 Micronutrient Deficiencies

Micronutrient deficiencies affect nearly two billion people worldwide (WFP, Ethiopia Country Programme Mid-Term Evaluation 2003-2006). Micronutrient malnutrition affects all age groups, but young children and women of reproductive age tend to be among those most at risk of developing deficiencies. Micronutrient malnutrition affects all age groups, but young children and women of reproductive age tend to be among those most at risk of developing deficiencies. The micronutrients consumed in small amounts by South African children may have the negative impact on the children's growth, development and general health (DBSA, 2008:22). Micronutrient deficiencies as mentioned by Cogill and Richardson (2008:27) occur when individuals have inadequate access to essential micronutrients or when the human body becomes unable to absorb or retain micronutrients due to disease or infection. Noted by Black (2003:79) is that micronutrient deficiencies not only weaken the immune system and health but also hinder the country's progress socially and economically. Micronutrient deficiencies during childhood affect growth, compromise immunity and, in severe cases, lead to brain damage, chronic disabilities and mortality (Ma, Jin, *et al.*, 2007:633). Without addressing micronutrient deficiencies, the vicious cycle of intergenerational undernutrition, chronic diseases, and poverty continues. Vitamins and minerals are essential nutrients required in small amounts in the diet to help regulate and control functions in cell metabolism and protect the body against sickness (Dittoh, *et al.*, 2007:618), however, insufficient intake of these nutrients leads to deficiencies which are of critical concern worldwide. According to Welch and Graham (2004), even a shortage of one of these nutrients may cause poor health. Black (2003:79) outlined micronutrient deficiencies as a risk factor which

compromises the lives of low and middle income groups by weakening individuals' immune system, making them prone to infectious diseases, growth and mental development. The school children were wasted, while millions of school children died from diseases directly related to micronutrient deficiencies, especially iodine, iron, zinc and vitamin A deficiency (Ruel and Hoddinott, 2008).

Deficiencies of iron, vitamin A, iodine, and zinc among children are the most devastating in terms of impaired development and mortality. In Africa, micronutrient intake is another element in assessing undernutrition. Recent data highlights an estimated 2 billion people suffer from one or more micronutrient deficiencies, demonstrating that hidden hunger is responsible in part for the global malnutrition burden. Four micronutrients of public health concern, which have devastating consequences for many individuals, are vitamin A, iron, folate, and iodine. (Graham *et al.,* 2006)

Micronutrient deficiencies inflict anaemia, cretinism and blindness (xerophthalmia) on tens of millions of people. Levels of mineral and vitamin deficiency that have no clinical symptoms can impair intellectual development, compromise immune systems, provoke birth defects, and cause individuals to live below their physical and mental potential which ultimately impairs their capabilities and the prospects of nations. Half of children with vitamin and mineral deficiencies are suffering from multiple deficiencies (Micronutrient Initiative, Investing in the Future, 2009).

2.7.4.1 Iron Deficiency and Anaemia

Iron deficiency (ID) is the most common nutritional disorder in the world and is estimated to affect more than 2billion people of whom 1.2billion suffer from Iron Deficiency Anaemia (IDA). Insufficient intake of iron rich foods is the major cause of Iron Deficiency. It can also be caused by parasitic infections (particularly hookworm and malaria) and deficiencies of other nutrients (Hall *et al.,* 2001). There is little evidence to suggest any recent decrease in the prevalence of anaemia (Mason *et al.,* (2001). It is estimated that 53% or 210m school-age children suffer from Iron Deficiency Anaemia. The highest prevalence is reported in Asia (58.4%) followed by Africa (49.8%) (WHO, 2000).

Iron deficiency, the most common form of micronutrient deficiency in school-age children, is caused by inadequate diet and infection, particularly hookworm and malaria. More than half the school-age children in low-income countries are estimated to suffer from iron deficiency anemia (Bhutta, 2009) Iron deficiency impedes cognitive development and evidence suggests that children with iron deficiency perform worse on educational tests and are less likely to attend school. Iodine deficiency affects an estimated 60 million school-age children in the developing world, and is also associated with lower test scores and cognitive abilities.

Recent studies and surveys have tried to capture the prevalence of IDA in school children. In a survey of nearly 14,000 rural school children in Africa and Asia, the prevalence of IDA was more than 40% in five African countries (Mali, Tanzania, Mozambique, Ghana, and Malawi) amongst children aged 7-11 years and in four African countries amongst children aged 12-14 years. In the two Asian countries studied, the overall prevalence of IDA was found to be considerably lower than in Africa (around 12% in Vietnam and 28% in Indonesia among 7-11 year olds). Children aged 7-11 years were found to have lower mean haemoglobin concentrations, while IDA was found to be more common in the older age group. Girls were also found to have lower haemoglobin concentrations than boys, although the overall prevalence of IDA was higher in boys, particularly in the 12-13-year age group. An association between late enrolment in school, as compared to enrolling closer to the correct age, and a higher prevalence of anaemia was also found (Partnership for Child Development (2001).

In a study of 1,210 primary school girls aged 7-14, in Riyadh, Saudi Arabia, an anaemia level of 55.4% was found. The highest level (71.4%) was found among 14 year-old girls (Al-Othaimeen *et al.,* 1999). A study of adolescent males and females primary school children was conducted in Bangladesh extremely high levels of anaemia were identified in both females (98%) and males (94%). At age 13, 100% of females were anaemic (Shahabuddin *et al.,* 2000).in a survey of 6,486 adolescent students (12-15 years) in East Java, Indonesia, anaemia levels of over 25% in girls, 24% in pre-pubertal boys and 12% in pubertal boys were detected. Higher levels of anaemia were found among adolescents of lower socioeconomic status. In this study as well, puberty increased the risk of anaemia among girls. (Soekarjo DD, *et*

al.,(2001). There is substantial evidence that IDA in children is associated with decreased physical development, impaired immune function, poor growth and increased fatigue. IDA also affects cognitive function and school achievement (a comprehensive review is provided by Grantham-McGregor and Ani, 2001).

2.7.4.2 Iodine Deficiency and Iodine Deficiency Disorders (IDD)

Iodine deficiency affects an estimated 1.6billion people worldwide and estimated 60m school-age children. The consequences of iodine deficiency include severe mental retardation, goitre (a condition involving the enlargement of the thyroid gland and a disruption of normal thyroid production), hypothyroidism, abortion, stillbirths and low birth weight and mild forms of motor and cognitive deficits. Recent studies in school-age children have found very high levels of goitre and iodine deficiency. School-age children are often the target population of IDD assessments because of their physiological vulnerability and their accessibility. A recent study of IDD in school children have been carried out in Egypt, Swaziland and South Africa. Overall prevalence rates of between 35 and 70% have been found indicating a severe public health problem in each of the areas studied (Lwenje *et al.*, (1999). In Calcutta, India, after having implemented a universal iodized salt programme for several years, a monitoring survey reported 23% of male school children and 32% of female school were moderately to severely iodine deficient (Sinha *et al.*, 1999).

2.7.4.3 Vitamin A Deficiency (VAD)

Mild or sub clinical VAD causes impaired immune function, increased severity of some infections and an increased risk of mortality from infectious diseases and is widely recognised as an important cause of blindness in children. It is estimated that 85m school-age children are at increased risk of acute respiratory and other infections because they are deficient in vitamin A. (Del Rosso, 1999). Recent data also suggests that vitamin A deficiency is a major public health problem, affecting an estimated 85 million school age children (Bhutta, 2009). This deficiency impairs immune function and increases the risk of dying from diarrhoea, malaria, and measles. It is also the leading cause of child blindness in developing countries. Finally, zinc deficiency contributes to growth failure and weakened immunity in young children and results in

some 800,000 child deaths per year (WFP, Ethiopia Country Programme Mid-Term Evaluation 2003-2006. 2005).

Vitamin A Deficiency also affects iron metabolism so that with any iron supplements taken, subsequent improvement in iron status may be limited when vitamin A status is low. School-age children have not been considered an 'at-risk' group for VAD in the past. Little is known about the occurrence or effects of VAD in this age group. However, the small number of recent studies conducted, suggest that VAD is a public health problem in school-age children. In Bangladesh, a study of adolescent health and nutrition status found that 2.1% of the children surveyed had eye changes (conjunctival xerosis and Bitot's spots), indicating severe VAD (Shahabuddin *et al.*, 2000). In Mexico, almost half of school children surveyed were found to be deficient in vitamin A, and over 6% had low serum retinol levels (<0.35mol/L) (Stoltzfus *et al.*, 1997).

A recent assessment of the vitamin A status of school children in Tanzania, Ghana, Indonesia and Vietnam found that that VAD was a severe public health problem in Tanzania (30% deficient in vitamin A), a moderate problem in Ghana and a mild problem in Indonesia and Vietnam according to WHO criteria68. A case control study involving 105 children with night blindness in rural Bangladesh found that affected children were 5.4 times more likely to have a low mid upper arm circumference, indicative of protein energy malnutrition, and associated with a low intake of low intake of beta-carotene-rich and vitamin A-containing foods as well as with low serum vitamin A. (Ahmed F (1999).

Vitamin A deficiency compromises the immune systems of approximately 40% of the developing world's children and leads to the early deaths of an estimated one million young children each year (Micronutrient Initiative, Investing in the Future:2009). Severe vitamin A deficiency amongst school age children afflicts almost the entire sub-Saharan African region. The deficiency prevalence ranges from20 to 40% on average across regions with little improvement in the last twenty years (UNSCN, (2011). Twenty-five countries in Sub-Saharan Africa reached 70% or more of their young children with one vitamin A capsule every year saving the lives of more than 200,000 young children annually and reducing the severity of childhood illnesses in 2008. These countries include Angola, Benin, Gambia, and Guinea. Burkina Faso,

Ghana, Sierra Leone, and Tanzania have been reaching their young children with the two required high-doses of vitamin A annually.

2.8 Causes of Malnutrition

A model developed by UNICEF (1997) provides a widely accepted framework that is the most likely causes of malnutrition. This framework indicates that malnutrition, as an outcome is as a result of immediate, underlying and basic causes in a hierarchal manner, dietary habits and leisure-time physical activities Food, health and care are major requirements for nutritional wellbeing.

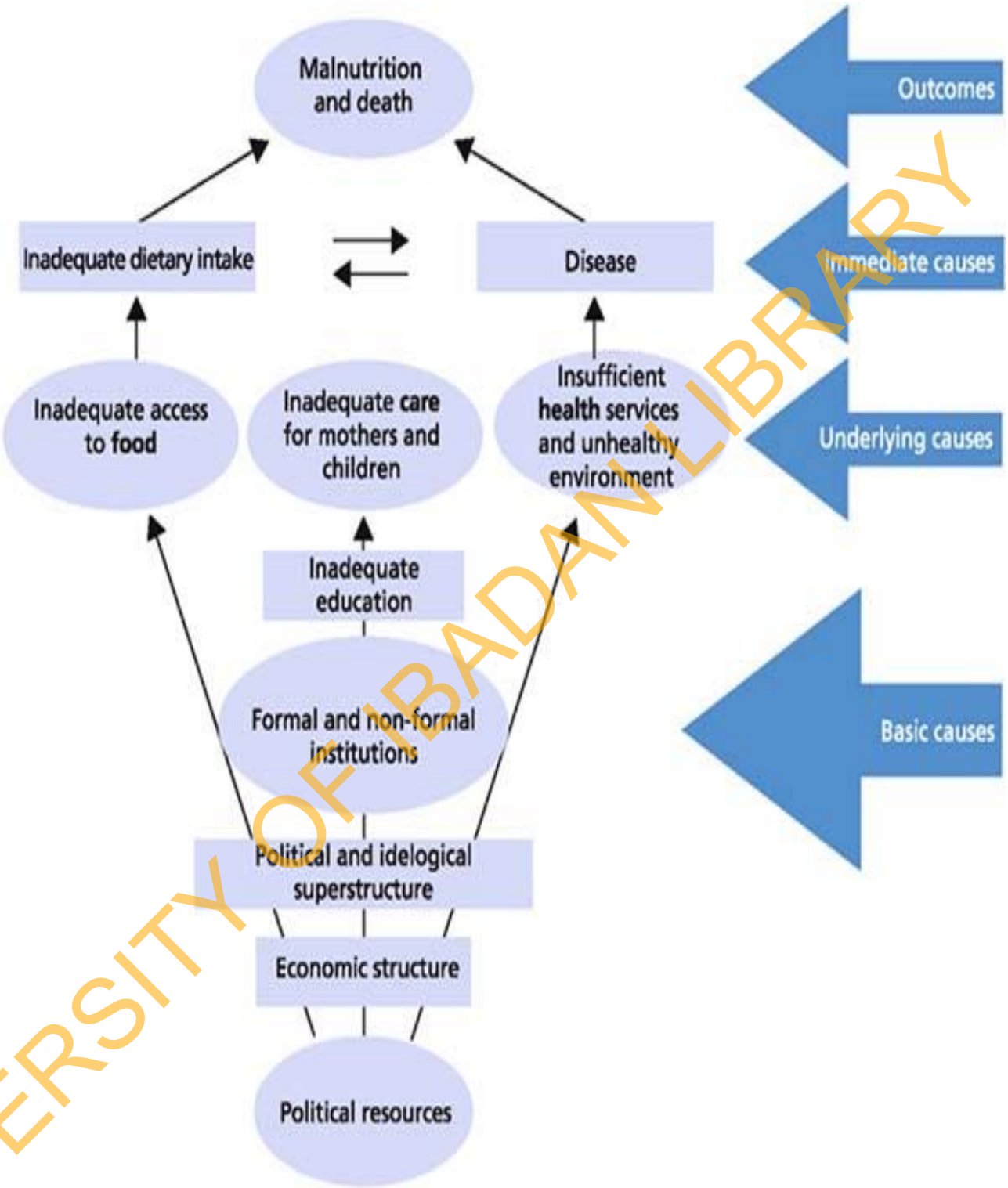

Figure 2: Pictorial framework on the causes of Malnutrition (UNICEF, 2000)

2.8.1 Inadequate dietary intake

Dietary patterns are defined by Cutler *et al.* (2009) as the distribution of foods by frequency and/or amount in the habitual diet. Alam *et al.* (2010) stated that inadequate dietary intake is associated with family income, education and food-shortage from time to time. Several other factors such as loss of appetite, religious restrictions or beliefs, sickness, chewing related to dental problems and weight loss obsession add to inadequate intake. These aforementioned factors are common during teenage years. Hill (2002) reported that teenage girls are not meeting the RDI for B-vitamins, fibre and other minerals. This indicates poor milk, meat and fruit and vegetables consumption. Breakfast skipping is another health compromising behaviour and unhealthy lifestyle adopted by most adolescent girls (Keski-Rahkonen *et al.*, 2003).Breakfast is an essential meal to provide energy to perform daily activities.

2.8.2 Insufficient household food security

Adequate nutrition is vital for building children's immune systems and cognitive development. Nord *et al.* (2005) defined food insecurity as a persistent lack of access to adequate food in needed quantity and quality due to physical, social and economic hindrances. South Africa is known to be food secure; however, large numbers of households within the country are food insecure (Altman *et al.*, 2009). Hunger and poverty propelled the FAO World Food Summit to set goals to reduce poverty in poverty stricken populations by 2015 (Shetty, 2006).

2.8.3 Education and ignorance

Malnutrition violates a child's human right to lead a healthy life. Malnourished children have lowered resistance to infection. Nutritional knowledge influences quality of life and impacts positively on individuals' nutritional status. Dietary knowledge and access to resources are critical to improve health and nutrition in a sustainable way. People perish due to a lack of knowledge and are often unaware of the health and nutrition programmes available. David etal (2008) believe that when the mind is adequately fed with necessary information to produce good food, it is more effective and useful in fighting hunger and poverty. Briggs, Safaii and Beall (2003) strongly believe in nutrition education as one of the fundamental tools in

promoting health, improving eating habits and fighting diseases. Chopra and Darnton-Hill (2006) declared that women need to be empowered and capacitated with the relevant knowledge to provide basic motherhood needs such as hygiene, breastfeeding and weaning guidelines. When mothers are educated as affirmed by Chopra and Darnton-Hill (2006), these women are in a rightful position to monitor, provide, care and seek medical attention for the health of the children. Walsh, *et al.* (2003) added that inadequate food intake and unhygienic dietary practices are due to food ignorance and poor knowledge.

2.8.4 Lack of Nutrition Education at school level

Nutrition education as David *et al.*, (2008) described it, as the process through which people gain the knowledge, attitude and skills that are necessary for developing good dietary habits. Children spend one-third of the day at school, thus providing a practical environment for education about healthy food choices (Foster, *et al.*, 2008). Peres-Rodrigo and Aranceta (2001) argue that schools have the potential to reach out to children at a critical age when eating habits are still forming and pave a way for healthy behaviour and dietary habits to adulthood.

The study by Neira and de Onis (2006) indicated that schools can positively influence the lives of most children and offer numerous opportunities for teaching children about healthy diets and physical activity. Children who are already at risk due to health nutritional problems come to school tired, hungry and unable to cope with learning demands or benefit from the lessons. Steyn (2010) stated that the curriculum-based nutrition programmes would significantly improve children's nutrition knowledge and dietary behaviour; hence the necessity for schools to develop school wellness policies and limit access to unhealthier food should be every school's priority. The need to educate the public about nutrition, as part of the overall effort for poverty eradication and food insecurity, was recognized at the World Food Summit, held at FAO Headquarters in 1996.

2.8.5 Insufficient health services and unhealthy environment

Malnutrition occurs largely due to inappropriate family practices related to diet, health care and hygiene and/ or sanitation. Many people lack access to basic sanitation and a lack of safe drinking water still remains a great risk to health in developing countries

and a determinant of cholera, dysentery (Cole and Neumayer, 2006), and other diseases associated with an unhealthy environment. Poor sanitation is a global challenge, as 1.1 billion people globally are reported to have no access to safe water, which explains why hygiene related diseases are so high in the developing world (Eisenberg,*et al.*, 2007; Ashbolt, 2004).The worldwide diarrheal infection (88%) reported is due to unsafe water, poor sanitation and hygiene (Obi, *et al.*,2007). The UNICEF (2010) reported 2.6 billion people without proper sanitation in the world, with the largest number in South Asia, Eastern Asia and Sub Saharan Africa. China and India are counted among the countries that have made remarkable progress in improving water and sanitation. Of one hundred and three billion of the Chinese population, (89%) used clean water from improved sources and 88% of the 1.2 billion of Indian population (WHO/UNICEF 2010).

The cholera outbreak in Limpopo Province in 2008 was due to high incidence of poor sanitation, more than fifty people died. Yet gain in 2009, all South African provinces were afflicted by cholera which left about twelve thousand people severely affected (UNICEF, 2009a). Stamoulis *et al.* (2004) produced data showing that internal migration impacts negatively and puts more pressure on public services like safe water, sanitation, transport and medical care services. More often, poor households are far away from health facilities, travel long distances and curb unnecessary cost to obtain health care and medical attention. A further study by Woolard (2002) showed that poor people have problems in accessing health care due to lack of transport fare, food and clothing.

2.9 Dietary Diversity

Dietary diversification is one of the four main strategies advocated internationally for the improvement of micronutrient intake and status, especially in undernourished individuals (Maunder *et al.*, 2001). Monotony in diet has been described as the result of poverty and poor nutrition (M. Golden, (1991), and indeed; typical child diets in communities and households with high rates of malnutrition are monotonous and bulky. Many infants and young children in Sub-Saharan Africa subsist on gruel and porridge prepared from staples such as cereals, roots and tubers accompanied with vegetables and pulses (kennedy et al., (2008)

Plant sourced foods account for more than three- quarters of energy intake and in some cases similar pro- portions of protein and micronutrient intakes (Tarini etal., 1999). Studies have presented information implying ecological associations between diversity and overall nutrition where it has been suggested that the nutritional success of the participants is linked with the greater diversity of their diet (Faber, et al., (2001). Many studies in several age groups have shown that an increase in individual dietary diversity score is related to increased nutrient adequacy of the diet. Dietary diversity scores have been positively correlated with increased mean micronutrient adequacy of complementary foods (Swindale and Bilinsky, 2006), micronutrient adequacy of the diet in adolescents (Mirmiran *et al.,* 2004) and adults (Ogle *et al.,* 2001; Foote *et al.,* 2004). Indicators of micronutrient status (iron, vitamin A and zinc) among School-age children in developing countries indicate that school children micronutrient status is unsatisfactory. They are mainly consuming plant-based diets which are predominantly from cereals, roots and tubers with limited animal source foods. This dietary pattern is especially common in rural communities.

2.9.1 Individual Dietary Diversity Scores

Individual dietary diversity scores aim to reflect nutrient adequacy. Studies in different age groups have shown that an increase in individual dietary diversity score is related to increased nutrient adequacy of the diet. Dietary diversity scores have been validated for several age/sex groups as proxy measures for macro and/or micronutrient adequacy of the diet. Scores have been positively correlated with adequate micronutrient density of complementary foods for infants and young children (FANTA, 2006), and macronutrient and micronutrient adequacy of the diet for non-breast-fed children (Hatloy *et al.*,1998; Ruel *et al.*,2004; Steyn *et al.,* 2006; Kennedy *et al.*,2007), adolescents (Mirmiran *et al.,* 2004) and adults (Ogle et al., 2001; Foote *et al.,* 2004; Arimond *et al.*,2009). Some of these validation studies refer to only one country while others have attempted to validate dietary diversity scores for several countries. Nevertheless, research is ongoing and there is currently no international consensus on which food groups to include in the scores at the individual level for different age/sex groups.

Dietary diversity scores are calculated by summing the number of food groups consumed in the household or by the individual respondent over the 24-hour recall

period. The household dietary diversity scores and individual dietary diversity scores are calculated based upon different numbers of food groups because the scores are used for different purposes. The household dietary diversity scores is meant to provide an indication of household economic access to food, thus items that require household resources to obtain, such as condiments, sugar and sugary foods, and beverages, are included in the score. Individual scores are meant to reflect the nutritional quality of the diet. The individual dietary diversity scores reflect the probability of micro nutrient adequacy of the diet and therefore food groups included in the score are tailored towards this purpose.

Twelve (12) food groups are proposed for the household dietary diversity scores, while nine (9) food groups are proposed for the individual dietary diversity scores. For both scores certain food groups in the questionnaire are aggregated.

1. The starchy staples food group is a combination of Cereals and White roots and tubers.
2. The other vitamin A rich fruit and vegetable group is a combination of vitamin A rich vegetables and tubers and vitamin A rich fruit.
3. The other fruit and vegetable group is a combination of other fruit and other vegetables.
4. The meat group is a combination of meat and fish.

Table 2.3: Aggregation of food groups from the Dietary Diversity questionnaire to create the Individual Dietary Diversity Score

Question Numbers	Food group
1,2	Starchy staples[1]
4	Dark green leafy vegetables
3,6andredpalmoilif applicable	Other vitamin A rich fruits and vegetables[2]
5,7	Other fruits and vegetables [3]
8	Organ meat
9,11	Meat and fish[4]
10	Eggs
12	Legumes, nuts and seeds
13	Milk and milk products

Source: (FAO, 2010).

2.10 Dietary Assessment

Adequate dietary intake is the basis of good health. Poor nutrition, whether under- or over-nutrition is one of the major limitations to growth and development throughout Africa and the world (Khongsdier, (2005). With the limited access to clinics and hospitals, particularly in rural areas, dietary intake and nutritional status assessment provide critical information in understanding individual and community health status. One of the best uses of dietary assessment methods is for planning, developing, and evaluating nutrition intervention programs Taren *et al.*, (2002), and hence the need for tools that will allow for quick and accurate dietary estimates to support such programs.

2.10.1 Dietary Assessment Methods

The most commonly used dietary assessment method includes:

2.10.1.1The 24-hour dietary recall

The 24-hour recall method was developed by Wiehl in 1942, and is still used today. The advantage of the 24-hour recall is that it is applicable for populations of different ethnicities. It is a rapid, non-invasive dietary tool, and one with the ability to quantify daily intakes for populations in developing countries. (Gibson RS. (2000). The questionnaire is administered by a trained interviewer who should be knowledgeable on the terminology and locally available, traditional foods and beverages (Deakin V., 2006)

The 24-hour recall is the most common recall method in dietary assessment. It requires the participant to report all foods consumed in the past 24 hours. (Gibson RS., (2005) This method requires the respondent to remember considerable detail of food types and amounts of foods often overlooked, for example, snacks and leftovers. There is also a tendency for over- or under-estimation of both macro and micronutrients. For example, in Kenya there were food replacements, food omissions, and poor estimations of food intake (Gewa CA, *et al.*, (2009).

2.10.1.2Food frequency questionnaire (FFQ)

A food frequency questionnaire (FFQ) asks participants about specific foods consumed in a specific time frame. Generally, these questionnaires ask the subject to recall food intake from long periods of time such as seven or more days. (Coulibaly A, *et al.*, (2008). This type of questionnaire is useful for assessing specific types of foods and can quickly be analyzed as it is structured rather than open-ended as the 24-hour recall method. In its quantitative format, an FFQ can be used to estimate amounts of foods and nutrients consumed (MacIntyre, *et al.*, 2002).

2.11 Assessment of Nutritional Status

According to Health and Nutrition Policy, (2011), Nutritional status is the balance between the intake of nutrients by an organism and the expenditure of these in the processes of growth, reproduction, and health maintenance. Because this process is highly complex and quite individualized, nutritional status assessment can be directed at a wide variety of aspects of nutritive. These range from nutrient levels in the body, to the products of their metabolism, and to the functional processes they regulate. Nutritional status can be measured for individuals as well as for populations. Accurate measurement of individual nutritional status is required in clinical practice. Population measures are more important in research. They can be used to describe nutritional status of the group, to identify populations or population segments at risk for nutrition-related health consequences, and to evaluate interventions.

The choice of nutritional status assessment method must be made mindful of the level at which one wants information, as well as of the validity and reliability of the method. All methods have error. All methods produce imperfect measures that are indirect approximations of the process. Whatever method is chosen for assessment of nutritional status, the data obtained must be compared with reference data to produce an indicator of nutritional status. The quality of the available reference data is, therefore, another factor that affects the assessment data. (UNICEF, 2011)

Ideal methods are sensitive and specific. Unfortunately, it is difficult to achieve both in the assessment of nutritional status. Sensitivity refers to the ability of a technique to correctly identify those affected by a condition (for example, undernutrition) as having that condition. Specificity refers to the ability of a technique to correctly

classify normal individuals as having normal nutritional status. Body mass index (wt/ht) is a global measure of nutritional status that illustrates the difference between these two constructs. Most persons who consume insufficient energy have low body mass index, so the measure is sensitive. However, there are other causes of low body mass index, including genetics and disease, so body mass index is not specific to nutritional status. (Health and Nutrition Policy, 2011)

The assessment of nutritional status is commonly summarized by the mnemonic "ABCD," which stands for anthropometric measurement, biochemical or laboratory tests, clinical indicators, and dietary assessment. This study will focus on anthropometric, dietary techniques and clinical indicators which are the methods used in this survey.

2.11.1 Anthropometric Approaches to Nutritional Status Assessment

According to WHO (2006), the term anthropometric refers to comparative measurements of the body. Anthropometric measurements are used in nutritional assessments. Those that are used to assess growth and development in infants, children, and adolescents include length, height, weight, weight-for-length, and head circumference (length is used in infants and toddlers, rather than height, because they are unable to stand). Individual measurements are usually compared to reference standards on a growth chart.

Anthropometric approaches are, for the most part, relatively non-invasive methods that assess the size or body composition of an individual. For adults, body weight and height are used to evaluate overall nutritional status and to classify individuals as at healthy or non-healthy weights. In the United States of America and other industrialized countries, the emphasis for unhealthy weight is over-weight and obesity. The standards for these have changed over time. The most recent classification is to use body mass index (BMI, in kg/m^2) (Kuczmarski and Flegal, 2000). BMI, regardless of age or population, is normal at 18.5 to 25.0 kg/m^2, overweight at 25.0 to 29.9 kg/m^2, and obese at over 30.0 kg/m^2 (USDA and USDHHS, 2000). In general BMI greater than 30 is assumed to be due to excessive adiposity. In children, growth charts have been developed to allow researchers and clinicians to assess weight and height-for-age, as well as weight-for-

height. For children, low height-for-age is considered stunting, while low weight-for-height indicates wasting. In addition to weight and height, measures of mid-arm circumference and skinfold measured over the triceps muscle at the mid-arm are used to estimate fat and muscle mass. Anthropometric measures of nutritional status can be compromised by other health conditions. For example, oedema characteristic of some forms of malnutrition and other disease states can conceal wasting by increasing body weight. Head circumference can be used in children 36 months and younger to monitor brain growth in the presence of malnutrition. Brain growth is better spared than either height or weight during malnutrition.

To interpret anthropometric data, they must be compared with reference data. The choice of the appropriate reference has been discussed by Johnston and Ouyang (2008). Because well-nourished children in all populations follow similar patterns of growth, reference data need not come from the same population as the children of interest. It is of greater importance that reference data be based on well-defined, large samples, collected in populations that are healthy and adequately nourished. Reference growth charts (Kuczmarski*et al.*, 2002) have been compiled from cross-sectional data collected from population surveys of U.S. children. These have been adopted as international standards by the World Health Organization.

2.12 Urban Slum

The (Britannica, 2003) defined a slum as a densely populated usually urban area marked by crowding, dirty run-down housing, poverty, and social disorganization. Also, slums as defined by (United Nations, 2007) are run-down area of a city characterized by substandard housing and squalor and lacking in tenure security. According to (Fourchard, 2003), slums are defined as those areas that are yet to develop in terms of good planning and settlement. Some of the characteristics of slums are that they lack infra-structural facilities, have no planned layout and the residents are predominantly poor and illiterate. Slums are areas that concentrate low-income earners, low-cost houses, possibly mud houses, no layout and poor inhabitants.

According to (World Bank/UNCHS, 2000) slums are highly congested urban areas, inhabited by urban squatters, marked by deteriorated, unsanitary buildings, poverty,

and social disorganization. In addition, they are also considered as a residential area in an urban locality inhabited by the very poor who have no access to tenured land. The slums are characterized by substandard housing units, acute shortage of dwelling units which resulted in overcrowding, poor urban living conditions, and services and infrastructure below the adequate or minimum levels, and indeed high crime rates (World Bank/UNCHS, 2000).

In line with (United Nations, 2007) The term has traditionally referred to housing areas that were once relatively affluent but which deteriorated as the original dwellers moved on to newer and better parts of the city, but has come to include the vast informal settlements found in cities in the developing world. Although their characteristics vary between geographic regions, they are usually inhabited by the very poor or socially disadvantaged. Slum buildings vary from simple shacks to permanent and well-maintained structures. Most slums lack clean water, electricity, sanitation and other basic services (United Nations, 2007).

A UN Expert Group has created an operational definition of a slum as an area that combines to various extents the following characteristics: inadequate access to safe water; inadequate access to sanitation and other infrastructure; poor structural quality of housing; overcrowding; and insecure residential status (United Nations, 2007).

These are the features manifesting in the Urban Slum communities in Ibadan North West Local Government Area which is the area of focus of the research.

1. Unplanned and Deteriorate structure: The buildings in the study area were arranged without adequate air spaces and setbacks. The proximity of these structures promotes transmission of communicable diseases. Also the structures in this locality are in poor condition. Walls cracked roof sagging, materials for the construction looked obsolete for human habitation. Even the environment quality of the structures is poor and unhygienic.

2. Unsanitary condition: The buildings in the study area lack infrastructural facilities such as pipe borne water and toilets. Also, there is absence of refuse depots and dustbins in the nook and cranny of the area. As a result, faeces and refuse are seen over the place and this makes the area to be stinking with offensive odours. There is

also problem of drainage system and thereby resulting in soil erosion in some part of the study area thereby promoting disease outbreak.

3. Overcrowding: Overcrowding was a common feature among the wards. This is a major challenge in the locality as unauthorized housing conversion and structural modification buildings are converted to commercial shops and even modifications are made to existing structure. This however, makes the area to be overcrowded.

4. Poor drainage: The drainages are blocked by refuse wastes which are usually disposed in run –off water during rainy season. As a result, the locality experiences flood during rainy season.

2.13PRECEDE Model Conceptual Framework

The conceptual frame work describes the relationship of a problem to some variable. It is a model frame work for the process of systematic development for health education. PRECEDE stands for Predisposing, Reinforcing, and Enabling Constructs in Educational Diagnosis and Evaluation. PROCEED stands for Policy, Regulatory, and Organisational Constructs in Educational and Environmental Development.

PRECEDE was developed as a health education planning model by Green, Kreuter, Patridge and Deeds (1980). It was used for determining antecedents of behaviour and as a guide to selection of health education intervention. This model is multi-dimensional and founded in the social, / behavioural sciences, epidemiology, administration and education. According to the model, any behaviour is caused by some behavioural antecedents. These antecedents could be differentiated into three components which interplay to urge an individual to taking specific or desired action/ behaviours towards their health and other aspect of their lives. (Green and Kreuter, 1991). These components are as follows:

Predisposing Factors

Predisposing factors are the cognitive conditions that motivate an individual towards certain behaviours. They include characteristics of individuals such as age, gender, educational level, knowledge, attitudes, beliefs, perception and habits. What are the eating habits of the school children?

Enabling Factors

The Enabling factors are those that will be useful in deciding what influences the level of information and opinion of the individual. They enable the respondents to act on their predisposition. They include the presence or absence resources, educational and socio economic status of the individuals as well as the laws and policies. The examples of the resources of interest include money, food stuff, facilities etc. the presence or absence of these have potential for influencing the behaviours of parents and school children relating to their dietary habits. The provision of reliable infrastructures such as potable water, good sanitation, economic empowerment through education and creation of employment are drive required to check or prevent

school children malnutrition. All this put together improves the quality of life of school children in terms of cognitive ability, good academic performance and intra/inter personal relationship etc.

Reinforcing Factors

Reinforcing factors come into play due to the influence of significant others. They include the influence of parents, teachers, relatives, and friends. The significant others have high potentials for influencing the way parents and students perceive good food and good nutritional habits.

The PRECEDE model is appropriate for this study because it contains all the necessary variables needed for measuring the dietary habits and nutritional status of the school children. These include, practices, perception, attitudes, time, money, knowledge, education and the significant others who influence the behaviours of parents as well as that of the school children.

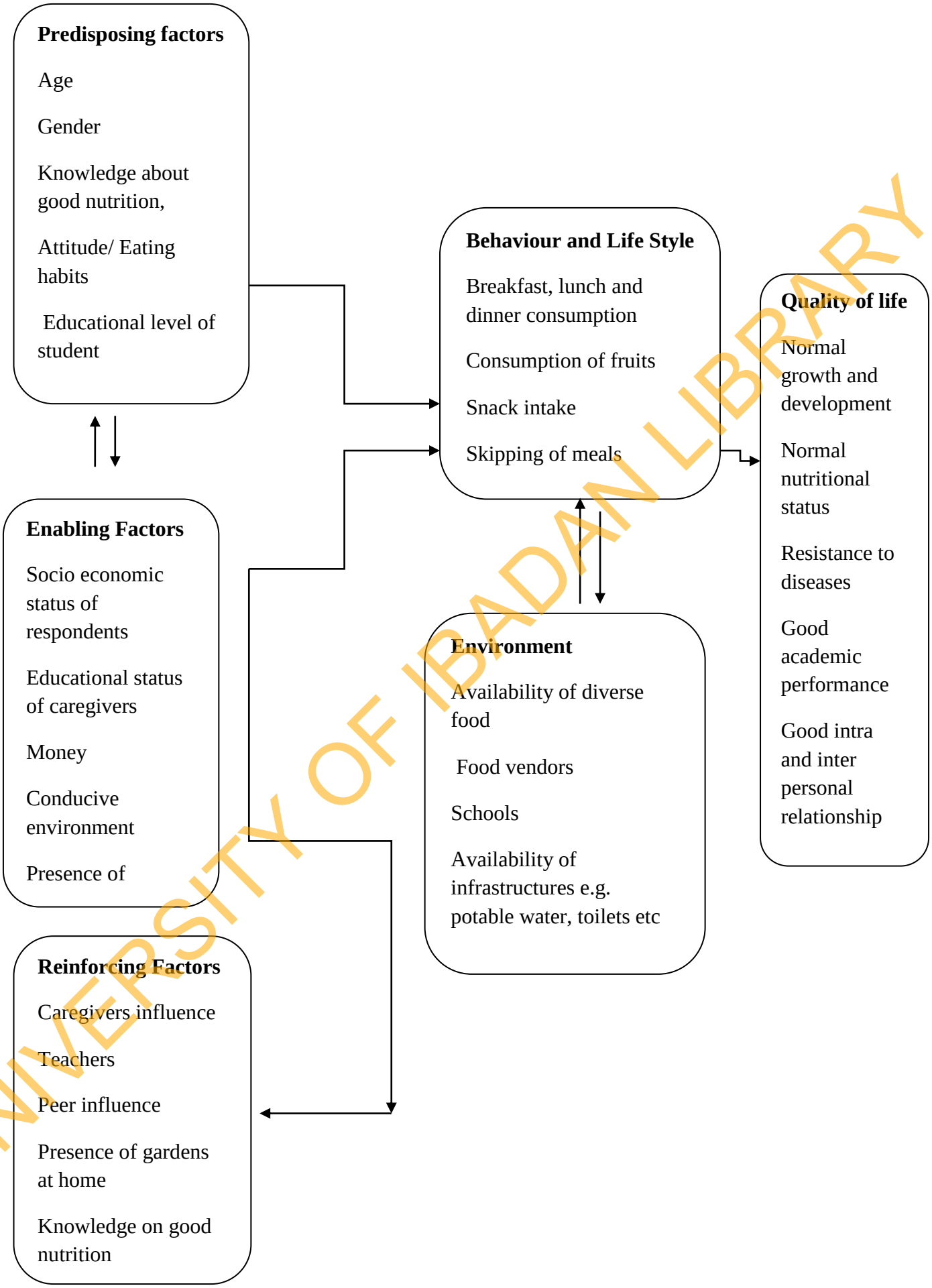

Figure 3: Application of the PROCEDE Conceptual Framework

CHAPTER THREE

METHODOLOGY

This chapter presents the description of the study area and describes the research design. The other components of the methodology include the study population, sample size and sampling technique, methods and instruments for data collection, validity and reliability, data collection process, data management and analysis, ethical consideration and limitations of the study.

3.1 Study design

This study is a descriptive and cross-sectional survey designed to investigate the dietary pattern and nutritional status of upper primary school children in the urban slum communities in Ibadan North West Local Government Area [IBNWLGA], Oyo State.

3.2 Variables

- Independent variables include age, sex, religion, class, parents' occupation, ethnic group etc
- Dependent variables include eating habits, food consumption frequency, factors affecting the dietary habits and nutritional status etc

3.3 Study Site

This research study work was carried out in Ibadan North West Local Government in Oyo state. Oyo State is an inland state in south-western Nigeria, with its capital at Ibadan. It is bounded in the north by Kwara State, in the east by Osun State, in the south by Ogun State and in the west partly by Ogun State and partly by the Republic of Benin. Oyo State covers approximately an area of 28,454 square kilometers and is ranked 14th by size. The landscape consists of old hard rocks and dome shaped hills, which rise gently from about 500 meters in the southern part and reaching a height of about 1,219 metre above sea level in the northern part. Some principal rivers such as Ogun River, Oba, Oyan, Otin, Ofiki, Sasa, Oni, Erinle and Osun river take their sources from this highland. Oyo State contains a number of natural features including the Old Oyo National Park. In this location there was earlier habitat for the

endangeredAfrican Wild Dog, *Lycaonpictus*; however, this is thought to have been locally extirpated at the present.

The Climate is equatorial, notably with dry and wet seasons with relatively high humidity. The dry season lasts from November to March while the wet season starts from April and ends in October. Average daily temperature ranges between 25 °C (77.0 °F) and 35 °C (95.0 °F), almost throughout the year.

Oyo State has three senatorial district and thirty-three Local Government areas. The Local Government areas include; Akinyele, Afijio, Egbeda, Ibadan North, Ibadan North-East, Ibadan North-West, Ibadan South-West, Ibadan South-East, Ibarapa Central, Ibarapa East, Ido, Irepo, Iseyin, Kajola, Lagelu, Ogbomosho North, Ogbomosho South, Oyo West, Atiba, Atisbo, Saki West, Saki East, Itesiwaju, Iwajowa, Ibarapa North, Olorunsogo, Oluyole, OgoOluwa, Surulere, Orelope, Ori Ire, Oyo East, OnaAra (OYSG, 2001)

3.4 Description of the Study Location

The study was carried out at selected wards in Ibadan North West Local Government Area, Oyo State. Ibadan North West Local Government (NWLG) was created in 1991 by then military Head of State, Major Gen. Ibrahim Gbadamosi Babangida (RTD). The Local Government covers a large area of land with a population of about 152, 834 according to 2006 National population census. Its headquarters is at Dugbe/Onireke.It has an area of 26 km² and a population of 152,834 at the 2006 census.Ibadan NWLG is predominantly urban area spanning over Onireke (headquarters), Sapati, AgbedeAdodo, Beere, Mokola, Ayeye, Dugbe, Inalende, Eleyele, Ologuneru and Oke-Are. The Local Government area has eleven (11) wards. It is shown in the table below

.

Table 3.1:Showing wards and communities in Ibadan North West Local Government Area

S/N	WARDS	COMMUNITIES
1	**Ward 1**	Ayeye, Idi-Agba, Asukuna, Lajumoke, Adeosun, Alekuso, Akatapa
2	**Ward 2**	Oke-are, AgbedeAdodo, OopeYeesa, Idi Oro, Adagbada, Ori' - Gbegi
3	**Ward 3**	Agbeni, Oritamerin, Agbaje,AlfaAbata, Gege
4	**Ward 4**	Ogunpa, Amunigun, Ile olosun, Akilapa.
5	**Ward 5**	Idikan, Oopo, Okeseni, Ile Alapa, Abebi, Ifeleye
6	**Ward 6**	Abebi, Okepadie, Oniyanrin, Daily Times,
7	**Ward 7**	Ekotede, Salvation Army,Idioro, Queen cinema, IyaOloba
8	**Ward 8**	Inalende, Alaiwo, Attenda, Omitowoju, Famoriyo, Adeoyo, Ode oolo
9	**Ward 9**	Adamasingba, Ayorinde,Onireke, Afonta, Kudeti Avenue, Akintola
10	**Ward 10**	Fan Milk, Eleyele, Benjamin, T.C.T.C, Idi-ope, Jericho,NIHORT, OdoElemu, Animashaun
11	**Ward 11**	Olopomewa, Oluseyi, Aromera, Askar, Adetokun, Idi osan, Okesuna, Ayetoro, Babalegba

Source: Town Planning Unit, Ibadan North West Local Government Area, Onireke, Ibadan (2001)

The wards had all the features characterized as Urban Slum.

Fourteen schools were selected out of the wards which constitute urban slums communities. The wards were 3, 4, 5 and 6. The Target Population was randomly selected through multistage sampling technique from each school. The wards and the fourteen schools are presented in the Table 3.2 below.

Table 3.2:The Wards and the fourteen public primary schools

Wards	Communities	No of Schools	Name of school
3	Agbeni, Oritamerin, Agbaje, etc	3	Chief AgbajeMem.Sch I
			Chief AgbajeMem.Sch 2
			Chief AgbajeMem.Sch 3
4	Ogunpa, Amunigun,etc	2	Sacred Heart, Ogunpa
			St Patrick, Ogunpa
5	Idikan, Oopo, Okeseni,	6	Baptist Primary School 1
			Baptist Primary School 2
			Baptist Primary School 3
			St Micheal Primary Sch 1 Okeseni
			St Micheal Primary Sch 2 Okeseni
			St Micheal Primary Sch 3 Okeseni
6	Abebi, Okepadie, etc	3	St Patrick Primary Sch 1, Abebi
			St Patrick Primary Sch 2, Abebi
			St Patrick Primary Sch 3, Abebi

3.5 Target population

This study was carried out among primary school children that are within the age range of 9-13 years in public primary schools within Ibadan North West Local Government Area of Oyo State who were willing to participate in the study

3.6 Inclusion Criteria

For the purpose of this study, all consenting primary school pupils within the age range of 9-14 years, whose parents permitted to participate in the research study and are apparently healthy and not on medication was involved.

3.7 Exclusion Criteria

This study excluded all unconsented pupils whose age was not within the speculated range, whose parents did not permit to participate and those pupils that were sick when the data was collected.

3.8 Sample Size Determination

This was calculated using sample size formula for single proportion;

$$n = \frac{z^2 (p) (1-p)}{e^2}$$, (Kasiulevicius *et al.*, 2006)

Z = Critical value at 95% confidence interval = 1.96

p = 50% (assumed prevalence)

e = Level of precision at 5% precision = 0.05

$$n = \frac{(1.96)^2 (0.5) (1-0.5)}{(0.05)^2}$$

n=384.16

Attrition value determination

Assume 10% of the study for the estimate of non-response.

10/100 x 384.16 = 38.42

Total sample population = 384 + 38.42 = 422

The minimum sample size for the study including the non response rate was approximately 422 respondents.

3.9 Sampling Strategy

A multistage sampling technique was used for this study to select the respondents from the various schools in urban slum wards.

The first stage involved the selection of wards in the areas that constitute urban slum using simple random sampling technique.

The second stage of sampling involved the selection of all the public schools in the selected wards.

The third stage of sampling involved selection of students from each school based on the sample size. It is shown in the table below.

Table 3.3: School Sample Size

S/N	Name of School	Number of students selected
1	Chief Agbaje Memorial School I	31
2	Chief Agbaje Memorial School 2	30
3	Chief Agbaje Memorial School 3	30
4	Sacred Heart, Ogunpa	30
5	St Patrick, Ogunpa	30
6	Baptist Primary School 1	30
7	Baptist Primary School 2	30
8	Baptist Primary School 3	30
9	St Micheal Primary School 1 Okeseni	30
10	St Micheal Primary School 2 Okeseni	30
11	St Micheal Primary School 3 Okeseni	31
12	St Patrick Primary School 2, Abebi	30
13	St Patrick Primary School 1, Abebi	30
14	St Patrick Primary School 3, Abebi	30
	Total	422

The fourth stage involved stratifying the pupils based on their classes eg, primary four, primary five, primary six and selection of equal number of pupils from each class. The inclusion criteria were used to select only the pupils within the age bracket 9-14 years. In each class, those within the ages of 9 and 14 years were identified and balloting (YES or NO) was then used to randomly select the require respondents for the study. Pupils who picked YES were selected.

The pupils selected were calculated for each school as stated in the table below

Table 3.4: Selection of Pupils based on their classes and schools.

S/N	Name of School	Class			Total Number of Pupils selected from each school
		Primary four	Primary five	Primary Six	
1	Chief Agbaje Memorial School I	10	10	11	31
2	Chief Agbaje Memorial School 1I	10	10	10	30
3	Chief Agbaje Memorial School 111	10	10	10	30
4	Sacred Heart, Ogunpa	10	10	10	30
5	St Patrick, Ogunpa	10	10	10	30
6	Baptist Primary School 1	10	10	10	30
7	Baptist Primary School 11	10	10	10	30
8	Baptist Primary School 111	10	10	10	30
9	St Micheal Primary School 1 Okeseni	10	10	11	31
10	St Micheal Primary School 11Okeseni	10	10	10	30
11	St Micheal Primary School 111Okeseni	10	10	10	30
12	St Patrick Primary School 1, Abebi	10	10	10	30
13	St Patrick Primary School 11, Abebi	10	10	10	30
14	St Patrick Primary School 111, Abebi	10	10	10	30
	Total	140	140	142	422

3.10 Instruments for Data Collection

3.10.1 Questionnaire

A semi-structured interviewer-administered questionnaire was developed for data collection with the following components Viz: socio-demographic characteristics, eating habits of the primary school children, factors that may influence poor dietary habits and nutritional status and dietary intake. The questionnaire was adapted from the National Food Consumption and Nutrition Survey and previously published research works.

3.10.2 Dietary diversity questionnaire (FAO, 2010)

Dietary diversity questionnaire which was originally developed by FAO in 2010 was developed to assess Dietary Intake. This measures quality of the individual's diet, that is, probability of micronutrient adequacy of the dietary intake of the children. The Children's Dietary Diversity Score (DDS) was calculated from this and necessary deductions were made.

3.10.3Food Frequency questionnaire:

Information on the respondent's dietary pattern was collected using the food frequency questionnaire in a standardized procedure. The Food Frequency questionnaire was developed to determine dietary pattern, and thus to assess habitual diet by asking the respondents about the frequency with which food items or specific food groups are usually consumed in a week. The questionnaire contained different classes of food, snacks and drinks and the number of times the respondent consumed them in a week.

3.10.4 Anthropometry measurement and Clinical observation

Anthropometry measurement and Clinical observation tool was developed to measure height, weight and calculation of the body mass index (BMI= Weight kg/ height (m^2) using validated weighing scale and height meter respectively.

3.11 Validity of the Instrument

Several measures were taken to ensure that the instruments were valid and reliable. Relevant literatures were viewed; the formulated objectives were guides in the modification of the instrument. The instrument was also reviewed by my research supervisor, and other experts in the department, senior colleagues, nutritionists, medical statistician for face and content validity. The instruments were pretested among 45subjects in a school in Ibadan North Local Government Area in order to check the psychometric properties of the instrument. Also, adequate measurements of the weight, and height of the children were taken using a well calibrated weighing scale and height meter respectively and use of trained research assistants on the data collection procedures.

3.12 Reliability of the Instrument

The analysis of the questionnaire pretested was done using the Cronbach Alpha Coefficient of the Statistical Package for Social Sciences(SPSS) in order to ascertain the psychometric properties of the instrument. Results A reliability coefficient of 0.5 and above was taken as being reliable and relevant corrections were made before using the instrument on the study population. The correlation coefficient for the instrument was 0.612.

3.13Data Collection Procedure

The data collection was carried out within one month from 10th July to 13th August 2015. Visits were made to the selected schools in the company of the research assistants that were trained before they were set up for data collection. The administrations of the questionnaires were done by the researcher together with the research assistants that were trained prior to the commencement of the study. Six research assistants were used. They were trained on the objectives of the study, understanding of the instruments for data collection, building rapport with the respondents, interviewing skills and other ethical issues involved in research.

The instruments and how they were used in the collecting the data are explained below:

The semi-structured questionnaire: The study participants were interviewed in their schools at a time convenient for them. The data collection process involved the following steps:

1. Permission from the Commissioner of Education, Oyo State.

2. Visit and permission from the Universal Basic Education Board, Oyo State.

3. Visit to the North West Local Government Area for Ward and School Identification.

4. Visit to the selected wards and identification of the public schools.

5. Permission from the school principals and selection of respondents based on the inclusion criteria and class.

6. Administration of the questionnaire to the respondents.

The anthropometric measurement: This was used to determine the nutritional status of the respondents. The anthropometric measurement involved accurate measurement of the weight, height and calculation of the body mass index (BMI- Weight (kg) / Ht (m^2).

Weight: This was taken with a digital bathroom scale which was calibrated. The scale was placed on hard flat surface and was set back to zero after every measurement, subjects were asked to stand unassisted at the centre and looked straight ahead relaxed but still, wearing minimum clothes and without shoes. Body weight was recorded to the nearest 0.1kg

Height: The measurement of height was done with graduated height meter. Clothing was minimal and posture clearly seen, shoes and socks were not worn. The subject was standing straight, feet together, knees straight and heels, buttocks and shoulder blade in contact with vertical surface. The arms were hanging loosely at the sides with palm facing the things in a natural manner. A wooden head pier was gently lowered to

the level of the scalp, crushing the hair and making contact with the tip of the head. Measurements were taken to the nearest 0.1cm.

Individual Dietary Diversity Scores**:** Dietary diversity scores were calculated by summing the number of food groups consumed in the household or by the individual respondent over the 24-hour recall period.

Food Frequency Questionnaire: This was also used along with the anthropometric measurement and dietary diversity scores to determine the respondents' nutritional status. The questionnaire contained different classes of foods and the number of times consumed in the past one week. With this, foods that were consumed regularly, seldom or not consumed at all were identified. This was later used to determine why a respondent was either underweight, healthy weight or overweight.

3.14 Ethical Considerations

Ethical approval was obtained from the Oyo State Ethics Review Committee.

A signed informed consent from the participants was obtained before administering the questionnaire. Participants were free to withdraw from the study, if they deemed it necessary

Confidentiality of data: Issues of confidentiality were adequately addressed to make every respondent reveal all necessary information that answers the research questions without any sense of the respondents being uncomfortable.

Translation of protocol to local language: The questionnaire, consent and assent form is translated into the local language (Yoruba language). Research assistants (who were assisting in the proper filling of the questionnaires) were fluent in the Yoruba language and conversant with the objectives of the study.

Beneficence to participants: Respondents were able to know their weight and height. Findings from this study gave an insight to the dietary pattern and nutritional status of upper primary school children, and hence will help to develop intervention strategies to improve their nutritional status.

Non-maleficence to participants: The proposed research was relatively risk free, however the inconvenience involved in the study is the time of the respondents that was required in the study.

Voluntariness: Voluntary participation and withdrawal from the study at any time without repercussion was guaranteed.

3.15 Data Management, Analysis and Presentation

The data collected was managed as thus:

1. The questionnaires were thoroughly sorted, cleaned and coded using a coding guide prepared for the instrument.

2. The quality of the information was verified by the researcher.

3. Serial numbers were written on the questionnaires for easy identification and recall of any instruments with problems

4. Administered questionnaires were edited and hand coded by the researcher.

5. The data collected were analysed as thus:

a. **Descriptive Statistics:** frequency, percentage tables, mean and standard deviation) were used to describe the socio-demographic data, food consumption pattern; dietary diversity score and feeding practices.

b. **Anthropometry:** Weight and height were entered as Microsoft Access file and using WHO Anthro Plus 2005.Nutritional Status of the subjects was assessed by using various parameters VIZ: body mass Index- for- age (BMI) and height- for age (Z-score). BMI for age was compared with WHO 2007 reference standard.

Normal -1SD to + 1SD

Overweight: >+1SD (equivalent to BMI 25 kg/m^2 at 19 years)
Obesity: >+2SD (equivalent to BMI 30 kg/m^2 at 19 years)
Severe thinness: <-3S

c. **Statistical Analysis :**The statistical analysis was done using statistical package for the social scientists (SPPSS version 16 Microsoft Excel 2003). Descriptive statistic was used to describe all variable and to differentiate between them; Mean, standard deviation (SD), frequencies and percentages. Chi-square analysis was used to established relationship between variable. The appropriate level of significance used was $P<0.05$.

3.16 Limitations of the Study

The study focused on the dietary habits and nutritional status of upper primary school children. Some respondents may not be able to give all the necessary information required by the researcher accurately. For instance, there may be recall bias like a respondent mentioning certain foods that were never consumed but claimed to have been consumed because of its nutritional values. For this, the validity of the food consumed may not be adequate. Consequently, since not all the school children were used for the study, it was possible to have excluded some children that could have provided vital information.

3.17 Reducing Identified Bias.

The researcher educated the school authority and the school children thoroughly on the objectives of the study and its significance in our society. Emphases were laid on honesty as the information was purely for research purposes in which their names / identity would not be mentioned or needed.

CHAPTER FOUR

Results

The dietary habits and nutritional status of upper primary school children in Ibadan North West Local Government Area, Oyo State, Nigeria are reported in this chapter.

4.1Respondents' Socio Demographics Characteristics

The socio-economic and demographic characteristics of the respondents are presented in Table 4.1. Ward 6 (Abebi), has the highest number of respondents with 182 (43.1%) followed by Ward 3(Agbeni) and Ward 5(Idika) with90 (21.3%)and 90 (21.3%) respectivelywhile Ward 4 (Ogunpa) had the least respondents with 60 (14.2%).

The mean age of the respondents was 11.5±1.3 years; 27.9% of the respondents were 13years and 5.2% were 9 years old. A total of 56 respondents (24.9%) within the age of 10 years were female and 17.4% of the population were male respondents within the same age range. Similarly, 62 (31.8%) of male respondents were 13 years. The difference in the age of male and female was statistically significant ($p<0.05$). The female respondents was 226 (53.6%) while 196 (46.4%) were male.

A third, 142 (33.7%) of the respondents were from primary 6, while 138 (32.8%) and 141 (33.5%) were from primary 4 and primary 5 respectively. Majority 387 (91.9%) of the respondents were from the Yoruba ethnic group but only a few 9 (2.1%) and 22 (5.2%) were from Hausa and Ibo respectively. However, only 3 (0.7%) of the respondents were from other ethnic groups namely; Edo. More than a half 303 (71.8%) of the respondents were Christians, only a few 110 (26.1%) and 7 (1.7%) were from Islam and Traditional religion respectively.

Majority 268 (63.5%) of the respondents were from monogamous families while about a third, 154 (36.5%) were from polygamous families. 121 (28.7%) have 5 children and 122 (28.9%) of respondents' birth position in the family is first position. Majority 327 (77.5%) of the respondents' parents were living together. Greater proportion 335 (84.1%) of the respondents do live with their parents but only a few 51 (12.1%), 9 (2.1%), 7 (1.7%) live with relations, friends and alone respectively. About

a half 182 (43.1%) of the respondent's father were traders while majority of the respondents' mothers were traders. Many 153 (36.3%) of respondents' father had completed higher education while 153 (36.5%) of respondents had completed secondary education. Although, 137 (32.5%) of respondents' mother had also completed higher education.

Majority 310 (73.5%) of the respondents depend on Power Holding for their source of energy for lightning but only a few 66 (15.6%), 46 (10.9%) depend on personal generator and solar energy respectively. Similarly, greater proportion341 (80.8%) of the respondents depends on kerosene as their source of energy for cooking. About a half 142 (33.6%) of respondents depends on rain as their source of water for drinking although, 112 (26.5%) and 100 (23.7%) depends on pipe bore water and bore hole water respectively. Less than half 157 (37.3%) depend on borehole as a source of water for cooking. Similarly, a few 144 (34.2%) of respondents depend on refuse dump as a source of refuse disposal. Many 242 (57.6%) of the respondents live in room and parlour while 213 (50.9%) depends on water system as a type of toilet for sewage disposal.

TABLE 4.1: Respondents Socio-Demographic Characteristics

VARIABLE	TOTAL N (%)	MALE N (%)	FEMALE N (%)	X^2	P-Value
Location					
Ward 3 (Agbeni)	90 (21.3)	38 (19.4)	52 (23.0)	0.845	0.839
Ward 4 (Ogunpa)	60 (14.2)	28 (14.3)	32 (14.2)		
Ward 5 (Idika)	90 (21.3)	43 (21.9)	47 (20.8)		
Ward 6 (Abebi)	182 (43.1)	87 (44.4)	95 (42.0)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		
Name of School					
Chiief Agbaje Memorial School 1	30 (7.1)	11 (5.6)	19 (8.4)	58.442	0.000
Chief Agbaje Memorial School 2	31 (7.3)	12 (6.1)	19 (8.4)		
Chief Agbaje Memorial School 3	30 (7.1)	15 (7.7)	15 (6.6)		
Sacred Heart Ogunpa	30 (7.1)	0 (0.0)	30 (13.3)		
St Patrick Ogunpa	30 (7.1)	28 (14.3)	2 (0.9)		
Baptist Primary School 1	30 (7.1)	15 (7.7)	15 (6.6)		
Baptist Primary School 2	30 (7.1)	14 (7.1)	16 (7.1)		
Baptist Primary School 3	30 (7.1)	14 (7.1)	16 (7.1)		
St Michael Okeseni 1	30 (7.1)	14 (7.1)	16 (7.1)		
St Michael Okeseni 2	30 (7.1)	10 (5.1)	20 (8.8)		
St Michael Okeseni 3	30 (7.1)	16 (8.2)	14 (6.2)		
St Patrick Abebi 1	30 (7.1)	15 (7.7)	15 (6.6)		
St Patrick Abebi 2	30 (7.1)	16 (8.2)	14 (6.2)		
St Patrick Abebi 3	31 (7.3)	16 (8.2)	15 (6.6)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		
Age				5.358	0.252
0	90 (21.4)	34 (17.4)	56 (24.9)		
11	94 (22.4)	42 (21.5)	52 (23.1)		
12	96 (22.9)	48 (24.6)	48 (21.3)		
13	118 (28.1)	62 (31.8)	56 (24.9)		
Total	420 (100.0)	195 (100.0)	226 (100.0)		
Gender					
Male	196 (46.4)	196 (100.0)	0 (0.0)		
Female	226 (53.6)	0 (0.0)	226 (100.0)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		

TABLE 4.1: Respondents Socio-Demographic Characteristics CONT'D

VARIABLE	TOTAL N (%)	MALE N (%)	FEMALE N (%)	X^2	P-Value
Class					
Primary 4	138 (32.8)	61 (31.3)	77 (34.1)	0.403	0.818
Primary 5	141 (33.5)	66 (33.8)	75 (33.2)		
Primary 6	142 (33.7)	68 (34.9)	74 (32.7)		
Total	**421 (100.0)**	**195 (100.0)**	**226 (100.0)**		
Ethnicity					
Igbo	22 (5.2)	9 (4.6)	13 (5.8)	0.544	0.909
Yoruba	387 (91.9)	182 (92.9)	205 (91.1)		
Hausa	9 (2.1)	4 (2.0)	5 (2.2)		
Edo	3 (0.7)	1 (0.5)	2 (0.9)		
Total	**421 (100.0)**	**196 (100.0)**	**225 (100.0)**		
Religion					
Christianity	303 (71.8)	144 (73.5)	159 (70.4)	0.924	0.630
Islam	110 (26.1)	49 (25.0)	61 (27.0)		
Traditional	7 (1.7)	2 (1.0)	5 (2.2)		
Total	**422 (100.0)**	**196 (100.0)**	**226 (100.0)**		
Family					
Monogamous	268 (63.5)	127 (64.8)	141 (62.4)	0.262	0.609
Polygamous	154 (36.5)	69 (35.2)	85 (37.6)		
Total	**422 (100.0)**	**196 (100.0)**	**226 (100.0)**		
Number of children					
1	22 (5.2)	12 (6.1)	10 (4.4)	3.251	0.661
2	32 (7.6)	19 (9.7)	13 (5.8)		
3	58 (13.7)	27 (13.8)	31 (13.7)		
4	88 (20.9)	40 (20.4)	48 (21.2)		
5	121 (28.7)	53 (27.0)	68 (30.1)		
6	101 (23.9)	45 (23.0)	56 (24.1)		
Total	**422 (100.0)**	**196 (100.0)**	**226 (100.0)**		
Respondents birth position in family					
1st	122 (28.9)	64 (32.7)	58 (25.7)	10.922	0.053
2nd	98 (23.2)	43 (21.9)	55 (24.3)		
3rd	100 (23.7)	36 (18.4)	64 (28.3)		
4th	44 (10.4)	19 (9.7)	25 (11.1)		
5th	37 (8.8)	20 (10.2)	17 (7.5)		
6th	21 (5.0)	14 (7.1)	7 (3.1)		
Total	**422 (100.0)**	**196 (100.0)**	**226 (100.0)**		

TABLE 4.1: Respondents Socio-Demographic Characteristics CONT'D

VARIABLE	TOTAL N (%)	MALE N (%)	FEMALE N (%)	X^2	P-Value
Are your parents living together?					
Yes	327 (77.5)	149 (76.0)	178 (78.8)	0.452	0.501
No	95 (22.5)	47 (24.0)	48 (21.2)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		
Who do you live with?					
Parents	335 (84.1)	171 (87.2)	184 (81.4)	3.069	0.381
Relation	51 (12.1)	19 (9.7)	32 (14.2)		
Friends	9 (2.1)	4 (2.0)	5 (2.2)		
Alone	7 (1.7)	2 (1.0)	5 (2.2)		
Total	422 (100.00	196 (100.0)	226 (100.0)		
Father's occupation					
Faming	47 (11.1)	24 (12.2)	23 (10.2)	3.187	0.364
Trading	182 (43.1)	91 (46.4)	91 (40.3)		
Civil servant	59 (14.0)	23 (11.7)	36 (15.9)		
Artisan	134 (31.8)	58 (29.6)	76 (33.6)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		
Mother's occupation					
Farming	16 (3.8)	7 (3.6)	9 (4.0)	2.223	0.527
Trading	305 (72.3)	148 (75.5)	157 (69.5)		
Civil servant	34 (8.1)	15 (7.7)	19 (8.4)		
Artisan	67 (15.9)	26 (13.3)	41 (18.1)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		
Educational level of father					
No Education	41 (9.7)	18 (9.2)	23 (10.2)	4.310	0.230
Primary Education	96 (22.7)	47 (24.0)	49 (21.7)		
Secondary Education	132 (31.3)	69 (35.2)	63 (27.9)		
Higher Education	153 (36.3)	62 (31.6)	91 (40.3)		
Total	422 (100.0)	196 (100.0)	223 (100.0)		
Educational level of mother					
No Education	25 (5.9)	13 (6.6)	12 (5.3)	1.455	0.693
Primary Education	107 (25.4)	54 (27.6)	53 (23.5)		
Secondary Education	153 (36.3)	68 (34.7)	85 (37.6)		
Higher Education	137 (32.5)	61 (31.1)	76 (33.6)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		

TABLE 4.1: Respondents Socio-Demographic Characteristics CONT'D

VARIABLE	TOTAL N (%)	MALE N (%)	FEMALE N (%)	X^2	P-Value
Source of energy for lightning					
Personal generator	66 (15.6)	25 (12.8)	41 (18.1)	2.749	0.253
Solar energy	46 (10.9)	20 (10.2)	26 (11.5)		
Power holding	310 (73.5)	151 (77.0)	159 (70.4)		
Total	422 (100.0)	196 (100.0)	224 (100.0)		
Source of energy for cooking					
Liquified gas	45 (10.7)	18 (9.2)	27 (11.9)	1.846	0.605
Kerosene	341 (80.8)	161 (82.1)	180 (79.6)		
Charcoal	18 (4.3)	10 (5.1)	8 (3.5)		
Firewood	18 (4.3)	7 (3.6)	11 (4.9)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		
Source of drinking water					
Spring/river	16 (3.8)	10 (5.1)	6 (2.7)	11.177	0.025
Well	52 (12.3)	32 (16.3)	20 (8.8)		
Borehole	100 (23.7)	51 (26.0)	49 (21.7)		
Pipe borne water	112 (26.5)	43 (21.9)	69 (30.5)		
Rain water	142 (33.6)	60 (30.6)	82 (36.3)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		
Source of water for cooking					
Spring/river	19 (4.5)	10 (5.1)	9 (4.0)	12.609	0.013
Well	74 (17.6)	40 (20.4)	34 (15.1)		
Borehole	157 (37.3)	84 (42.9)	73 (32.4)		
Pipe borne water	97 (23.0)	37 (18.9)	60 (26.7)		
Rain water	74 (17.6)	25 (12.8)	49 (21.8)		
Total	421 (100.0)	196 (100.0)	225 (100.0)		
Method of refuse disposal					
Burning	87 (20.7)	41 (20.9)	46 (20.4)	1.505	0.826
Bush	113 (26.8)	50 (25.5)	63 (28.0)		
Refuse dump	144 (34.2)	71 (36.2)	73 (32.4)		
City service	74 (17.6)	32 (16.3)	42 (18.7)		
River	3 (0.7)	2 (1.0)	1 (0.4)		
Total	421 (100.0)	196 (100.0)	225 (100.0)		

TABLE 4.1: Respondents Socio-Demographic Characteristics CONT'D

VARIABLE	TOTAL N (%)	MALE N (%)	FEMALE N (%)	X^2	P-Value
Single room	95 (22.6)	48 (24.6)	47 (20.9)	11.849	0.019
Room and parlor	242 (57.6)	118 (60.5)	124 (55.1)		
Flat	51 (12.1)	18 (9.2)	33 (14.7)		
Duplex	19 (4.5)	10 (5.1)	9 (4.0)		
Bungalow	13 (3.1)	1 (0.5)	12 (5.3)		
Total	420 (100.0)	195 (100.0)	225 (100.0)		
Type of toilet					
No toilet	48 (11.4)	21 (10.7)	27 (11.9)	5.102	0.078
Pit latrine	159 (37.7)	85 (43.4)	74 (32.7)		
Water system	213 (50.9)	90 (45.9)	125 (55.3)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		

4.2 Respondents Eating Habits

Table 4.2 reveals the eating habits of the primary school children. A greater proportion, 309 (73.6%) of respondents had breakfast this morning but only a few 110 (26.2%) skipped breakfast. Many 59 (53.2%) reported that they are not used to having breakfast, only 29 (26.1%) agreed that it was due to lack/absence of money. Many 176 (42.1%) had breakfast for 5-7 times a week. Although, 106 (25.4%) reported having breakfast for 1-2 times a week. Majority 351 (83.2%) reported that they usually have breakfast, lunch and dinner but only a few 30 (7.1%), 24 (5.7%), 8 (1.9%), 4 (1.0%) and 3 (0.7%) had breakfast and lunch, breakfast and dinner, lunch and dinner, breakfast only and dinner only respectively. Few 90 (21.8%) usually take beans and rice for breakfast, 121 (30.6%) usually take amala and ewedu for lunch, 106 (26.7%) usually depend on amala and ewedu for dinner.

About a half 146 (35.6%) of the respondents reported white rice and stew as their favourite food. Greater proportion 355 (84.1%) reported that food is always available at home and at all time, 155 (36.7%) ate outside the home once on the average daily, majority 326 (79.3%) reported eating at school, 344 (81.5%) obtain their food from food vendors, 188 (44.5%) purchase food on daily basis. Less than half 194 (46.4%) consume snacks always and many 173 (41.0%) obtain their snack outside the home. Majority 374 (89.5%) reported that their favourite food are always available at their home. Although, 212 (50.7%) agreed that there are certain foods they don't like to consume. A few 21 (25.6%) reported amala and ewedu, 17 (20.7%) reported beans. More than half 238 (57.4%) reported that they don't have a garden at home were crops are planted.

TABLE 4.2: Respondents Eating Habits

VARIABLE	TOTAL N (%)	MALE N(%)	FEMALE N (%)	X^2	P-Value
Have you had breakfast this morning?					
Yes	309 (73.6)	136 (69.7)	173 (76.9)	3.889	0.143
No	110 (26.2)	59 (30.3)	51 (22.7)		
I don't know	1 (0.2)	0 (0.0)	1 (0.4)		
Total	420 (100.0)	195 (100.0)	225 (100.0)		
If no, why?					
No food at home	23 (20.7)	7 (11.9)	16 (30.8)	6.956	0.031
No money	29 (26.1)	15 (25.4)	14 (26.9)		
Total	111 (100.0)	59 (100.0)	52 (100.0)		
How often do you have breakfast in a week?					
1-2 times	106 (25.4)	57 (29.2)	49 (22.0)	3.615	0.306
3-4 times	129 (30.9)	57 (29.2)	72 (32.3)		
5-7 times	176 (42.1)	79 (40.5)	97 (43.5)		
Never	7 (1.7)	2 (1.0)	5 (2.2)		
Total	418 (100.0)	195 (100.0)	223 (100.0)		
Which meal do you frequently eat?					
Breakfast, lunch and dinner	351 (83.2)	159 (82.0)	192 (85.0)	1.138	0.951
Breakfast and lunch	30 (7.1)	16 (8.2)	14 (6.2)		
Breakfast and dinner	24 (5.7)	12 (6.2)	12 (5.3)		
Lunch and dinner	8 (1.9)	4 (2.1)	4 (1.8)		
Breakfast only	4 (1.0)	2 (1.0)	2 (0.9)		
Dinner only	3 (0.7)	1 (0.5)	2 (0.9)		
Total	420 (100.0)	194 (100.0)	226 (100.0)		
Which food item do you usually take for breakfast?					
White rice and stew	236 (57.3)	114 (58.8)	122 (56.0)	14.837	0.389
Beans	9 (2.2)	5 (2.6)	4 (1.8)		
Beans and rice	90 (21.8)	44 (22.7)	46 (21.1)		
Amala and ewedu	8 (1.9)	2 (1.0)	6 (2.8)		
Bread and tea	12 (2.9)	5 (2.6)	7 (3.2)		
Yam and egg	8 (1.9)	2 (1.0)	6 (2.8)		
Soaking garri	2 (0.5)	1 (0.5)	1 (0.5)		
Indomie and egg	1 (0.2)	0 (0.0)	1 (0.5)		
Jollof rice	33 (8.0)	14 (7.2)	19 (8.7)		
Bread and egg	6 (1.5)	5 (2.6)	1 (0.5)		
Garri and egusi	1 (0.2)	1 (0.5)	0 (0.0)		
Fufu and egusi	2 (0.5)	0 (0.0)	2 (0.9)		
Yam and beans	1 (0.2)	1 (0.5)	0 (0.0)		
Potato	1 (0.2)	0 (0.0)	1 (0.5)		
Moimoi	2 (0.5)	0 (0.0)	2 (0.9)		
Total	412 (100.0)	194 (100.0)	218 (100.0)		

TABLE 4.2: Respondents Eating Habits CONT'D

VARIABLES	TOTAL N (%)	MALE N (%)	FEMALE N (%)	X^2	P-Value
Which food do you usually take for lunch?					
White rice and stew	32 (8.1)	9 (4.9)	23 (10.9)	35.355	0.104
Beans	42 (10.6)	15 (8.1)	27 (12.8)		
Beans and rice	13 (3.3)	5 (2.7)	8 (3.8)		
Amala and ewedu	121 (30.6)	57 (30.8)	64 (30.3)		
Bread and tea	22 (5.6)	6 (3.2)	16 (7.6)		
Yam and egg	72 (18.2)	40 (21.6)	32 (15.2)		
Soaking garri	27 (6.8)	18 (9.7)	9 (4.3)		
Iyan and efo	1 (0.3)	1 (0.5)	0 (0.0)		
Okro and Amala	1 (0.3)	0 (0.0)	1 (0.5)		
Indomie and egg	5 (1.3)	3 (1.6)	2 (0.9)		
1Indomie	1 (0.3)	0 (0.0)	1 (0.5)		
Jollof rice	6 (1.5)	6 (3.2)	0 (0.0)		
Porridge yam	5 (1.3)	2 (1.1)	3 (1.4)		
Bread and egg	6 (1.5)	3 (1.6)	3 (1.4)		
Garri and egusi	11 (2.8)	5 (2.7)	6 (2.8)		
Spaghetti	1 (0.3)	0 (0.0)	1 (0.5)		
Fufu and egusi	4 (1.0)	1 (0.5)	3 (1.4)		
Yam and beans	4 (1.0)	2 (1.1)	2 (0.9)		
Bread and butter	6 (1.5)	3 (1.6)	3 (1.4)		
Yam and plantain	2 (0.5)	0 (0.0)	2 (0.9)		
Yam and egusi	2 (0.5)	1 (0.5)	1 (0.5)		
Pounded yam with vegetable soup	2 (0.5)	1 (0.5)	1 (0.5)		
Moinmoin	1 (0.3)	1 (0.5)	0 (0.0)		
Bread and akara	4 (1.0)	3 (1.6)	1 (0.5)		
Snacks	3 (0.8)	2 (1.1)	1 (0.5)		
Soft drink and snacks	1 (0.3)	1 (0.5)	0 (0.0)		
Plaintain and eggs	1 (0.3)	0 (0.0)	1 (0.5)		
Total	396 (100.0)	185 (100.0)	211 (100.0)		

TABLE 4.2: Respondents Eating Habits CONT'D

VARIABLE	TOTAL N (%)	MALE N(%)	FEMALE N (%)	X^2	P-Value
Which food do you usually take for dinner?					
White rice and stew	50 (12.6)	26 (14.1)	24 (11.3)	38.143	0.045
Beans	34 (8.6)	16 (8.6)	18 (8.5)		
Beans and rice	14 (3.5)	7 (3.8)	7 (3.3)		
Amala and ewedu	106 (26.7)	50 (27.0)	56 (26.4)		
Bread and tea	37 (9.3)	12 (6.5)	25 (11.8)		
Yam and egg	55 (13.0)	18 (9.7)	37 (17.5)		
Soaking garri	1 (0.3)	1 (0.5)	0 (0.0)		
Indomie and egg	12 (2.8)	7 (3.8)	5 (2.4)		
Jollof rice	6 (1.5)	6 (3.2)	0 (0.0)		
Porridge yam	3 (0.8)	1 (0.5)	2 (0.9)		
Bread and egg	10 (2.5)	3 (1.6)	7 (3.3)		
Garri and egusi	23 (5.8)	10 (5.4)	13 (6.1)		
Spaghetti	3 (0.8)	3 (1.6)	0 (0.0)		
Fufu and egusi	7 (1.8)	2 (1.1)	5 (2.4)		
Yam and beans	2 (0.5)	0 (0.0)	2 (0.9)		
Bread and butter	1 (0.3)	0 (0.0)	1 (0.5)		
Yam and plantain	1 (0.3)	1 (0.5)	0 (0.0)		
Yam and egusi soup	2 (0.5)	1 (0.5)	1 (0.5)		
Pounded yam with vegetable soup	7 (1.8)	5 (2.7)	2 (0.9)		
Potato	1 (0.3)	0 (0.0)	1 (0.4)		
Moinmoin	3 (0.8)	1 (0.5)	2 (0.9)		
Bread and akara	14 (3.5)	10 (5.4)	4 (1.9)		
Fruits	1 (0.3)	1 (0.5)	0 (0.0)		
Snacks	2 (0.5)	2 (1.1)	0 (0.0)		
Plantain and egg	1 (0.3)	1 (0.5)	0 (.0)		
Pap	1 (0.3)	1 (0.5)	0 (0.0)		
Total	397 (100.0)	185 (100.0)	212 (100.0)		

TABLE 4.2: Respondents Eating Habits CONT'D

VARIABLE	TOTAL N (%)	MALE N (%)	FEMALE N (%)	X^2	P-Value
What is your favourite food?					
White rice and stew	146 (35.6)	69 (36.3)	77 (35.0)	17.273	0.748
Beans	21 (5.1)	10 (5.3)	11 (5.0)		
Beans and rice	91 (22.2)	48 (25.3)	43 (19.5)		
Amala and ewedu	21 (5.1)	12 (6.3)	9 (4.1)		
Bread and tea	9 (2.2)	4 (2.1)	5 (2.3)		
Yam and egg	57 (13.9)	23 (12.1)	34 (15.5)		
Soaking garri	1 (0.2)	1 (0.5)	0 (0.0)		
Iyan and efo	2 (0.5)	1 (0.5)	1 (0.5)		
Indomie and egg	8 (2.0)	2 (1.1)	6 (2.7)		
Indomie	1 (0.2)	0 (0.0)	1 (0.5)		
Jollof rice	28 (6.6)	10 (5.3)	18 (8.2)		
Porridge yam	2 (0.5)	0 (0.0)	2 (0.9)		
Bread and egg	2 (0.5)	0 (0.0)	2 (0.9)		
Garri and egusi	6 (1.5)	2 (1.1)	4 (1.8)		
Spaghetti	1 (0.2)	1 (0.5)	0 (0.0)		
Yam and beans	4 (1.0)	2 (1.1)	2 (0.9)		
Yam and plantain	2 (0.5)	1 (0.5)	1 (0.5)		
Yam and egusi	2 (0.5)	1 (0.5)	1 (0.5)		
Pounded yam with vegetables soup	1 (0.2)	0 (0.0)	1 (0.5)		
Moinmoin	1 (0.2)	1 (0.5)	0 (0.0)		
Bread and akara	1 (0.2)	1 (0.5)	0 (0.0)		
Fried rice	2 (0.5)	1 (0.5)	1 (0.5)		
Plantain and egg	1 (0.2)	0 (0.0)	1 (0.5)		
Total	410 (100.0)	190 (100.0)	220 (100.0)		

TABLE 4.2: Respondents Eating Habits CONT'D

VARIABLE	TOTAL N (%)	MALE N (%)	FEMALE N (%)	X^2	P-Value
Is food always available to you all the time at home?					
Yes	355 (84.1)	170 (86.7)	185 (81.9)	3.758	0.153
No	60 (14.2)	25 (12.8)	35 (15.5)		
I don't know	7 (1.7)	1 (0.5)	6 (2.7)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		
What is the average number of time you eat outside the home daily?					
Once	155 (36.7)	74 (37.8)	81 (35.8)	7.672	0.053
2 times	114 (27.0)	63 (32.1)	51 (22.6)		
3 times	132 (31.3)	50 (25.5)	82 (36.3)		
4 times	21 (5.0)	9 (4.6)	12 (5.3)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		
Where do you eat?					
School	326 (79.3)	144 (75.4)	182 (82.7)	5.319	0.070
On the way to school	42 (10.2)	20 (10.5)	22 (9.7)		
Others	43 (10.5)	27 (14.1)	16 (7.3)		
Total	411 (100.0)	191 (100.0)	220 (100.0)		
From whom do you get these foods to eat?					
Food vendors	344 (81.5)	158 (80.6)	186 (82.3)	0.209	0.901
Neighbours	55 (13.0)	27 (13.8)	28 (12.4)		
Friends	23 (5.5)	11 (5.6)	12 (5.3)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		
How often do you buy food from vendors?					
Everyday	188 (44.5)	91 (46.4)	97 (42.9)	4.402	0.111
4-5 times /week	99 (23.5)	37 (18.9)	62 (27.4)		
2-3 times /week	135 (32.0)	68 (34.7)	67 (29.6)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		
How often do you eat snacks?					
Always	194 (46.4)	91 (46.9)	103 (46.0)	5.772	0.123
Occasionally	105 (25.1)	56 (28.9)	49 (21.9)		
Sometimes	102 (24.4)	38 (19.6)	64 (28.6)		
Never	17 (4.1)	9 (4.6)	8 (3.6)		
Total	418 (100.0)	194 (100.0)	224 (100.0)		
Where do you get snack?					
Home	133 (31.5)	73 (37.2)	60 (26.5)	10.647	0.005
Outside the home	173 (41.0)	83 (42.3)	90 (39.8)		
Both home and outside the home	116 (27.5)	40 (20.4)	76 (33.6)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		

4.3 Factors Influencing Respondents' Poor Dietary Habits and Nutritional Status

The factor influencing the respondents' poor dietary habits and nutritional status is presented in Table 4.3. Greater proportion 367 (87.8%) of respondents offer food and nutrition study as part of subject in school. Similarly, 331 (80.0%) knows the benefits of eating healthy. More than half 52 (61.2%) said to grow. Majority 403 (96.2%) reported that there are food vendors in their school. Many 132 (33.5%) listed white rice and stew as the kind of food sold in their school. More than half 234 (59.7%) usually purchase white rice and stew from the food vendor

TABLE 4.3: Factors Influencing Respondents Poor Dietary Habits and Nutritional Status

VARIABLE	TOTAL N (%)	MALE N (%)	FEMALE N (%)	X^2	P-Value
Is your favourite food always available at home?					
Yes	374 (89.5)	173 (89.2)	201 (89.7)	1.158	0.560
No	43 (10.3)	20 (10.3)	23 (10.2)		
I don't know	1 (0.2)	1 (0.5)	0 (0.0)		
Total	418 (100.0)	196 (100.0)	224 (100.0)		
If no , why					
No money	3 (60.0)	3 (60.0)	0 (0.0)		
No body to cook	2 (40.0)	2 (40.0)	0 (0.0)		
Total	5 (100.0)	5 (100.0)	0 (100.0)		
Are there certain foods that you don't like to eat?					
Yes	212 (50.7)	105 (53.8)	107 (48.0)	1.958	0.376
No	199 (47.6)	86 (44.1)	113 (50.7)		
I don't know	7 (1.7)	4 (2.1)	3 (1.3)		
Total	418 (100.0)	195 (100.0)	223 (100.0)		
If yes, what are these foods?					
White rice and stew	11 (13.4)	4 (12.5)	7 (14.0)	19.148	0.085
Beans	17 (20.7)	7 (21.9)	10 (20.0)		
Beans and rice	8 (9.8)	0 (0.0)	8 (16.0)		
Amala and ewedu	21 (25.6)	12 (37.5)	9 (18.0)		
Bread and tea	4 (4.9)	1 (3.1)	3 (6.0)		
Yam and egg	1 (1.2)	1 (3.1)	0 (0.0)		
Soaking garri	2 (2.4)	0 (0.0)	2 (4.0)		
Indomie and egg	4 (4.9)	0 (0.0)	4 (8.0)		
Jollof rice	1 (1.2)	0 (0.0)	1 (2.0)		
Garri and egusi	10 (12.2)	6 (18.8)	4 (8.0)		
Spaghetti	1 (1.2)	0 (0.0)	1 (2.0)		
Fufu and egusi	1 (1.2)	0 (0.0)	1 (2.0)		
Yam and beans	1 (1.2)	1 (3.1)	0 (0.0)		
Total	82 (100.0)	32 (100.0)	50 (100.0)		
Do you have a garden at home where crops are planted?					
Yes	173 (41.6)	84 (43.5)	89 (39.9)	1.027	0.598
No	238 (57.4)	106 (54.9)	132 (59.2)		
I don't know	5 (1.2)	3 (1.6)	2 (0.9)		
Total	416 (100.0)	193 (100.0)	223 (100.0)		

TABLE 4.3: Factors Influencing Respondents Poor Dietary Habits and Nutritional Status CONT'D

VARIABLE	TOTAL N (%)	MALE N (%)	FEMALE N (%)	X^2	P-Value
Is food and nutrition study part of your subject offered in school?					
Yes	367 (87.8)	164 (85.0)	203 (90.2)	2.671	0.102
No	51 (12.2)	29 (15.0)	22 (9.8)		
I don't know	0 (0.0)	0 (0.0)	0 (0.0)		
Total	418 (100.0)	193 (100.0)	225 (100.0)		
Do you know the benefits of eating healthy?					
Yes	331 (80.0)	149 (77.6)	182 (82.0)	1.507	0.471
No	80 (19.3)	41 (21.4)	39 (17.6)		
I don't know	3 (0.7)	2 (1.0)	1 (0.5)		
Total	414 (100.0)	192 (100.0)	222 (100.0)		
If yes, list some of them?					
To grow	52 (61.2)	20 (62.5)	32 (60.4)	1.116	0.773
It gives us energy	24 (28.2)	10 (31.3)	14 (26.4)		
To stay alive	5 (5.9)	1 (0.5)	4 (7.5)		
To avoid sickness	4 (4.7)	1 (0.5)	3 (5.7)		
Total	85 (100.0)	32 (100.0)	53 (100.0)		
Are there food vendors in your school?					
Yes	403 (96.2)	186 (95.9)	217 (96.4)	1.164	0.559
No	15 (3.6)	7 (3.6)	8 (3.6)		
I don't know	1 (0.2)	1 (0.5)	0 (0.0)		
Total	419 (100.0)	194 (100.0)	225 (100.0)		
If yes, what are the kinds of food that are sold in your school?					
White rice and stew	132 (33.5)	49 (26.5)	83 (39.7)	13.733	0.017
Beans	56 (14.2)	32 (17.3)	24 (11.5)		
Beans and rice	201 (51.0)	104 (56.2)	97 (46.4)		
Amala and ewedu	2 (0.5)	0 (0.0)	2 (1.0)		
Bread and tea	2 (0.5)	0 (0.0)	2 (1.0)		
Yam and egg	1 (0.3)	0 (0.0)	1 (0.5)		
Total	394 (100.0)	185 (100.0)	209 (100.0)		

TABLE 4.3: Factors Influencing Respondents Poor Dietary Habits and Nutritional Status CONT'D

VARIABLE	TOTAL N (%)	MALE N (%)	FEMALE N (%)	X^2	P-Value
Which food do you usually purchase from them?					
White rice and stew	234 (59.7)	104 (57.1)	130 (61.9)	7.904	0.245
Beans	33 (8.4)	18 (9.9)	15 (7.1)		
Beans and rice	112 (28.6)	57 (31.3)	55 (26.2)		
Amala and ewedu	2 (0.5)	0 (0.0)	2 (1.0)		
Bread and tea	4 (1.0)	1 (0.5)	3 (1.4)		
Yam and egg	6 (.5)	1 (0.5)	5 (2.4)		
Indomie and egg	1 (0.3)	1 (0.5)	0 (0.0)		
Total	392 (100.0)	182 (100.0)	210 (100.0)		

4.4: Respondents Frequency of Food Intake

Table 4.4 presents the frequency of food intake consumed by the respondents in one week (7 days). As shown in table 4.4, the main staple foods of the respondents from roots and tubers were yam flour 95 (45.2%) while maize pap *ogi* 102 (48.6%); rice cooked 216 (51.2%) and white bread 212 (50.2%) were the cereal staples mainly consumed. Legume were regularly consumed by many as cowpea cooked "*Beans"* 228 (54.2%), cowpea pudding *moinmoin* 181 (42.9%), and cowpea fried *akara* 187 (44.3%). Their major animal protein intake was from beef (meat) 157 (37.3%) and fish 201 (47.7%) while dairy products such as milk 212 (50.4%) were consumed 1-3 times a week. Although oranges 164 (39.0%), apple 157 (37.3%), banana 181 (43.0%) were the major fruits intake, fruits were consumed 1-3 times by the respondents. Green leafy vegetables were reported to be regularly taken as vegetable soup *ewedu* by majority 199 (47.2%) of the respondents. Their major source of fat and oil was from vegetable oil P*alm oil* 196 (46.6%) which were only added to food during food preparation.

TABLE 4.4: Respondents Frequency of Food Intake

Food Items	Never (0)/wk	1-3x/wk	4-6x/wk	Daily
Carbohydrates				
Rice	15 (3.6)	216 (51.2)	104 (24.6)	87 (20.6)
Bread	105 (24.9)	212 (50.2)	81 (19.2)	24 (5.7)
Yam	168 (39.8)	150 (35.5)	68 (6.1)	36 (8.5)
Amala	90 (21.3)	166 (39.3)	98 (23.2)	68 (16.1)
Garri	138 (32.7)	171 (40.5)	76 (18.0)	37 (8.8)
Fufu	192 (45.5)	150 (35.5)	46 (10.9)	34 (8.1)
Pap	162 (38.4)	162 (38.4)	78 (18.5)	20 (4.7)
Plaintain	128 (30.3)	169 (40.0)	75 (17.8)	50 (11.8)
Maize	125 (29.6)	187 (44.3)	72 (17.1)	38 (9.0)
Indomie	94 (22.3)	166 (39.3)	101 (23.9)	61 (14.5)
Spaghetti	125 (29.6)	150 (35.5)	75 (17.8)	72 (17.1)
Potato	282 (66.8)	90 (21.3)	32 (7.6)	18 (4.3)
Proteins				
Beans	76 (18.1)	228 (54.2)	67 (15.9)	50 (11.9)
Meat	43 (10.2)	157 (37.3)	119 (28.3)	102 (24.2)
Eggs	53 (12.6)	201 (47.7)	93 (22.1)	74 (17.6)
Fish	45 (10.7)	185 (43.8)	96 (22.7)	96 (22.7)
Moinmoin	114 (27.0)	181 (42.9)	84 (19.9)	43 (10.2)
Akara	105 (24.9)	187 (44.3)	79 (18.7)	51 (12.1)
Vegetables				
Ewedu	74 (17.5)	199 (47.2)	76 (18.0)	73 (17.3)
Efo	96 (22.7)	167 (39.6)	105 (24.9)	54 (12.8)
Ugu	216 (51.2)	115 (27.3)	52 (12.3)	39 (9.2)
Egusi	246 (58.4)	115 (27.3)	29 (6.9)	8 (1.9)
Fats and oil				
Palm oil	64 (15.2)	196 (46.6)	76 (18.1)	85 (20.2)
Groundnut oil	79 (18.8)	172 (40.9)	114 (27.1)	55 (13.1)
Butter	124 (29.4)	195 (46.3)	66 (15.7)	36 (8.6)
Fruits				
Mango	203 (48.2)	146 (34.7)	41 (9.7)	31 (7.4)
Banana	94 (22.3)	181 (43.0)	95 (22.6)	51 (12.1)
Orange	75 (17.8)	164 (39.0)	100 (23.8)	82 (19.5)
Pawpaw	169 (40.1)	144 (34.2)	62 (14.7)	46 (10.9)
Apple	142 (33.7)	157 (37.3)	73 (17.3)	49 (11.6)
Coconut	121 (28.7)	178 (42.3)	80 (19.0)	42 (10.0)

TABLE 4.4: Respondents Frequency of Food Intake CONT'D

Food items	Never (0)	1-3x	4-6x	Daily (7 times)
Beverages				
Milk	49 (11.6)	212 (50.4)	77 (18.3)	83 (19.7)
Milo	81 (19.2)	183 (43.4)	88 (20.9)	69 (16.4)
Bournvita	86 (20.5)	168 (40.0)	99 (23.6)	66 (15.7)
Nescafe	226 (53.6)	109 (25.9)	46 (10.9)	40 (9.5)
Herbal tea (e.g. lipton tea)	190 (45.1)	140 (33.3)	59 (14.0)	32 (7.6)
Snacks				
Biscuits	45 (10.7)	163 (38.7)	94 (22.3)	118 (28.0)
Pop corn	138 (32.8)	132 (31.4)	103 (24.5)	48 (11.4)
Purfpurf /buns	108 (25.7)	166 (39.4)	77 (18.3)	70 (16.6)
Plantain chips	135 (32.1)	166 (39.4)	68 (16.2)	52 (12.4)
Ice cream/juice	121 (28.7)	170 (40.4)	65 (15.4)	65 (15.4)
Soft drinks	87 (20.6)	183 (43.4)	86 (20.4)	66 (15.6)
Sweets/chewing gum	77 (18.2)	176 (42.2)	93 (22.0)	74 (17.5)

4.5 Respondents Dietary Diversity

Table 4.5 reveals the dietary diversity of the respondents based on all the foods taken in the previous 24 hours preceding the day of their interview. The dietary diversity of the respondents as shown in table 4.6 indicates that a high proportion 421 (99.8%) were taking cereals, vitamin A rich vegetables and fruits 371 (87.9%), dark green leafy vegetables 210 (49.8%), meat and fish 196 (46.4%) and legumes, nuts and seeds 194 (46.0%). However, a low proportion of the respondents were taking other vegetables and fruits 26 (6.2%), organ meat rich in iron 7 (1.7%), egg 101 (23.9%), milk and milk products 92 (21.8%). Respectively. No significant difference between the dietary diversity of male and female respondents ($p>0.05$).

TABLE 4.5: Respondents' Dietary Diversity

VARIABLE	TOTAL N (%)	MALE N (%)	FEMALE N (%)	X^2	P-Value
Starchy staples					
Yes	421 (99.8)	195 (99.5)	226 (100.0)	1.156	0.282
No	1 (0.2)	1 (0.5)	0 (0.0)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		
Dark Green leafy Vegetables					
Yes	210 (49.8)	94 (48.0)	116 (51.3)	0.476	0.490
No	212 (50.2)	102 (52.0)	110 (48.7)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		
Vitamin A rich fruits and vegetables					
Yes	371 (87.9)	177 (90.3)	194 (85.8)	1.970	0.160
No	51 (12.1)	19 (9.7)	32 (14.2)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		
Other fruits and vegetables					
Yes	26 (6.2)	11 (5.6)	15 (6.6)	0.191	0.662
No	396 (93.8)	185 (94.4)	221 (93.4)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		
Organ meat					
Yes	7 (1.7)	5 (2.6)	2 (0.9)	1.786	0.181
No	415 (98.3)	191 (97.4)	224 (99.1)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		
Meat and fish					
Yes	196 (46.4)	98 (50.0)	98 (43.4)	1.859	0.173
No	226 (53.6)	98 (50.0)	128 (56.6)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		
Eggs					
Yes	101 (23.9)	49 (25.0)	52 (23.0)	0.229	0.633
No	321 (76.1)	147 (75.0)	174 (77.0)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		
Legume nuts and seeds					
Yes	194 (46.0)	92 (46.9)	102 (45.1)	0.138	0.770
No	228 (54.0)	104 (53.1)	124 (54.9)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		
Milk and Milk products					
Yes	92 (21.8)	40 (20.4)	52 (23.0)	0.416	0.519
No	330 (78.2)	156 (79.6)	174 (77.0)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		

4.5.1: Dietary Diversity Score of the Respondents

The dietary diversity score of the respondents according to gender is presented in table 4.5.1 and figure 1. Majority 227 (53.8%) of the respondents had medium dietary diversity while 173 (41.0%) and 22 (5.2%) had low and high dietary diversity respectively. No significant difference was observed in the dietary diversity of male and female respondents ($p>0.05$).

Table 4.5.1. Dietary Diversity Score of the Respondents

VARIABLE	TOTAL N (%)	MALE N (%)	FEMALE N (%)	X^2	P-Value
Low (≤ 3.0)	173 (41.0)	75 (38.3)	98 (43.4)	1.701	0.427
Medium (4.0 -5.0)	227 (53.8)	112 (57.1)	115 (50.9)		
High (≥ 6.0)	22 (5.2)	9 (4.6)	13 (5.8)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		

FA0, 2010

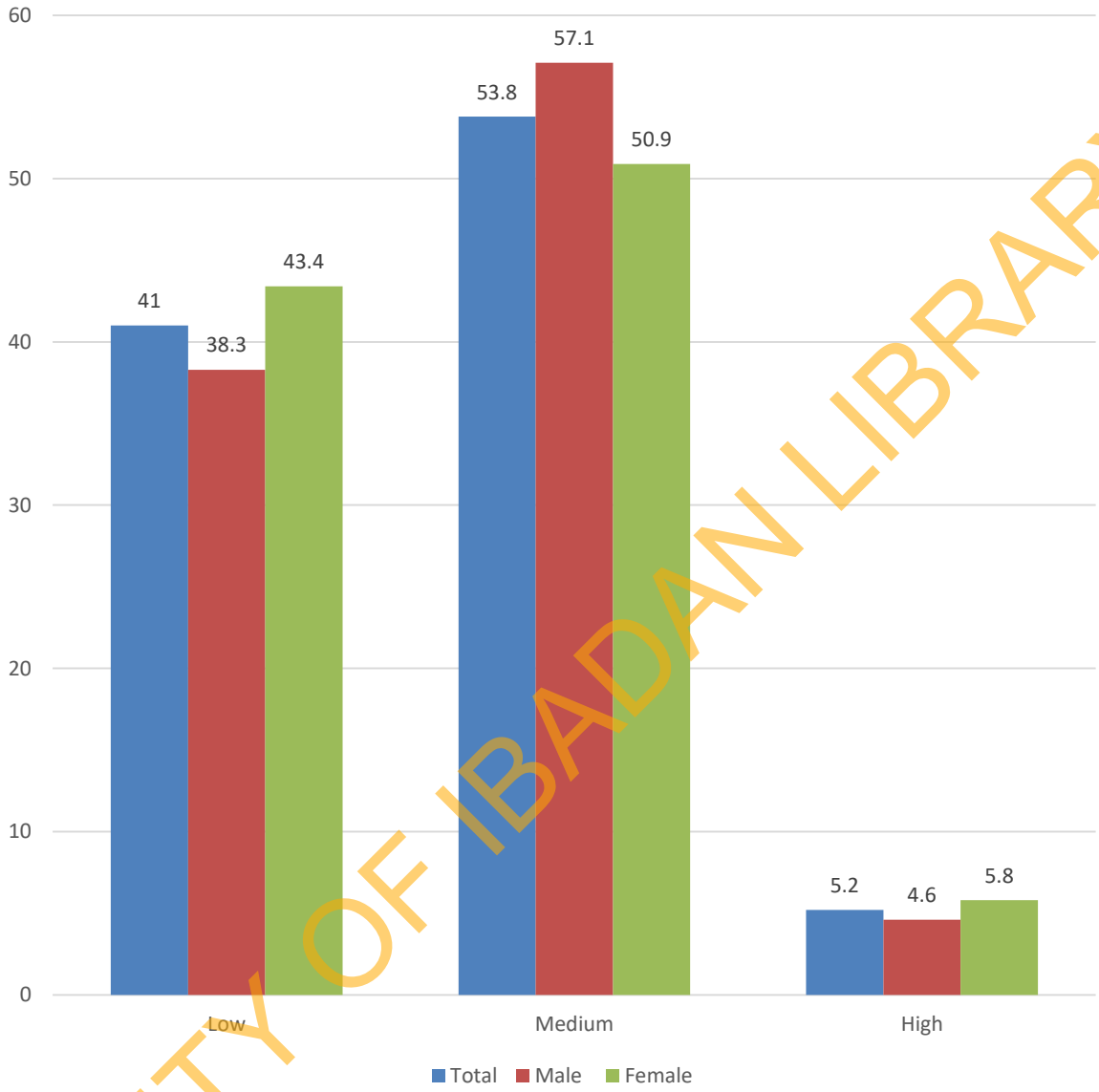

Figure 2: Dietary Diversity in Group of the Respondents

4.6 Respondents' Nutritional Status

Table 4.6 shows the nutritional status of the respondents using Body Mass Index. The Body Mass Index as shown in table 4.8 and figure 2 reveals that greater proportion 356 (84.4%) of the respondents had normal nutritional status (BMI for age) while a few 13 (3.1%), 14 (3.3%) were undernourished (severely thin and thin) respectively. However, only a few 36 (9.0%), 1 (0.2%) were overweight and obese respectively. There was no significant difference between nutritional status (BMI for age) of male and female respondents ($p>0.05$).

Table 4.6.1 presents the nutritional status of the respondents using Height for Age. The height for age of the respondents is presented in table 4.6.1 and figure 3. Majority 184 (43.6%) of the respondents had normal height while 84 (19.9%), 154 (36.5%) were severely and moderately stunted. Greater proportion 238 (56.4%) of the respondents were stunted. There was no significant difference between nutritional status (BMI for age) of male and female respondents ($p>0.05$).

TABLE 4.6: Body Mass Index for Age in groups of the Respondents

VARIABLE	TOTAL N (%)	MALE N (%)	FEMALE N (%)	X^2	P-Value
Severe thinness (<-3SD)	13 (3.1)	7 (3.6)	6 (2.7)	5.325	0.256
Thinness (-3SD to -2SD)	14 (3.3)	8 (4.1)	6 (2.7)		
Normal (-2.1SD to 0.99SD)	356 (84.4)	169 (86.2)	187 (82.7)		
Overweight (1SD to 1.99SD)	36 (9.0)	12 (6.1)	26 (11.5)		
Obese (2SD to 2.99SD)	1 (0.2)	0 (0.0)	1 (0.4)		
Severely Obese (≥ 3SD)	0 (0)	0 (0.0)	0 (0.0)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		

Source: WHO, 2009

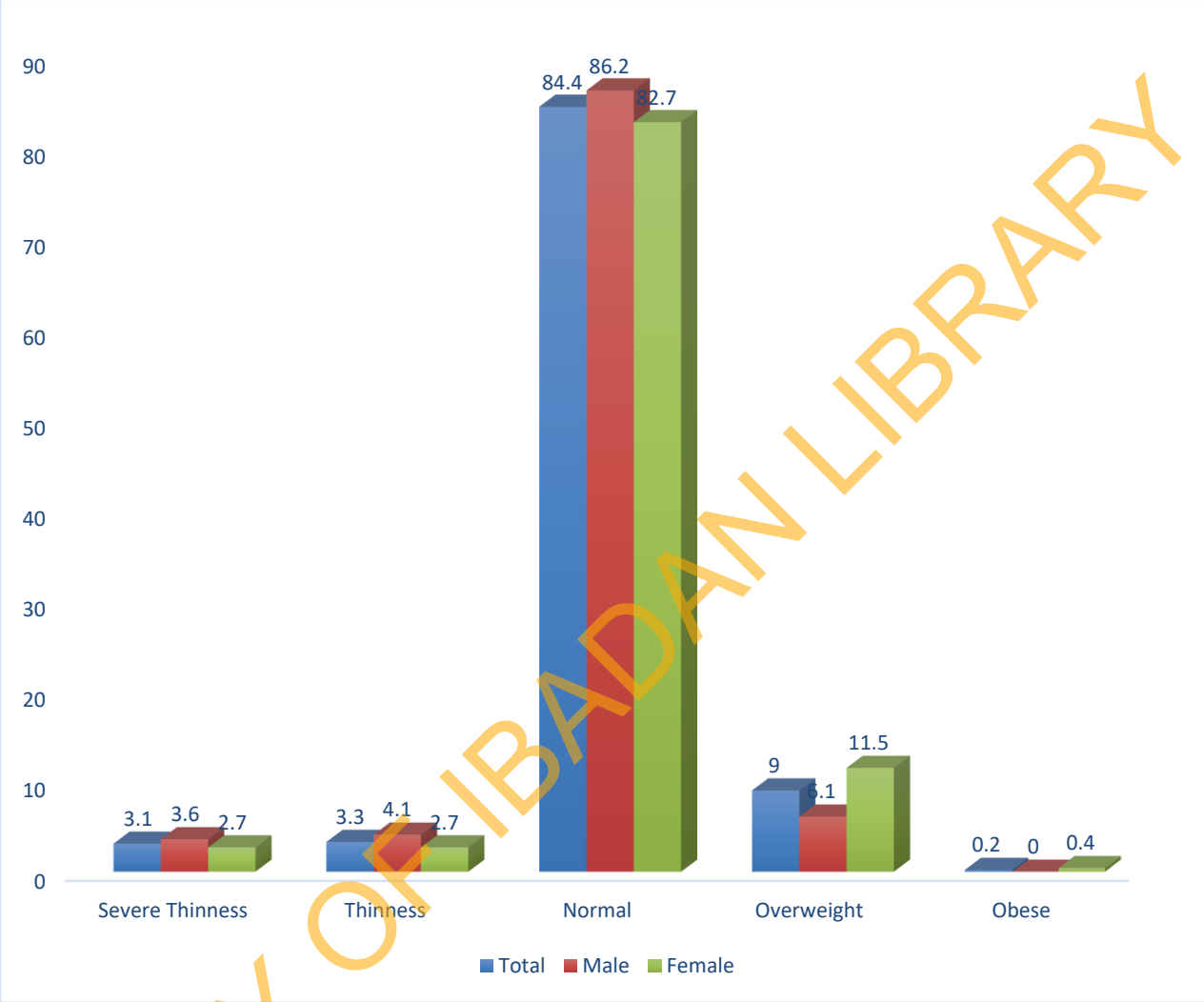

Figure 3: Body Mass Index for Age in Group of the Respondents

TABLE 4.6.1: Height for Age in groups of the Respondents

VARIABLE	TOTAL N (%)	MALE N (%)	FEMALE N (%)	T-test	P-Value
Severely stunted (<-3SD)	84 (19.9)	35 (17.9)	49 (21.7)	1.872	0.392
Moderately stunted (-3SD to -2.1SD)	154 (36.5)	69 (35.2)	85 (37.6)		
Normal (-2SD to 2SD)	184 (43.6)	92 (46.9)	92 (40.7)		
Moderately above normal height (2.1SD to 2.99SD)	0 (0.0)	0 (0.0)	0 (0.0)		
Excess height (≥ 3SD)	0 (0.0)	0 (0.0)	0 (0.0)		
Total	422 (100.0)	196 (100.0)	226 (100.0)		

Source: WHO, 2009

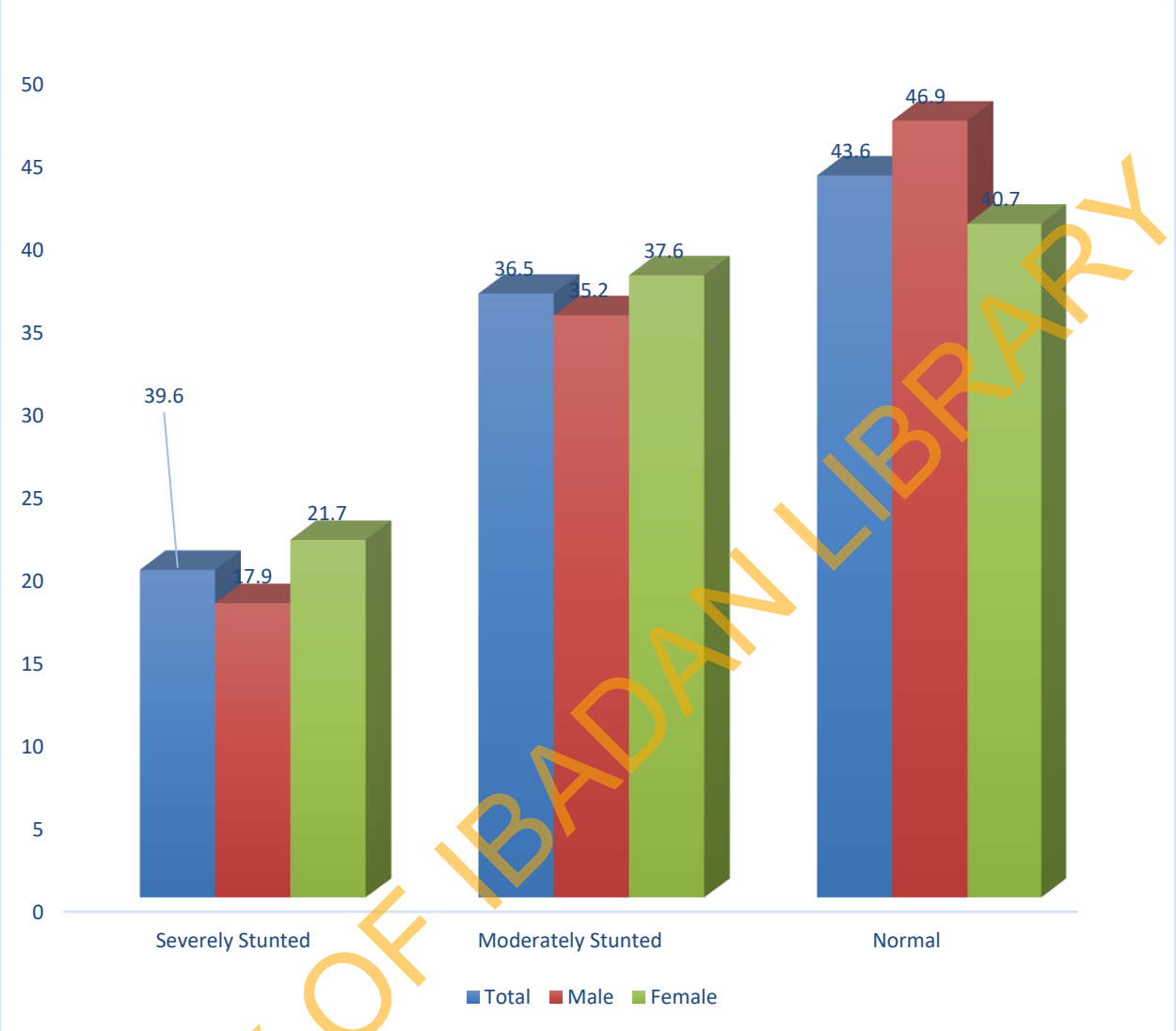

Figure 4: Height for Age in Group of the Respondents

4.7 Research Hypotheses

4.7.1 Hypotheses One

Hypothesis 1: There is no significant relationship between the socio-demographic characteristics of the respondents and their nutritional status.

The relationship between the socio-economic characteristics and nutritional status of the respondent is shown in the table below. Socio demographic characteristics include location of the study, age, class, the person respondent lives with etc.

As regards location, 6(46.2%) of the respondents in ward 5 (Idika) are severely thin. About a half 116(45.2%) that had normal nutritional status were from ward 6 (Abebi). However, 15(39.5%) of overweight respondents were from ward 4(Ogunpa). Significant relationship exists between location of the study and the nutritional status of the respondents (X^2: 33.931, df: 12, P< 0.001).

In respect to age, greater 6(46.2%) of respondents who were severally thin were 13 years. Similarly, 16(42.1%) of the respondents who were overweight were 10 years of age. Significant relationship was observed between age of the respondents and Nutritional status (X^2: 59.000, df: 20, P< 0.000).

The class of the respondents is statistical significant to the nutritional status of the respondents, as 9(69.25. %) of the respondents in primary six were severely thin, 17(44.7%) of the school children in primary four were overweight and 123(34.6%) of the school children in primary five had normal nutritional status with X^2: 16.463, df: 8, PP< 0.036).

As regards to the caregiver of the respondents, 33(86.8%) of the respondents staying with their parents were overweight. Consequently, 300(84.3%) of the respondents staying with their parents had normal nutritional status. However, 2(15.4%) of the respondents living with their relatives were severely thin. (X^2: 54.137, df: 12, P< 0.000).

Table 4.7a: Relationship between Location and Nutritional Status of Respondents

Variable		Body Mass Index for Age					Total	X^2	df	P-Value
		Severe thinness	Thinness	Normal	Overweight	Obese				
Location of the field work	Ward 3, Agbeni	3	3	79	5	0	90			
		23.1%	21.4%	22.2%	13.2%	0.0%	21.3%	33.934	12	0.001
	Ward 4,1 Ogunkpa	1	2	42	15	0	60			
		7.7%	14.3%	11.8%	39.5%	0.0%	14.2%			
	Ward 5,6 Idika	6	6	74	4	0	90			
		46.2%	42.9%	20.8%	10.5%	0.0%	21.3%			
	Ward 6,3 Abebi	3	3	161	14	1	182			
		23.1%	21.4%	45.2%	36.8%	100.0%	43.1%			
Total		**13**	**14**	**356**	**38**	**1**	**422**			
		100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**			

Figure 4.7a:

Table 4.7b: Relationship between Age and Nutritional Status of Respondents

Variable		Body Mass Index for Age					Total	X^2	df	P Value
		Severe thinness	Thinness	Normal	Overweight	Obese				
Age (years)	9	0	0	16	6	0	22			
		0.0%	0.0%	4.5%	15.8%	0.0%	5.2%	30.314	16	0.016
	10	2	2	69	16	1	90			
		15.4%	14.3%	19.5%	42.1%	100.0%	21.4%			
	11	2	3	85	4	0	94			
		15.4%	21.4%	24.0%	10.5%	0.0%	22.4%			
	12	3	4	83	6	0	96			
		23.1%	28.6%	23.4%	15.8%	0.0%	22.9%			
	13	6	5	101	6	0	118			
		46.2%	35.7%	28.5%	15.8%	0.0%	28.1%			
Total		**13**	**14**	**354**	**38**	**1**	**420**			
		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%			

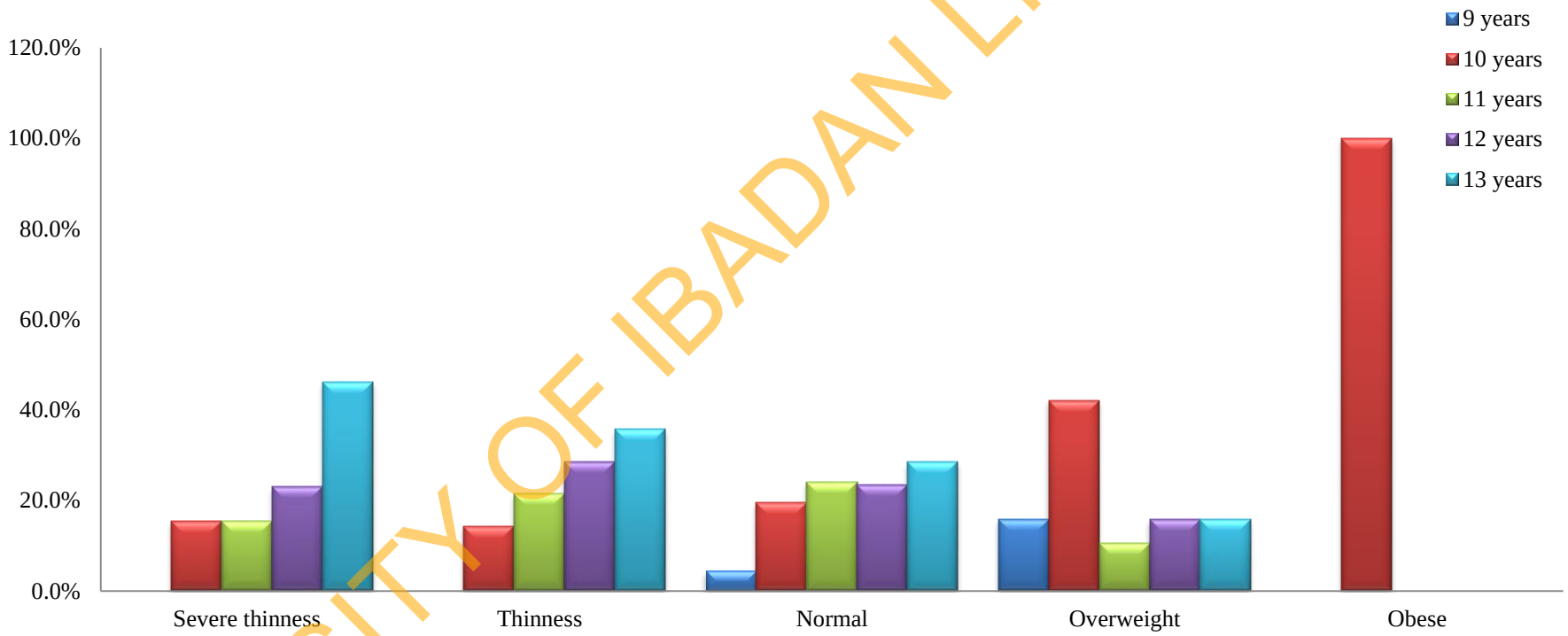

Figure 4.7b: Relationship between Age and Nutritional Status

Table 4.7c: Relationship between Class of respondents and Nutritional Status of Respondents

Variable		Body Mass Index for Age Transformed					Total	X^2	Df	P Value
		Severe thinness	**Thinness**	**Normal**	**Overweight**	**Obese**				
Class of respondent	Primary Four	2	3	116	17	0	138	16.463	8	0.036
		15.4%	21.4%	32.7%	44.7%	0.0%	32.8%			
	Primary Five	2	3	123	13	0	141			
		15.4%	21.4%	34.6%	34.2%	0.0%	33.5%			
	Primary Six	9	8	116	8	1	142			
		69.2%	57.1%	32.7%	21.1%	100.0%	33.7%			
Total		**13**	**14**	**355**	**38**	**1**	**421**			
		100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**			

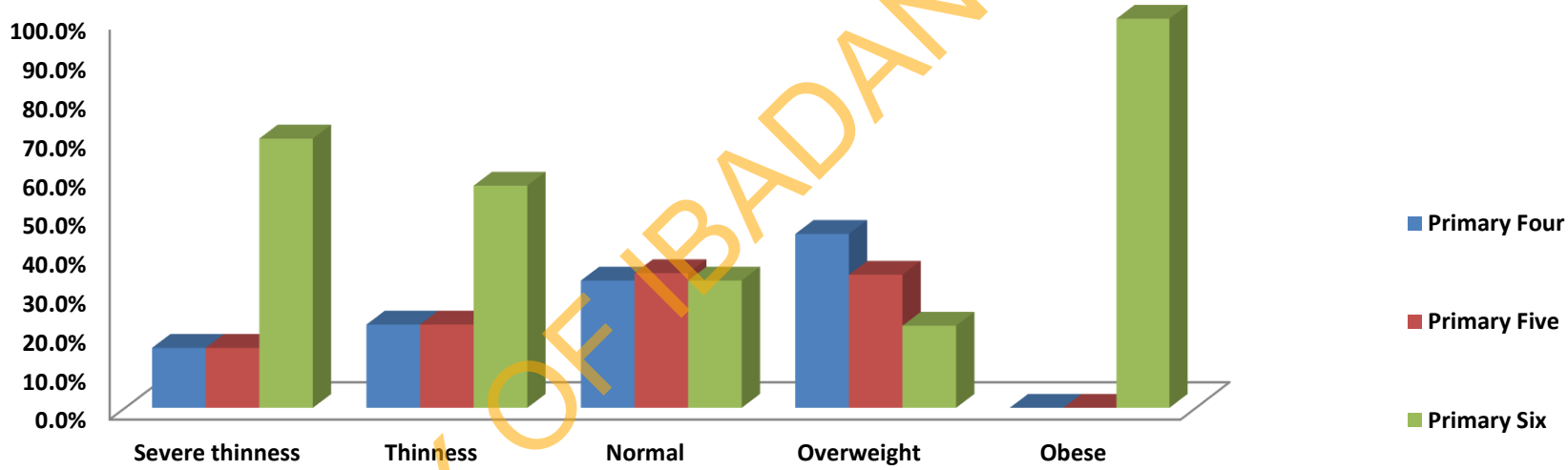

Figure 4.7c: Relationship between Class and Nutritional Status

TABLE 4.7d: Relationship between the caregiver of the respondents and their Nutritional Status

Variable		Body Mass Index for Age Transformed					Total	X^2	df	P Value
		Severe thinness	**Thinness**	**Normal**	**Overweight**	**Obese**				
Whom do you live or stay with?	Parent	10	12	300	33	0	355			
		76.9%	85.7%	84.3%	86.8%	0.0%	84.1%	54.137	12	0.000
	Relation	2	1	44	4	0	51			
		15.4%	7.1%	12.4%	10.5%	0.0%	12.1%			
	Friends	0	0	8	0	1	9			
		0.0%	0.0%	2.2%	0.0%	100.0%	2.1%			
	Alone	1	1	4	1	0	7			
		7.7%	7.1%	1.1%	2.6%	0.0%	1.7%			
Total		**13**	**14**	**356**	**38**	**1**	**422**			
		100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**			

4.7.2 Hypotheses Two

Hypothesis 2: There is no significant relationship between the eating habits of the respondents and their nutritional status**.**

The relationship between the eating habits of the respondents and their nutritional status is shown in the tables below. Eating habits of the respondents include: frequency of breakfast intake, frequency of meal intake, consumption of snacks and place where the snacks were obtained.

As regards the frequency of breakfast intake of the respondents, 9(64.3%) of the respondents who consumed breakfast 1-2 times in a week were very thin whereas 144(40.8%) of the respondents who ate breakfast 5-7 times in a week had normal nutritional status,

(X^2: 21.916, df: 12, P< 0.038).

The frequency of meal intake is statistically significant to the nutritional status of the respondents. The proportion of respondents that ate breakfast, lunch and dinner regularly were 297 (83.7%) and they had normal weight.There is significant relationship between the frequency of meal intake and the nutritional status of the respondents

(X^2: 37.768, df: 20, P< 0.009).

There is no significant relationship between snacks consumption and nutritional status as 8(72.7%) of the respondents who consumed snacks always were severely thin and 12 (31.6%) of the respondents who consume snacks sometimes were overweight,

(X^2: 12.369, df: 12, P< 0.417).

The relationship between the place of obtaining snacks and the nutritional status of respondents is statistically significant. The respondents that get snacks from home who were severely thinner than 7(53.8%), 8(47.4%) respondents who get snacks both at home and outside the home were overweight, (X^2: 21.416, df: 8, P< 0.006).

Table 4.7e: Relationship *between frequency of breakfast intake of respondent in a week and nutritional status

Variable		Body Mass Index for Age					Total	X^2	df	P Value
		Severe thinness	Thinness	Normal	Overweight	Obese				
How often do you take breakfast in a week	1-2 times	3	9	86	7	1	106	21.916	12	0.038
		23.1%	64.3%	24.4%	18.9%	100.0%	25.4%			
	3-4times	4	2	116	7	0	129			
		30.8%	14.3%	32.9%	18.9%	0.0%	30.9%			
	5-7times	6	3	144	23	0	176			
		46.2%	21.4%	40.8%	62.2%	0.0%	42.1%			
	Never	0	0	7	0	0	7			
		0.0%	0.0%	2.0%	0.0%	0.0%	1.7%			
Total		**13**	**14**	**353**	**37**	**1**	**418**			
		100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**			

Table 4.7f: Relationship between frequency of meal intake and nutritional status of respondents

Variable		Body Mass Index for Age Transformed					Total	X^2	df	P Value
		Severe thinness	Thinness	Normal	Overweight	Obese				
Which meals do you regularly/frequently eat?	Breakfast, Lunch and dinner	12	14	297	28	0	351			
		92.3%	100.0%	83.7%	75.7%	0.0%	83.6%	37.768	20	0.009
	Breakfast and lunch	0	0	29	1	0	30			
		0.0%	0.0%	8.2%	2.7%	0.0%	7.1%			
	Breakfast and dinner	0	0	19	4	1	24			
		0.0%	0.0%	5.4%	10.8%	100.0%	5.7%			
	Lunch and dinner	1	0	6	1	0	8			
		7.7%	0.0%	1.7%	2.7%	0.0%	1.9%			
	Breakfast only	0	0	2	2	0	4			
		0.0%	0.0%	0.6%	5.4%	0.0%	1.0%			
	Dinner only	0	0	2	1	0	3			
		0.0%	0.0%	0.6%	2.7%	0.0%	0.7%			
Total		**13**	**14**	**355**	**37**	**1**	**420**			
		100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**			

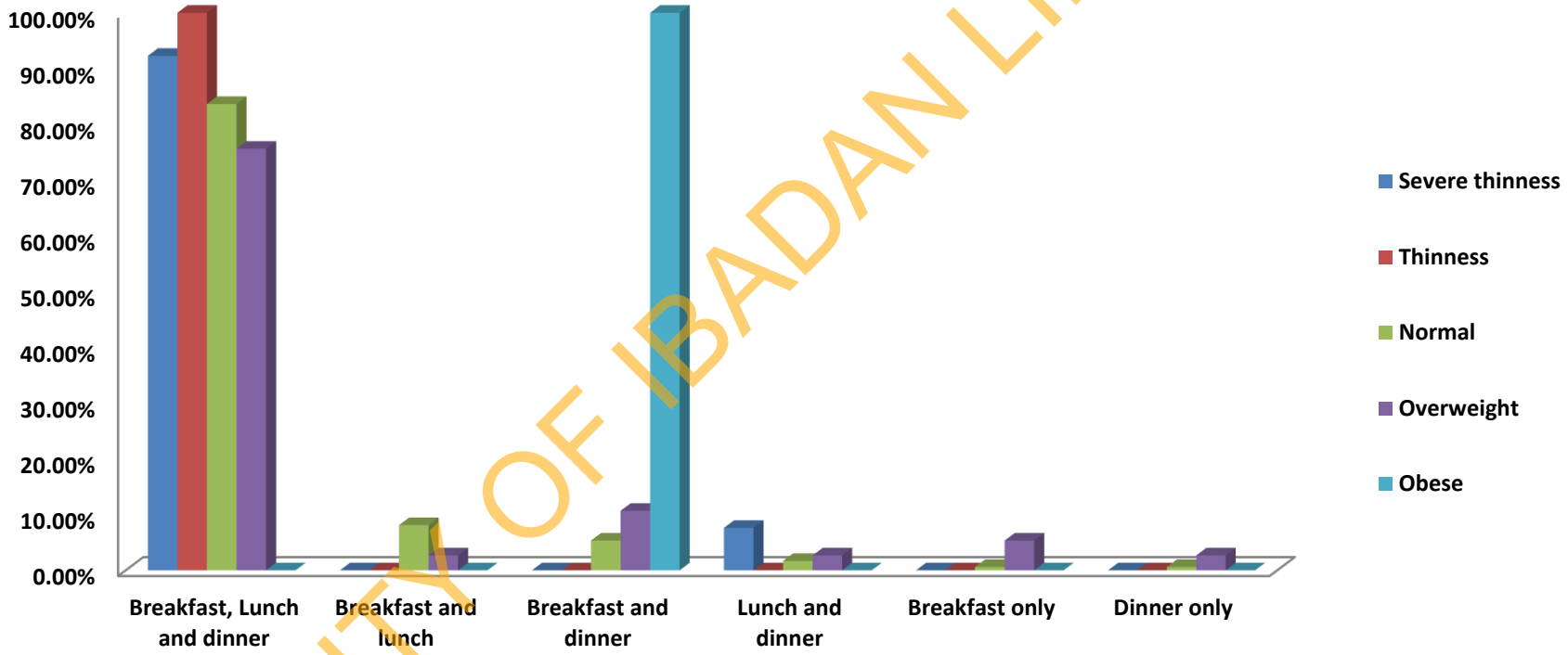

Figure 4.7f: Relationship between Frequency of Meal Intake and Nutritional Status

Table 4.7g: Relationship between snacks consumption and nutritional status of respondents

Variable		Body Mass Index for Age Transformed					Total	X^2	df	P Value
		Severe thinness	Thinness	Normal	Overweight	Obese				
How often do you eat snacks?	Always	8	10	161	15	0	194	12.369	12	0.414
		72.7%	71.4%	45.5%	39.5%	0.0%	46.4%			
	Occasionally	2	3	90	10	0	105			
		18.2%	21.4%	25.4%	26.3%	0.0%	25.1%			
	Sometimes	1	1	87	12	1	102			
		9.1%	7.1%	24.6%	31.6%	100.0%	24.4%			
	Never	0	0	16	1	0	17			
		0.0%	0.0%	4.5%	2.6%	0.0%	4.1%			
Total		**11**	**14**	**354**	**38**	**1**	**418**			
		100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**			

Table 4.7h: Relationship between place of obtaining snacks and the nutritional status of respondents

Variable		Body Mass Index for Age					Total	X^2	df	P Value
		Severe thinness	Thinness	Normal	Overweight	Obese				
Where do you get the snacks?	Home	7	8	114	4	0	133	21.416	8	0.006
		53.8%	57.1%	32.0%	10.5%	0.0%	31.5%			
	Outside the home	3	4	150	16	0	173			
		23.1%	28.6%	42.1%	42.1%	0.0%	41.0%			
	Both home and outside the home	3	2	92	18	1	116			
		23.1%	14.3%	25.8%	47.4%	100.0%	27.5%			
Total		**13**	**14**	**356**	**38**	**1**	**422**			
		100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**			

4.7.3 Hypotheses Three

Hypothesis 3: There is no significant relationship betweenfactors that influence dietary habits of the respondents and the nutritional status of the respondents.

The relationship between the factors influencing dietary habit and nutritional status is as follows: Among the factors thatinfluence the respondents include: taking Food and Nutrition as a subject in school and the presence of food vendors in the school.

As regards the variable- taking Food and Nutrition as a subject taught in school, 306 (86.9%) of the respondents who did Food and Nutrition in school had normal nutritional status while 2(14.3%) of the respondents who did not study Food and Nutrition in school were thin. There is a significant relationship between taking Food and Nutrition in school and the respondents' nutritional status, (X^2: 10.995, df: 4, P< 0.027).

Consequently, in regards to the presence of food vendors in the school, 341(96.6%) of the school children who had food vendors in their schools had normal nutritional status. Whereas 2(15.4%) of the school children who did not have food vendors in their schools were severely thin,(X^2: 33.201, df: 8, P< 0.000).

Table 4.7i: Relationship between taking Food and Nutrition as a subject in School and Nutritional Status of the Respondents

Variable		Body Mass Index for Age Transformed					Total	X^2	df	P Value
		Severe thinness	**Thinness**	**Normal**	**Overweight**	**Obese**				
Is food and nutrition study part of your subjects offered in school?	Yes	12	12	306	37	0	367			
		92.3%	85.7%	86.9%	97.4%	0.0%	87.8%	10.995	4	0.027
	No	1	2	46	1	1	51			
		7.7%	14.3%	13.1%	2.6%	100.0%	12.2%			
Total		**13**	**14**	**352**	**38**	**1**	**418**			
		100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**			

Table 4.7j: Relationship between presence of food vendors in school and Nutritional Status

Variable		Body Mass Index for Age					Total	X^2	df	P Value
		Severe thinness	**Thinness**	**Normal**	**Overweight**	**Obese**				
Are there food vendors in your school?	Yes	11	14	341	37	0	403	33.201	8	0.000
		84.6%	100.0%	96.6%	97.4%	0.0%	96.2%			
	No	2	0	11	1	1	15			
		15.4%	0.0%	3.1%	2.6%	100.0%	3.6%			
	I dont know	0	0	1	0	0	1			
		0.0%	0.0%	0.3%	0.0%	0.0%	0.2%			
Total		**13**	**14**	**353**	**38**	**1**	**419**			
		100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**			

4.7.4 Hypotheses Four

Hypothesis 4: There is no significant relationship betweenfrequency of food intake of the respondents and their nutritional status.

The relationship between the food frequency intake of the respondents and their nutritional status is shown in the tables below. Food frequency intake of the respondents include: frequency of banana intake and soft drinks.

As regards the frequency of banana intake of the respondents, 162(45.6%) of the respondents who consumed banana 1-3 times in a week had normal nutritional status.There is significant relationship between food frequency intake of banana in the respondents and their nutritional status,(X^2: 23.300, df: 12, P< 0.025).

Similarly, the consumption of soft drinks among the respondents had significant relationship with the nutritional status. 6(45.6%) of the respondents who consumed soft drinks daily (7days in a week) were severely thin. The proportion of school children who consumed soft drinks occasional (1-3 times in a week) had normal nutritional status. There is a strong relationship between consumption of soft drinks among school children and their nutritional status, (X^2: 20.921, df: 20, P< 0.052).

Table 4.7k: Relationship between frequency of banana intake and Nutritional Status

Variable		Body Mass Index for Age Transformed					Total	X^2	df	P Value
		Severe thinness	**Thinness**	**Normal**	**Overweight**	**Obese**				
Banana	Never, 0time	0	4	81	9	0	94	23.300	12	0.025
		0.0%	28.6%	22.8%	23.7%	0.0%	22.3%			
	Occasional, 1-3times	7	2	162	9	1	181			
		53.8%	14.3%	45.6%	23.7%	100.0%	43.0%			
	Frequently,4-6times	4	7	69	15	0	95			
		30.8%	50.0%	19.4%	39.5%	0.0%	22.6%			
	Daily, 7times	2	1	43	5	0	51			
		15.4%	7.1%	12.1%	13.2%	0.0%	12.1%			
Total		**13**	**14**	**355**	**38**	**1**	**421**			
		100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**			

Table 4.7l: Relationship between Soft drinks consumptions of respondents and their Nutritional Status

Variable		Body Mass Index for Age Transformed					Total	X^2	df	P Value
		Severe thinness	**Thinness**	**Normal**	**Overweight**	**Obese**				
Soft drinks	Never, 0time	2	2	76	7	0	87			
		15.4%	14.3%	21.3%	18.4%	0.0%	20.6%	20.921	20	0.052
	Occasional, 1-2 3times	4	4	161	15	1	183			
		30.8%	28.6%	45.2%	39.5%	100.0%	43.4%			
	Frequently,4-6times	3	7	67	9	0	86			
		23.1%	50.0%	18.8%	23.7%	0.0%	20.4%			
	Daily, 7times	6	1	52	7	0	66			
		46.2%	7.1%	14.6%	18.4%	0.0%	15.6%			
Total		**13**	**14**	**356**	**38**	**1**	**422**			
		100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**			

4.7.5 Hypotheses Five

Hypothesis 5: There is no significant relationship between the socio-economic status and the dietary diversity score of the respondents.

The relationship between the dietary diversity score of the respondents and their socio- economic status is shown in the tables below.The socio-economic status of the respondents include: location, ethnicity, respondents' birth position in the family.

As regards the location of study, the respondents who had low dietary score were from Ward 6 (Abebi) with 43.9%. Similarly, the respondents who stay in Ward 3, (Agbeni) had high dietary diversity score with 11(50%). There is a significant relationship between dietary diversity score and the location of study with (X^2: 14.082, df: 6, P< 0.029).

There is also a relationship between ethnicity and the dietary diversity score of the respondents. 164 (94.8%),205 (90.7%) and 18 (81.8%)of the respondents who had low dietary diversity score , medium dietary diversity score and high dietary diversity score respectively were Yoruba. (X^2: 12.973, df: 6, P< 0.043).

As regards to the respondents' birth position, the dietary diversity score of respondents who were the sixth position in the family was high, while the respondents who were the Ist or 2nd position in their families had medium and low dietary diversity score respectively. There is a significant relationship with the position of respondents in the family and the socio-economic status (X^2: 24.965, df: 10, P< 0.005).

Table 4.7m: Relationship between Location and Dietary Diversity Score

Variable		DDS classified			Total	X^2	Df	P Value
		Low Dietary Diversity	**Medium Dietary Diversity**	**High Dietary Diversity**				
Location of the field work	Ward 3, Agbeni	30	49	11	90			
		17.3%	21.6%	50.0%	21.3%	14.082	6	0.029
	Ward4, Ogunpa	24	33	3	60			
		13.9%	14.5%	13.6%	14.2%			
	Ward 5, Idika	43	44	3	90			
		24.9%	19.4%	13.6%	21.3%			
	Ward 6, Abebi	76	101	5	182			
		43.9%	44.5%	22.7%	43.1%			
Total		**173**	**227**	**22**	**422**			
		100.0%	**100.0%**	**100.0%**	**100.0%**			

4.7n: Relationship between ethnicity and Dietary Diversity Score of the Respondents

Variable		DDS classified			Total	X^2	Df	P Value
		Low Dietary Diversity	**Medium Dietary Diversity**	**High Dietary Diversity**				
Ethnicity	Igbo	4	16	2	22	12.973	6	0.043
		2.3%	7.1%	9.1%	5.2%			
	Yoruba	164	205	18	387			
		94.8%	90.7%	81.8%	91.9%			
	Hausa	5	3	1	9			
		2.9%	1.3%	4.5%	2.1%			
	Edo	0	2	1	3			
		0.0%	0.9%	4.5%	0.7%			
Total		**173**	**226**	**22**	**421**			
		100.0%	**100.0%**	**100.0%**	**100.0%**			

Table 4.7o: Relationship between respondents' birth position in the family and Dietary Diversity Score

Variable		DDS classified			Total	X^2	df	P Value
		Low Dietary Diversity	**Medium Dietary Diversity**	**High Dietary Diversity**				
Respondent birth position in the family	1st	42	75	5	122	24.965	10	0.005
		24.3%	33.0%	22.7%	28.9%			
	2nd	49	45	4	98			
		28.3%	19.8%	18.2%	23.2%			
	3rd	39	58	3	100			
		22.5%	25.6%	13.6%	23.7%			
	4th	22	20	2	44			
		12.7%	8.8%	9.1%	10.4%			
	5th	13	21	3	37			
		7.5%	9.3%	13.6%	8.8%			
	6th	8	8	5	21			
		4.6%	3.5%	22.7%	5.0%			
Total		**173**	**227**	**22**	**422**			
		100.0%	**100.0%**	**100.0%**	**100.0%**			

CHAPTER FIVE

Discussion, Conclusion and Recommendations

This study explored the dietary habits and nutritional status of upper primary school children in public schools in urban slum communities in Ibadan North West Local Government Area, Oyo State. This chapter explains the results given in the previous chapter. The demographic characteristics of the respondents, their eating habits, the perceived factors that influence the dietary habits of the respondents, the frequency of food intake of the respondents, the dietary diversity score of the respondents and their nutritional status. Implication of the findings of this study to health promotion and education was also discussed and recommendations were made at the end of this report.

5.1 Respondents' Socio-demographic characteristics

In Nigeria, the appropriate starting school age for primary school education is six years while the normal age for starting secondary school is twelve years, though there are exceptional cases. (Federal Ministry of Education, 2006). The mean age of the respondents in this study was 11.5±1.3 years.About a little above a quarter of the respondents were 13 years olds which shows that a proportion of them did not start primary school early as stated by Federal Ministry of Education in normal cases. In conformity to this study, Danquah *et al.*(2013) in a similar study in Ghana reported a mean age of 13years, with about 40% of the pupils too old to be in primary school because they start school at a late age with some dropping out. More so in rural settings and semi urban, some children start school when they are much older as reported by the Institute of Food Research Programmes and may also be due to poor health (IFPRI).

A little above half of the respondents reported that they are about 5 children and above in the family and less than one-third of the respondents' birth position in the family was first position. This showed that some of the pupils came from relatively large homes and most of their younger ones are still in nursery and primary school. It shows that the parents / caregivers have many children to carter for. In conformity

with the result, Danquah1*et al.* (2013a) reported the household size of the pupils ranged from 5 to 7 with a mean of 5.8}2.248. This showed that pupils came from homes with more dependents to cater for, which meant there were many persons in the household to share a plate offood (Bronte'- Tinkew *et al.*, 2013) Large family size implies that distribution of resources will be meagre for each individual and this is translated into the nutritional health of family memberswith children being affected the most.This indicates that most of the household are food insecure. Andrews and Carlson (2005) defined food insecurity as a persistent lack of access to adequate food in needed quantity and quality due to physical, social and economic hindrances. More so, the location of study is characterised by overcrowding, congestion, poor sanitation, lack of facilities like potable water etc.According to Cole and Neumayer, (2006), many people lack access to basic sanitation and safedrinking water which still remains a great risk to health in developing countries and a determinant ofcholera, dysentery (and other diseases associated with anunhealthy environment. Poor sanitation is a global challenge, as 1.1 billion people globallyare reported to have no access to safe water, which explains why hygiene related disease areso high in the developing world (Eisenberg,*et al.*, 2007; Ashbolt, 2004).

Above half of the respondents' parents were living together and a greater proportion of the respondents that reported living with their parents had normal nutritional status compared tothose living with relations, friends and alone respectively who were malnourished. Bronte-Tinkew and Dejong (2003). In a study conducted in Jamaica to assess the influence of household structure and resource dilution characteristics on children's nutritional status concluded that living as a single parent and cohabiting household increase the odds of stunting in children. They also found out that children who have low height-for-age were from single parents, low income families with siblings. According to Bertolis *et al.*, (2006) in a study conducted on the nutritional status and household patterns of children, it was revealed that children from male headed households suffered chronic malnutrition. Cataldo *et al.*(1999) also said that single parent households which are predominantly headed by women with mean lower income and less money for all expenses, including food, are compared to those households headed by men.

Virtually, all the respondents reported that their parents were traders. This shows that generally, the predominant occupations of the caregivers were petty trading andsubsistence farming. From the occupation profiles of the caregivers of the pupils given, it was evident that these pupils were coming from families which were not financially very well to do. WHO (2011) reported that children from low and middle income countries are always at increased risk of under nutrition due to poverty and lack of food. Such children have also been found to be at risk of overweight or obesity since they consume low-cost, high calorie and energy-dense foods.

5.2 Respondents Eating Habit

Nutritional status of children is influenced by diet. Shetty *et al.*, (2002) has stated that both under nutrition and over nutrition could be reduced by increasing the diversity of foods available for consumption. Majority of the children had the habit of always taking their breakfast as almost all of them had taken breakfast before they came to school in the morning they were interviewed. This laid emphasis on the importance of breakfast consumption as almost half of the respondents who consumed breakfast daily had normal nutritional status while more than half of those who had breakfast only 1-2 times in a week were underweight. Most of them who seldom have breakfast attributed their non-consumption to having no money and absence of food in the home. Though (Keski-*et al.*, 2003:842) reported that breakfast skipping is another health compromising behaviour and unhealthy lifestyle adopted by most school children and adolescent girls especially.

Less than half of the respondents consumed snacks always and many a little below half of them obtained their snack outside the home. In this study, less than half of them ate outside the home once on the average daily. Studies in different countries have shown that in general, children's eating patterns have changed over the years with the trends being eating more food away from home, consuming more snacks, drinking more sugar-sweetened beverages, Paeratakul *et al.*, (2003) along with a decline in breakfast consumption and less consumption of fruits by Jahns L *et al.*, (2001).

Also, only about a quarter of the children consumed fruits and vegetables daily. Fruits and vegetables are rich sources of Vitamin C which enhances iron absorption from

plant sources when consumed with meals (Wardlaw and Hampl, 2007). Unfortunately very few of these children consumed fruits and vegetables alongside their meals. This is in line with an earlier observation by (Nnam *et al.*, 2014). The report indicated that fruits were not eaten in conjunction with meals but were consumed between meals as snacks. This implies that the Vitamin C present in the fruits would not be available during meal to enhance iron absorption thus predisposing the individual to poor iron status. Iron deficiency is the commonest cause of malnutrition. (Viteri, 2001; Beulter 2006).

5.3 Factors influencing dietary habits of Respondents

Quite a few studies have explored how socio-demographic and economic factors (gender, household composition, age, education, income etc.) can affect the choice of a diet and influence the nutritional status of the respondents. These results are difficult to disentangle because of the heterogeneity of findings, research designs and interaction of these factors at various levels.

The effects of socio-demographic and socio-economic and other nutrition related factors influencing their dietary habits and nutritional status were studied. There was a significant relationship between the socio-economic factors and the nutritional status. The study was in conformity with Goldberg *et al.*, (2009) who reported that the socio-economic variables influence the school children' eating habits, lifestyle and social behaviour. Adamu *et al.*, (2013) stated that low income families tend to either purchase less nutritious cheap food items as a means to cope with the situation or reduce intake of food. The less nutritious cheap food items will certainly not meet the nutritional requirement of the household particularly the vulnerable groups of which adolescents are included. The study also revealed an association between the age of the respondents and their nutritional status as a little below half of the respondents who were 13 years and 10years of age were severely thin and obese respectively. Whereas, onequarter of the respondents who were 11 years had normal nutritional status respectively. More so, the presence of vendor in the respondents' schools has significant relationship between the nutritional status of the respondents as majority of the respondents who consumed foods from food vendors were overweight, severely thin and had normal weight respectively. Similarly, there is a strong relationship

between taking food and nutrition as a subject in school and their nutritional status, (P<0.027)

5.4 Dietary Diversity of Respondents

Dietary diversification is one of the four main strategies advocated internationally for the improvement of micronutrient intake and status, especially in undernourished individuals (Maunderetal., 2001).Many studies among several age groups have shown that an increase in individual dietary diversity score (DDS) is related to increased nutrient adequacy of the diet. Dietary diversity scores have been positively correlated with increased mean micronutrient adequacy of complementary foods (SwindaleandBilinsky,2006), micronutrient adequacy of the diet in children (Mirmiran et al., 2004) and adults(Ogle *et al.*,2001; Foote *et al.*,2004).

The dietary diversity of the respondents indicates that a high proportion of the respondents were taking cereals, vitamin A rich vegetables, fruits, dark green leafy vegetables. A little below half of the respondents consume meat, fish, legumes, nuts and seeds respectively. However, a low proportion of the respondents were taking other vegetables and fruits, organ meat rich in iron, egg, milk and milk products respectively. No significant difference between the dietary diversity of male and female respondents (p>0.05).The children with high and medium dietary diversity score of 6.0 and 4.0 respectively were observed to be normal. While the children with low dietary diversity score of 3.0 and below were among the underweight and wasted children. Ruel and Seo (2003) have stated that dietary diversity is associated with child nutritional status and growth and their nutritional status. The study reported a significant relationship between the dietary diversity score of the respondents and their socio economic status with emphases laid on the location of the communities of study and respondents birth position in the family. As regards, location, it was reported that the a little below half of the respondents who had low and high dietary score were from Ward 6 (Abebi), and Ward 5(Idika), respectively. Whereas half of the respondents who were in Ward 3 (Agbeni), had high dietary diversity score with 11(50%) with (P<0.029).This could as a result of availability of diverse agricultural produces and farmlands in the different communities. Similarly, it was reported that the dietary diversity score of respondent who were the six positions in the family was high, while the respondents who were the Ist or 2nd position in their families had

medium and low dietary diversity score respectively. This could be as a result of household food insecurity which parents/caregivers focus on the younger children more than the others.

5.5 Frequency of food intake of respondents

As reported by the respondents, the main staple foods of the respondents from roots and tubers were yam flour, while maize pap-*ogi*, rice cooked and white bread were the cereal staples mainly consumed. Foods from starchy roots and tubers were also consumed occasionally (1-3 times weekly) by children. The most commonly consumed among them was yam flour (amala), followed by maize pap- ogi and white bread were also commonly consumed. This could be attributed to the fact that these were the commonly consumed staples native to the people in the study area (Yoruba community).

Rice was the most commonly consumed among the cereals and legumes group, as about half consume it every day and more than half of the children consumed it between 4-6 times weekly. Legumes were regularly consumed by many as cowpea cooked *beans*, cowpea pudding, moinmoin and cowpea fried akara. Their major animal protein intake was from beef (meat) and fish while dairy products such as milk was consumed 1-3 times a week by respondents.

Although a little below half of the respondents consumed oranges, apple, bananas were the major fruits intake, fruits were consumed 1-3 times by the respondents. It was also reported that banana and soft drinks consumption had significant relationship with the nutritional status of the respondents. Almost half of the respondents who consume banana occasionally had a normal nutritional status compared to quarter of the respondents who were severely thin and do not consume banana. Similarly, the consumption of soft drinks among the respondents had significant relationship with the nutritional status ($P< 0.052$). Almost half of the respondents who consumed soft drinks daily (7days in a week) were severely thin. The proportion of school children who consumed soft drinks occasional (1-3 times in a week) had normal nutritional status. There is a strong relationship between consumption of soft drinks among school children and their nutritional status. Green leafy vegetables were reported to be regularly taken as vegetable soup ewedu by majority of the respondents. This could be

attributed to the fact that these were the commonly consumed staples native to the people in the study area (Yoruba community).

5.6 Anthropometry Measurement

World Health Organization has recommended various indices based on anthropometry to evaluate the nutritional status of the school aged children and has recognized Body Mass Index (BMI) as the most appropriate variable to assess nutritional status of school children and adolescents (WHO, 2000).Anthropometric examination is appropriate means in any research to evaluate health and nutritional condition in children and the indices does not only directly reflect the socioeconomic status of the family, health and social wellbeing of the population, but also the competence of the health care system, and the influence of the immediate surroundings, and can also predict academic performance (Faber and Wenhold, 2007; Prista, *et al.,*; 2003;Srivastava *et al.*, 2012).

Anthropometric data is related to measurement of physical characteristics of the body and can therefore be collected by both medical and non-medical personnel (Latham, 1997).The three common anthropometric indicators for assessing nutritional status of children includes height-for-age (stunting), weight-for-age (underweight) and weight-for-height (wasting) (Wamani *et al.*, 2006). Therefore, the impact on reduction in child mortality can be achieved once consideration is given to all levels of malnutrition through appropriate identification, this identification is only likely if anthropometric measurements are regularly done (Müller and Krawinkel, 2005; Caulfield *et al.*, 2004).

In this present study 6.4% of the children were found to be wasted (thin) when Body Mass Index-for-age criteria was used. The prevalence was lower than prevalence of underweight recorded among school children by other studies conducted by (Appiah *et al.*, 2014), (Mekonnen *et al.*,2013), Bloss *et al.*, (2004) and Kwena *et al.*, (2003) as 19.4%, 59.7%, 30.0% and 25.0% respectively. Also this study revealed a stunted prevalence of 56.4% when a height-for-age criterion was used. However, this prevalence is far higher than what other studiesconducted in Ghana by Appiah *et al.*, (2014), Kenya by Mekonnen *et al.*, (2013) and Kwena *et al.*, (2003) as 50.3% , 30.7% and 42.0% respectively.

This study also revealed a prevalence rate of overweight to be 9.2%. This is higher, though comparable to childhood overweight/obesity prevalence rate of 6.9%, found by Appiah *et al.,* (2014) and that of 7.6% found by Peltzer & Pengpid (2011) among a sample of children from Ghana and Uganda. However, it was lower than overweight prevalence of 17.0% among children aged 10-16 years in Greece and Italy (Janssen *et al.,* 2005). Also it was lower than prevalence estimates of other countries including Aboriginal families in Australia where 26.8% of children aged 5 - 15 years were overweight (Schultz, 2012) and Saudi Arabia where 29.0% of childrenaged 5-19 years were overweight (El Mouzan *et al.,* 2010). A study conducted among children between 2-18 years in Nigeria reported overweight prevalence of 14.2% (Ene-Obong *et al.,* 2012). Studies conducted by Cole *et al.,* (2000), Lobstein *et al.,* (2004) and Gupta *et al.,* (2012) conclude that overnutrition and obesity were gradually rising in children in poorer communities in the developing world due to adoption of western lifestyles. It was not a surprise that the prevalence was at this level. Lobstein *et al.,* (2004) also estimated that 10% of school-age children were overweight and were at risk of getting type2 diabetes if measures were not put in place.

In this study, there is a significant association between overweight and gender as 11.5% of the females was obsessed. However, in conformity with the of the findings of the present study, Peltzer and Pengpid (2011) among a sample of 5613 Ugandan and Ghanaian children aged 13-15years observed a significant association between gender andoverweight/obesity. Majority (52.9%) of the study participants were those between 10 - 13 years, the prevalence of overweight were found higher (60.0%) among this age group, nevertheless overweight was not associated with age in this study. Overweight was found to be higher (80.0%) among rural areas with significant disparities among the sub-districts. Even though, overweight was higher among rural folks, children in the urban communities were more likely to be overweight.

5.6 Implication of the study findings for Health Promotion and Education

The results of this study will have far reaching implications for planning, implementation and evaluation of nutritional education in the primary schools in study location and Nigeria at large. Health education is a major component of Health Promotion. In health education, information is directed to individuals, families and communities to influence their habits and knowledge. Thus, this study has revealed the behaviours (habits) associated with nutrition which should be addressed with appropriate nutrition education strategies. More so, improvement in quality and quantity of service availability, facilities and sustainable environment, educational level of caregivers and school children have a significant impact on health, it should be addressed too.

This study has identified reasons behind poor dietary habits and nutritional status of the upper primary school children. The impact of information and communication is very essential in health promotion on behaviour change. Providing adequate, appropriate and suitable Information, Education and Communication (IEC) materials can be used to address the dietary habits and nutritional status of upper primary school children and to get students familiar with the risk involve in poor eating habit with the aim of helping them to achieve optimum well being. This can be achieved by health promoters in collaboration with key stakeholders in education. By providing adequate and appropriate information, steps must be taken to ensure that well-structured guidelines are set so as to achieve a communication that is effective.

5.7 Conclusion

These findings of this study shows that malnutrition (Stunting and Underweight) still persist among school age attending public school in Oyo State. The nutritional standards on school children in this study were found to be unsatisfactory. With the stunted prevalence of 56.4% when a height-for-age criterion was used, 6.4% of the children were found to be wasted (thin) when Body Mass Index-for-age criteria was used and a prevalence rate of overweight to be 9.2% among the upper primary school children in Public Schools in Ibadan North West Local Government Area.

Consumption of food which is inadequate in required calories and from less than four varieties of food groups by the children were important predictors of malnutrition.

The children with high and medium dietary diversity score of 6.0 and 4.0 respectively were observed to be normal. While the children with low dietary diversity score of 3.0 and below were among the underweight and wasted children.

Malnutrition has a long term damaging effect on school children in public primary schools in Nigeria which is attributed to the unsanitary environments in school and home thereby creating opportunities for infections that comprise their nutritional status.

5.8 Recommendations

In view of the findings of this study, the following recommendations are made:

1. Nutrition education should be more emphasized in all schools in the study location and be part of the school curriculum.

2. Enlightenment programme or seminar should be developed for parents in the study location since they are the sustenance of the family food supply so as to improve the dietary intake of their children.

3. Supplementary feeding programme shod be induced in various public schools in the study location so as to reduce the incidence of malnutrition and deficiency in their diet.

4. There should be supplementation of minerals and vitamins supplied in the form of tablets in public schools.

5. Food-based strategies which incorporate home gardens, food diversification should be implemented in the communities.

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QUESTIONNAIRE

ASSESSMENT OF DIETARY HABITS AND NUTRITIONAL STATUS OF PRIMARY SCHOOL CHILDREN IN IBADAN NORTH WEST LGA OF OYO STATE.

INTRODUCTION:

Dear Respondent,

My name is OGBU, Chioma Geraldine, a postgraduate student of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan, Nigeria. I am presently conducting a study on "**Dietary Habits and Nutritional Status of Primary School Children in Ibadan North West Local Government Area, Oyo State, Nigeria"**

I would be asking you questions on your dietary habits and will also be measuring your height and weight. Your honest response to every question is very important as all the information provided will be kept confidential. Thanks.

Questionnaire Identification Number:
Name of School:
Date of Interview:
Name of interviewer:

SECTION A: DEMOGRAPHIC CHARACTERISTICS

1. Age as at last birthday: 9[1] 10 [2] 11[3] 12[4]
2. Sex: male [1] female [2]
3. Class: Primary 4 [1] primary [2] primary 6 [3]
4. Ethnic group: Igbo [1] Yoruba [2] Hausa [3] Others[4]
5. Religion: Christianity [1] Islamic [2] Traditional [3] Others[4]
6. Family Setting: Monogamous [1] Polygamous [2]

7. Number of children in family: 1 [ ] 2 [ ] 3 [ ] 4 [ ] 5[ ] others [ ]
8. Respondent's birth position in the family: Ist [1] 2nd [2] 3rd [3] 4th[4] 5th[5] others [6]
9. Are your parents still living together? yes[1] No [2]
10. Whom do you live or stay with? Parent [1] Relation [2] Friends [3] Alone [4] Others[5]
11. Father's occupation: Farming [1] Trading [2] Civil Servant [3] Artisan [4] Others(specify).....
12. Mother's occupation: Farming [1] Trading [2] Civil Servant [3] Artisan [4] Others(specify).....
13. Educational level of Father: No education [1] Primary School Cert [2] Secondary School Cert [3] Higher education [4]
14. Educational level of Mother: No education [1] Primary School Cert [2] Secondary School Cert [3] Higher education [4]
15. Source of lightening: Personal generator [1] Solar energy [2] Power holding [3]

    Others (specify).....
16. Source of fuel for cooking: Liquefied gas [1] Kerosene[2] Charcoal [3] Fire wood [4] Others
17. Source of water for drinking: spring/river [1] Well [2] Borehole [3] Pipe-borne water[4] Rain water [5]
18. Source of water for cooking: spring/river [1] Well [2] Borehole [3] Pipe-borne water [4] Rain water [5]
19. Method of refuse disposal: Burning [1] Bush [2] Refuse dump [3] City service [4]
20. Type of housing: Single room [1] Room&Parlour [2] Flat [3] Duplex [4] Bungalow [5]
21. Toilet type: No toilet [1] Pit latrines [2] VIP latrines [3] Water system [4]

SECTION B: EATING HABITS OF THE SCHOOL CHILDREN

No	QUESTION	CODING CATEGORY
22	Have you had breakfast this morning	Yes [1] No [2]
23	If no, why	No food at home[1] Not used to having breakfast [ ] Others [3]
24	How often do you take breakfast	Always [1] Sometimes [2] Never [3]
25	Which meals do you regularly/frequently eat?	Breakfast, lunch and dinner [1] breakfast and Lunch [2] breakfast and dinner [3] lunch and Dinner [4] breakfast only [5] lunch only [6] dinner only [7]
26	What food items are usually taken for each meal	Breakfast[1] _____ Lunch [2] _____ Dinner [3] _____
27	What is your favourite food	
28	Is food always available to you all the time at home?	Yes [1] No [2]
29	What is the average number of times that you eat outside the home daily	Once [1] 2 times[2] 3 times [3] Others [4]
30	Where do you eat?	School[1]On the way to school[2] Others[3]
31	From whom do you get these foods to eat?	Food vendors [1] Neigbours [2] Friends [3]
32	If yes at 28, how often do you buy	Everyday [1] 4-5times/week [2] 2-3times/week [3]

	food from them?	
33	Is eating snack your habit?	Always [1] Occasionally [2] Sometimes (3)
34	If yes, source of snack eaten	Home [1] outside the home [2] both home and outside the home [3]

SECTION C: FACTORS THAT INFLUENCE POOR DIETARY HABITS AND NUTRITIONAL STATUS IN PRIMARY SCHOOL CHILDREN

NO	QUESTION	CODING CATEGORY
35	Is your favourite food always available at home?	Yes [1] No [2]
36	If no, why?	
37	Are there certain foods that you don't like to eat?	Yes [1] No [2]
38	If yes, what are these foods?	
39	How is food purchased where you live?	Bulk purchase [1] As the need arises [2]
40	Do you have a garden at home where crops are planted?	Yes [1] No [2]
41	Is Nutrition study part of your subjects offered in school?	Yes [1] No [2]
42	Do you know the benefits of eating healthy?	Yes [1] No [2]
43	If yes, list some of them	
44	Are there food vendors in your school?	Yes [1] No [2]
45	If yes to question 3, what are the kinds of foods that are sold in your school?	
45	Which food do you usually purchase from them?	

SECTION D: FOOD FREQUENCY QUESTIONNAIRE/WEEK

I would like to know your normal eating pattern over the past one week.

	Food Group	Never (1)	Occasionally (2)	Frequently (3)	Daily (4)
S/N	**Carbohydrate**	**0time**	**1-3 times**	**4-6 times**	**7 times**
46	Rice				
47	Bread				
48	Yam				
49	Amala				
50	Gari				
51	Fufu				
52	Pap				
53	Plantain				
54	Maize				
55	Indomie				
56	Spaghetti				
57	Others				
	Proteins	**0 time**	**1-3 times**	**4-6 times**	**7 times**
58	Beans				
59	Meat				
60	Egg				
61	Fish				
62	Moinmoin				
63	Akara				
64	Others				
	Vegatables	**0 time**	**1-3 times**	**4-6 times**	**7 times**
65	Ewedu				
66	Efo				
67	Ugu				
68	Others				

	Fats and Oil	**0 time**	**1-3 times**	**4-6 times**	**7 times**
69	Palm oil				
70	Groundnut Oil				
71	Butter				
72	Others				
	Fruits	**0 time**	**1-3 times**	**4-6 times**	**7 times**
73	Mango				
74	Banana				
75	Orange				
76	Paw paw				
77	Apple				
78	Coconut				
79	Others				
	Beverages	**0 time**	**1-3 times**	**4-6 times**	**7 times**
80	Milk				
81	Milo				
82	Bournvita				
83	Nescafe				
84	Herbal tea(e.glipton)				
85	Others				
	Snacks	**0 time**	**1-3 times**	**4-6 times**	**7 times**
86	Biscuit				
87	Pop corn				
88	Purfpurf/ Buns				
89	Plaintain chips				
90	Ice cream/ Juice				
91	Soft drinks				
92	Sweets/chewing gum				
93	Others				

SECTION E:DIETARYDIVERSITYQUESTIONNAIRE

Please describe the foods (meals and snacks) that you ate or drank yesterday during the night, whether at home or outside the home. Start with the first food or drink of the morning.

Breakfast	Snack	Lunch	Snack	Dinner	Snack

Question number	Foodgroup	Example	YES=1 NO=0
94	CEREALS	Bread,noodles,biscuits,cookiesoranyotherfoodsmade frommillet,sorghum,maize,rice,wheat+*insertlocalfoods*	
95	VITAMINARICH VEGETABLESAND TUBERS	pumpkin,carrots,squash,or sweetpotatoesthat areorange inside+*otherlocallyavailablevitamin-Arichvegetables(eg. Sweetpepper)*	
96	WHITETUBERSAND ROOTS	Whitepotatoes,whiteyams,cassava,orfoodsmadefrom roots.	
97	DARKGREENLEAFY VEGETABLES	Darkgreen/leafyvegetables,includingwildones+*locally availablevitamin-Arichleavessuchascassavaleavesetc.*	
98	OTHERVEGETABLES	Othervegetables,includingwildvegetables	
99	VITAMINARICHFRUITS	Ripemangoes,papayas+*otherlocallyavailablevitamiA- richfruits*	
100	OTHERFRUITS	Otherfruits,includingwildfruits	
101	ORGANMEAT(IRON-RICH)	liver,kidney,heartorotherorganmeatsorblood-based foods	
102	FLESHMEATS	Beef,pork,lamb,goat,rabbit,wildgame,chicken,duck, or otherbirds	
103	EGGS		
104	FISH	Freshordriedfishorshellfish	
105	LEGUMES,NUTSAND SEEDS	beans,peas, lentils,nuts,seedsorfoodsmadefromthese.	
106	MILKANDMILK PRODUCTS	milk,cheese,yogurtorothermilkproducts	
DDS	**DIETARY DIVERSITY SCORE**		

SECTION F: NUTRITIONAL STATUS OF THE SCHOOL CHILDREN

a) Anthropometric Data

107	Age	
108	Weight	
109	Height	
110	BMI/ Age	
111	Weight/ Age	
112	Height/ Age	
113	Weight/ Height	

b) Observational checklist for clinical nutrition assessment

S/N	Part of the body	Sign	Present	Absent
114	Face	Moon face		
115	Hair	Easy Pluckability		
116	Eye	Pale Conjunctiva		
117	Lips	Angular Scares		
118	Skin	Xerosis		
119	Teeth	Mottled Enamel		
120	Gums	Spongy Bleeding gums		
121	Nails	Koilonychia		

INFORMED CONSENT FORM **Serial No:**

Dear Respondent,

My name is OGBU, CHIOMA GERALDINE, a postgraduate student of the department of Health Promotion and Education, Faculty of Public health, College of Medicine, University of Ibadan.

I am carrying out a research on dietary habits and nutritional status of primary school children in Ibadan North Local Government, Oyo State in order to make recommendations on prevention and intervention to the problems. I will need to ask you some questions which you may find difficult to answer. Please note that your answers will be kept confidential. You will be given a serial number and your name will not be written on the form so that your name will never be used in connection with any information you give to me. We shall also measure your height and weight.

The process of getting this information will not cause you any harm of injury. Your honest answers to this questions will help us to understand what people think, feel say, and do in respect to the issue.

I will greatly appreciate your cooperation in responding to the survey and taking part in this study.

Consent: Now that the study has been well explained to me and I fully understand the consent of the study process. I will be willing to take part in the research.

…….. ……..

Signature/ thumb print of participate& date Signature/ thumb print of participate& date