THE STUDY OF SOME ANTHROPOMETRIC PARAMETERS, NUTRITIONAL STATUS AND ACADEMIC PERFORMANCE OF PRIMARY SCHOOL CHILDREN IN ZARIA, KADUNA STATE, NIGERIA

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DECLARATION

I, OPOOLA, Florence declare that the work in the thesis titled **‘‘The study of some anthropometric parameters, nutritional status and academic performance of primary school children in Zaria, Kaduna state Nigeria”** was carried out by me in the Department of Human Anatomy, Faculty of Medicine, Ahmadu Bello University, Zaria. The information used for my literature review was fully acknowledged in the text and references. This dissertation has not been presented in any scientific gathering, neither has it been presented for another degree or diploma at any University.

FLORENCE OPOOLA _____ **SIGNATURE** _____ **DATE**

CERTIFICATION

The project thesis titled **THE STUDY OF SOME ANTHROPOMETRIC PARAMETERS, NUTRITIONAL STATUS AND ACADEMIC PERFORMANCE OF PRIMARY SCHOOL CHILDREN IN ZARIA KADUNA STATE NIGERIA BY Florence OPOOLA** meets the regulations governing the award of degree of Master of Science in Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literacy presentation.

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DEDICATION

This work is dedicated to the Almighty God, my beloved parents Daddy and Mummy S.A. Opoola, Mr. Uzezi Gerald and my lovely daughter Zoe.

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I wish to tender my appreciation and thanks to Almighty God for seeing me throughout my programme.

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ABSRACT

Nutrition is a fundamental part of human life and good nutrition is essential for survival, physical growth, mental development, health and well-being. The aim of the present study was to determine the relationship between Nutritional Status and Academic performance of Primary School Children in Zaria, Kaduna State, Nigeria. School children from Primary three to six were used for the study and were from three randomly selected Primary Schools within Zaria and its environs in Kaduna State. A total of 759 pupils made up of 385 girls and 374 boys were assessed. Ethical clearance was obtained from Ahmadu Bello University Teaching Hospital Zaria and Self administered questionnaires were used which were completed by the parents or guardians of these children. Body anthropometrics such as height, weight, hip, waist, chest circumferences were measured using stadiometer and measuring tape from which BMI was calculated. The Nutritional status of the children were determined using the Centre for Disease Control (CDC) standard for BMI percentile, while the academic performance of the children were determined by finding the mean of the 5 subjects taken during their term examination. When a Childs BMI is less than 5^{th} percentile is said to be Under weight , 5^{th} percentile to less than 85^{th} is said to be healthy weight, 85^{th} to less than 95^{th} percentile is said to be overweight, equal or greater than 95^{th} percentile is said to be obese. The result of the present study showed that Overweight children performed better academically when compared to others with a mean academic score of 66.19±17.00, Underweight was observed to be more prevalent amongst the males than the females, while on the other hand, Overweight was more prominent in females than males. There was no statistical significant difference between the Nutritional status and Academic performance of the Primary School Children studied. The total number of children that were Underweight

was 140 (71 males and 69 females) while a total number of 38 children were Overweight (12males and 26 females). Children whose parents attained tertiary education performed better academically than others. From the present study children whose parents are Civil servants performed better academically than others. This study also showed that a total number of 37 Children had a Heavy birth weight and tends to perform better academically than others while Children born in dry season perform better academically than children born in rainy season. Conclusively, this study showed that a high percentage of the population have Healthy weight, while only a small proportion was Obese. This could be a result of in balance in the food intake of the population and from the result the total number of children that were Overweight performed better academically than the Others which could mean that the children that were well fed and well nourished tend to do better academically than those that are not well fed and nourished.

CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND OF STUDY

The development of any nation or community largely depends upon the quality of education available to its citizens. It is generally believed that the basis for any true development must commence with the development of human resources (Akanle, 2007). Primary education is the foundation on which further education is built (Vegas and Petrow, 2008). Primary education has two main purposes. The first purpose is to produce a literate and numerate population that can jointly deal with problems both at home and at work. The second purpose is to serve as a foundation on which further education is built (Akanle, 2007).

Nutrition is a fundamental pillar of human life, health and development across the entire life span (FAO/WHO, 1992). From the earliest stages of foetal development, at birth, through infancy, childhood, adolescence, and into adulthood and old age, proper food and good nutrition are essential for survival, physical growth, mental development, performance and productivity, health and well-being (WHO, 2000). Evidence has shown that physical growth and cognitive development in children are faster during early years of life, and that by the age of four years, 50 % of the adult intellectual capacity has been attained and before thirteen years, 92 % of adult intellectual capacity is attained (Vernon, 1976).

Evidence has shown that four (4)% of the total children born in developing countries die of malnutrition before they are five years old (Toriola, 1990) and that the most affected

are usually the children of illiterate parents in low socio-economic status that have low purchasing power in the economy (Adekunle, 2005). Quite a number of studies have shown that poor feeding and or recurrent infections as a result of poverty leads to stunted growth, substantial brain impairment, low intellectual competence and capacity to learn in children (Kerr et al., 2000; Ivanovic *et al.,* 2002; Chang *et al.,* 2002; Braveman and Gruskin, 2003; Liu *et al.,* 2003; Adebisi, 2013).

Strong evidence exists that poor feeding practices are associated with stunted growth and delayed mental development (Mendez and Adair, 1999); and that there is a relationship between impaired growth status and both poor school performance and intelligence quotient (PAHO, 1998). The relationship between timely and quality dietary intake, brain size and academic performance has been documented (Strupp and Levitsky, 1995; Florey *et al.,* 1995), and that a significant correlation exists between head circumference and intelligence quotient (1Q). This suggests that difference in human brain size could be relevant in explaining the differences in intelligence and academic performance, although genetic and environmental factors like socio-economic, socio-cultural and psychological factors could be direct or indirect co-determinants of both intelligence and school performance (Vernon *et al*., 2000; Wickett *et al.,* 2000).

Head circumference is a physical index of both past nutrition and brain development and a good predictor of later intelligence of a child (Botting *et al.,* 1998), and it is used as the most sensitive anthropometric index of prolonged under nutrition during the infancy, associated with intellectual impairment (Ivanovic, 1996). Traditionally, family status variables such as socio-economic status and parents' level of education have been regarded as predictors of children's academic achievement (Joan, 2009). Head circumference (HC) has been defined as an anthropometric indicator of both nutritional

background and brain development (Ivanovic *et al.*, 2004). Findings by other authors reveal that poor prenatal and postnatal HC growth results in poor outcomes in terms of the acquisition of cognitive and academic abilities by the child, and this group is followed by those children with prenatal brain compromise but satisfactory postnatal HC growth (Frisk *et al.*, 2002).

Low maternal education is associated with slower fetal growth, and this effect appears to be stronger for growth of the head than for growth of other organs (Silva *et al.*, 2010). Maternal intelligence quotient, home environment, ethnicity, and family size have been described as important predictors of child intelligence quotient (Cornelius *et al.*, 2009). A 1-cm decrease in HC predicted a 1-point decrease in the Stanford–Binet composite score (Cornelius *et al.*, 2009). Mother's educational background, gestational age, and HC at age 2 years could explain the achievement of appropriate schooling at age 8 years (Charkaluk *et al*., 2011).

Findings by other authors suggest that abnormal brain development after prenatal injury or postnatal nutritional deficits are responsible for cognitive deficits in preterm children (Abernethy *et al*., 2004). For all age and sex groups, Head circumference (HC) has been defined as an anthropometric indicator of both nutritional background and brain development (Ochiai *et al.*, 2008).

1.2 STATEMENT OF RESEARCH PROBLEM

Poor Nutritional status is one of the major causes of low academic performance and productivity in primary education which may affect the physical and cognitive development in children during their early years of life. This study seeks to address the

causes of poor academic performance of pupils in selected primary schools in Zaria metropolis.

1.3 JUSTIFICATION

Identifying the variables that influence the achievement of school children is of great importance, because it would serve as an essential tool for Nigeria Universal Basic Education Board and other policy makers in the design of education policies. This would eventually lead to a rise in the quality of primary education and pupils nationally. The study would also add to the body of knowledge in the study area.

This study will shed more light into the current situation regarding the relationships between academic performance versus nutritional status, and family background of pupils from selected primary schools in Zaria metropolis. The outcome of the study is therefore expected to assist all stakeholders in Zaria, particularly at the basic education level, to fashion out appropriate strategies that would enhance the qualities of pupils.

1.4 AIMS AND OBJECTIVES OF STUDY

1.4.1 Aim of Study

The aim of this study was to investigate the relationship between anthropometric parameters, nutritional status and academic performance of primary school children in Zaria, Kaduna State Nigeria.

1.4.2 Objectives of Study

The present study is designed to achieve the following objectives, to;

i. assess the influence of Nutritional Status on Academic Performance of Primary School Children in Zaria Kaduna State Nigeria.
ii. study the influence of anthropometric parameters on academic performance of Primary School Children in Zaria Kaduna State Nigeria.
iii. assess the relationship between nutritional status and some anthropometric parameters of Primary School Children in Zaria Kaduna State Nigeria.
iv. study the influence of parental social economic status on academic performance of Primary School Children in Zaria Kaduna State Nigeria.

1.5 SIGNIFICANCE OF STUDY

It is therefore hoped that results of this study will assist parents and other stakeholders in understanding the influence of some anthropometric parameters on academic performance of these pupils. This will also help policy makers in the design and implementation of nutrition education program at primary school level. The study will create a data base on the influence of some anthropometric parameters and social status on academic performance of primary school children within Zaria metropolis.

1.6 STUDY HYPOTHESES

This study sets out to test the following hypotheses:

i. There will be difference in academic performance of the school children due to difference in anthropometric parameters, nutritional and social status.

1.7 DEFINITION OF TERMS

It is important to define some key concepts that have been used in order to clarify the context within which they are being used in this study.

i. **Nutritional status:** Refers to the physical well-being of the child in weight and height.

ii. **Socio-demographic factors:** These include age, gender, birth order, etc.

- **Sex:** It is categorized into female or male.
- **Age:** Refers to the age of the child as at last birthday. Parents help child in filling the child's age as at last birthday.
- **Birth order:** Refers to child's position in the sib ship. Response are categorized into 1^{st}, 2^{nd}, 3^{rd} or later born.
- **Family size:** this refers to the total number of siblings there are in a family and was categorized into 1, 2, 3 and greater than or equal 4.

i. **Father's occupation:** Refers to the job of head of the family. For simplicity during analysis, these are grouped into civil servants, artisans, traders, private/company employee or farmer.

ii. **Mother's occupation:** Refers to the job of child's mother. These could be civil servant, artisan, housewife, trader, private/company employee, or farmer.

iii. **Father's level of education:** This refers to the highest level of education of child's father. This was categorized as none, primary, secondary, or tertiary education.

iv. **Mother's level of education:** This refers to the highest level of education of child's mother. This was categorized as none, primary, secondary, or tertiary education.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 FACTORS INFLUENCING ACADEMIC ACHIEVEMENT

Various factors have been given for poor performance of pupils. Rothstein (2000) argues that learning is not only a product of formal schooling but also of communities, families and peers. Socio-economic and socio-cultural forces can affect learning and thus school achievement. The next part focuses on the relative effects of home-related, school-related, pupil characteristics, and teacher-side factors.

The status of a family can have an influence on the performance of its children as observed by Sentamu (2003) that the higher the status of a family the more likely it motivates its children to learn and perform better. They looked at this status in three ways: Level of education of parents, level of family income and parents' marital status. They defined education as acquisition of knowledge, skills and attitudes from parents to children. Nabbumba (1994) reports that pupils' performance and aspirations, is linked to level of education of their parents. Heyman (1980) emphasized the importance of family income that children born and reared from wealthier families do better in all aspects of life and have high moral reasoning and good performance. Sentamu (2003) reports that family incomes gives direction of what kind of schools the child will attend. She defined income as money received over a certain period of time, which can be through payment for work or returns on investment. She defines family income as the state at which a family receives money over a certain period of time (Sentamu, 2003).

According to Oxford Advanced Learners' Dictionary (1994) marital status refers to the state of being together as a husband and a wife. The state has both positive and negative influence on pupils' performance. For example, in a polygamous family pupils' performance is negatively influenced by low family income because big number of children over burden the parents. Where parents are separated children become targets of mistreatments by their stepmother, hence, they do not perform well in schools. While those who have stable marriages collectively exercise control over their children's behaviour, children receive enough adult attention, love, sympathy, guidance, security and they are well supported that motivate them to perform better in schools (Nabbumba, 1994).

2.1.1 Home-Related Factors

Whether a child performs well in school can be influenced by a range of household factors. These include socio-economic status (education, occupation and income), size of the household, type of discipline at home, family structure, and the level of parental involvement and interest in child schooling are all factors which affect performance in school. In a study by Christenson and Gorney (1992), family and environmental factors were found to affect pupils' achievement. The factors are parents' expectation and attribution, structure and learning, home environment, discipline, and parental involvement. Engin-Demir (2009) argued that sizable research has consistently shown that pupils' academic achievement has been influenced by background of family characteristics such as socio-economic status of parents (Engin-Demir 2009).

Parents who have more education appear better and are able to provide their children with the academic and social support important for educational success when compared to

parents with less educated (Schiller *et al*., 2002) also argued that. (Avotri *et al*., 1999) for instance, found that the educational status of parents was a major factor determining a child's academic achievements. This finding corroborates with that of (Johnson *et al*.,2001) study that parental education, particularly the mother's education has a big influence on children's school achievement.(Fertig *et al*.,2002) also found that mother's education has a greater effect on child's learning overall, but that father's education becomes more important when they have attained tertiary levels.

Fuchs and Woessmann (2004) found parental education and occupation to have more substantial effects on reading than on mathematics test scores. They stated that parental occupation and having at least one parent with a full-time job have important effects on pupil academic performance. In other words poverty, low level of parental education, parental and neighborhood negative attitudes toward schooling in general, children among from disadvantaged background have significantly affected academic achievement negatively (Currie, 1995; Gregg and Machin, 1999) whereas children with high level of parental education have greater access to a wide variety of economic and social resources (family structure, home environment, parent-child interaction) that can be drawn upon to help their children succeed in school (Coleman, 2006; McNeal, 1999). Higher family income is associated with higher pupils' achievement (Hanushek, 1992).

Akanle (2007) studied socio-economic factors influencing pupils' academic performance in Nigeria. The study revealed that insufficient parental income influences pupils' academic performance. (Jing-Lin *et al*., 2009) found that perceived importance of learning success to family, English writing ability and social communication with their compatriots are significant predictors of international pupils' academic achievement.

An increased number of children in the family leads to less favourable child outcome. Children from larger families have been found to have less favourable home environments and lower levels of verbal facility (Parcel and Menagham, 1994) as well as highest rates of behavioural problems and lower levels of education achievement (Downey, 1995).

Research work has shown that the nature of parental discipline affect academic output of children (Aremu, 2000). Oluwole (2001) found that the degree of self-efficacy and anxiety manifested by learners determine their academic performance. On the other hand, children from permissive homes are too complacent, unmotivated, and lack personal will to succeed. The democratic style of parenting has been found to be very helpful to teaching-learning situation. Here, children receive punishment that is commensurate with the offence committed. Such children are strong willed and ready for success. Aremu (2000) observes from a study that undergraduates that receive democratic type of parenting perform better than their counterparts from autocratic homes.

In addition, structurally, a family is either broken or intact. A broken family in this context is one that is not structurally intact for various reasons; death of a parent, divorce, separation, dissertation and illegitimacy in which case, the family was never completed (Coukline, 1996). This analysis becomes necessary because life in a single parent family can be stressful for both the child and the parent. Such families are faced with the challenges of diminished financial resources, assumption of new roles and responsibilities, establishment of new patterns in intra-familial interaction and reorganization of routines and schedules (Agulanna, 1999). These conditions are not conducive for effective parenting. This is because when the single parent is overburdened by responsibilities and by their own emotional reaction to their situation, they often

become irritable, impatient and insensitive to their children's needs. Such conditions do not provide a conducive environment for academic excellence (Uwaifo, 2008).

Furthermore, parental involvement tends to influence children's school achievement. Grolnick and Slowiaczek (1987) indicated that pupils with parents who are involved in their education tend to have better academic performance than pupils whose parents are not involved in their school. Corroborating this finding, Reynolds and Gill (1994) revealed that a significant relationship existed between parental involvement and academic achievement. Conway and Houtenwille (2008) also found that parental involvement has a strong positive effect on pupil achievement. Further research shows parental involvement in children's learning not only leads to higher academic achievement, but greater cognitive competence, greater problem solving skills, greater school enjoyment, better school attendance and fewer behavioral problems at school Ademola and Olajumoke, (2009). Additionally, (Tremblay *et al.*, 2001) found a significant association between pupils with parents involved at school and their academic performance.

Also, parental interest in schooling has been found to contribute significantly to the academic achievement of pupils. For instance, Odinko and Adeyemo (1999) found that parental interest in schooling together with socio-psychological factors were good predictors of pupils' learning outcomes in English language. Ghanney (2007) examined the effects home environment has on the child's achievement in primary schools in Winneba Township. He found that positive parental attitude towards education; great parental support and interest combine to enhance children's progress in education rather than the level of parent's educational attainment.

2.1.2 School-Related Factors

Several school environmental factors have generally been identified as influencing academic performance. These include availability of instructional materials, school location and quality of the physical facilities, class size and pupil-teacher ratios, teacher qualification and experience, and supervision. Instructional materials provide information, organize the scope and sequence of the information presented, and provide opportunities for pupils to use what they have learned (Etsey *et al*.,2004). Pupils usually perform better when they have books or study aids to foster their learning. These study aids or material resources could be textbooks, teachers' guides, wall pictures, maps, atlases and other learning aids. The availability and use of teaching and learning materials affect the effectiveness of a teacher's lessons (Etsey *et al*., 2004).

In addition, the school location and quality of the physical building influence the performance and achievement levels of pupils. Harbison and Hanushek (1992) stated that the quality of the physical facilities is positively related to pupil performance. Engin-Demir (2009) argue that attending a school with a better physical environment is associated with increased mathematics scores. Adepoju (2001) found that pupils in urban schools manifest more brilliant performance than their rural counterparts. Also, Ogunleye (2002) reported a significant difference in the achievement of pupils in urban and semi-urban areas.

Class sizes have also been identified as determinants of academic performance. Studies have indicated that schools with smaller class sizes perform better academically than schools with larger class sizes. (Fabunmi *et al*., 2007), for instance, indicated that three class factors (class size, pupil classroom space and class utilization rate), when taken

together, determined significantly pupils academic performance in Oyo state, Nigeria. Similarly, Salfi and Saeed (2007) found a significant correlation between school size and pupils' achievement in Pakistan. They revealed that small schools performed better than medium and large schools. (Tremblay *et al*., 2001) found class size to be inversely related to achievement, especially for children in early grades. Kraft (1994) in his study of the ideal class size and its effects on teaching and learning in Ghana concluded that class sizes above 40 have negative effects on pupils' achievement. Adeyela (2000) found that large class size is unconducive for serious academic work.

Furthermore, schools with effective supervision of teaching and learning activities have high performance rates (Etsey *et al*., 2004), in a study of 60 schools from semi-urban (29 schools) and rural (31 schools) areas in Ghana found that academic performance was better in private schools than public schools because of more effective supervision of work. According to Etsey *et al*. (2004) if circuit supervisors are more regular in schools, this would put the teachers on the alert to be more regular and early in school. This would forestall teacher absenteeism and improve teaching in the schools. If teachers are present always following regular visits of circuit supervisors, pupils would be challenged to change their attitudes toward school (Etsey *et al*., 2004).

2.1.3 Pupil Characteristics

Several pupils' characteristics have generally been identified as influences to their academic performance. These include time with books and homework, attendance in school, pupils' attitude towards schooling, pupils' self-concept and motivation, health and nutritional status of pupils. According to Engin-Demir (2009) regardless of intelligence, pupils who spend more time on assignments and homework are very important activities

to improve their grades. The amount of time pupils invests in homework and other related activities have also been found to be strongly related to motivation. (Etsey *et al*, 2004; Amedahe and Edjah, 2004) found homework to be a correlate of academic performance. Homework is in reality an interaction between school and the home, and an essential ingredient of the educational process when measuring academic achievement (Harbison and Hanushek, 1992; Alomar, 2006). Also, Stricker and Rock (1995) conducted an analysis by assessing the impact of the pupils' initial characteristics (gender, ethnicity, parental education, geographic region and age) and the academic performance. They found that the pupils' initial characteristics have a modest impact on their academic performance and among them parental education is the most significant.

In addition, school attendance has a high correlation with individual academic achievement. The success of a pupil in school is predicated on regular school attendance. According to Allen-Meares *et al*. (2000) poor attendance such as truancy or unexcused absence from school, cutting classes, tardiness, and leaving school without permission is seen as important in determining pupils' academic. Heady (2003) argued that there is a negative relationship between pupil academic achievement and work during school hours. Also (Akabayashi *et al*., 1999) found that additional working hours decrease a child's reading and computational ability, whereas with additional hours of school attendance and study the reading and computational ability increased. From their findings, Ray and Lancaster (2003) concluded that time spent at work had negative impact on education variables with marginal impact weakening at higher levels of study hours. Unbalanced demand of work and education places a physical and mental strain on pupils and often leads to poor academic performance (Ray and Lancaster, 2003).

Several researchers have investigated the significant role of pupil attitudes toward learning with regard to their academic achievement. Pupils' attitudes such as absenteeism, truancy, indiscipline, etc. can affect their performance. For instance, McLean (1997) found, by distinguishing between the attitudes of high and low achievers, that five attitudinal factors were significantly related to academic performance. Pupils' attitudes may not only directly affect academic achievement, but also may indirectly influence the effect of other factors as well. In another study, Abu-Hilal (2000) found the effect of attitudes on pupil level of aspiration. Despite the difference between the findings of these two studies, the authors achieved consensus as regards to the significance of attitudes in predicting achievement. House (1997) and Hassan (2002) further complemented the results of earlier studies, with the former proving that the pupil's initial attitude towards school was significantly related to academic performance, while the latter found that attitudes predicted the pupil's basic approach to learning (Hassan, 2002).

Among one of the personal variables most studied is self-concept, which concerns the group of thoughts and beliefs that a pupil has about his/her academic ability. Self-concept results from the pupil's internalization of his social image. It is developed from different interactions with the social environments and agents. Great importance is assigned the pupils self-image and the acceptance or rejection by others (Diaz, 2003). This factor has also been investigated by several authors, as regards the relationship between self-concept and academic achievement. Marsh (1990) investigated the reciprocal relationship between self-concept and academic achievement and found that an individual's present achievement is affected by prior academic self-concept, and that grades had no effect on subsequent academic self-concept. Similarly, Marsh and Yeung's (1997) revealed that prior academic achievement did affect subsequent academic self-concept, and likewise,

prior academic self-concept also affected subsequent achievement, with prior achievement being the control. Contrary to these results, Helmke and Van Aken (1995) found that elementary school achievement did not affect prior self-concept. Edwards (2002) found that self-concept better predict performance than variables such as age or pupil gender.

Another personal variable most studied is motivation. Motivation is considered to be the element that initiates the pupil's own involvement in learning. When a pupil is strongly motivated, all his effort and attention are directed toward the achievement of a specific goal, thus bringing to bear all his or her resources (Diaz, 2003). In relation, pupils' academic achievement motivation is influenced by the pupils' perception of parental support and involvement. If pupils' perception is positive on their parents support and involvement, they will achieve well (Grolnick and Slowiaczek, 1994; Wang and Wildman, 1995). Gottfried (1994) revealed that parental motivational practices have significant direct effects on academic intrinsic motivation, and indirect effects on subsequent motivation and achievement.

Fuchs and Woessmann (2004) observed that pupils performed significantly worse in reading, mathematics and basic science in schools whose headmasters reported that learning was strongly hindered by the lack of parental support. However, some research has shown most aspects of the relationship between educational support of parents and scholastic achievement of children to be negative. Studies have looked at children's nutritional and health status on school indicators such as classroom concentration, general intelligence and performance on selected cognitive tasks including achievement test scores (Pridmore, 2007). Research by the Ghana National Commission on Children (GNCC, 2000) found that in total, a little over 16 per cent of school-aged children

surveyed, suffered from recurring health problems such as headache, malaria/fever, stomach disorder and other ailments.

Research by (Fentiman *et al*., 2001) in the Eastern Region, revealed that 70 per cent of all primary school-age children were anemic. Sarris and Shams (1991) studied malnutrition among school age children in Ghana and found that about 36 % of children surveyed were malnourished. Most weighed below the 80 percent Harvard weight-for-age standard. The GNCC survey (2000) also reported that only about a third (29%) of children ate meals with protein. The research indicates that in general malnutrition is higher in northern Ghana (Sarris and Shams, 1991) where socio-economic indicators are low. In these regions enrolment, attendance, completion rates and achievement tend to be lower (Sarris and Shams, 1991).

Health has the potential to affect access to schooling. Research indicates a child's health can influence when and whether they go to school, their functioning in school and how long they are expected to stay in school. Research in Ghana indicates a correlation between malnutrition, stunted growth and delayed enrolment in school (Fentiman *et al*., 2001). A child's health status affects how they function at school. Children who suffer from malnutrition, hunger, or who lack certain micronutrients do not have the same potential for learning as healthy and well-nourished children (Pridmore, 2007).

Harbison and Hanushek (1992) found a statistically significant relationship between health and nutritional indicators and academic achievement. They concluded that the influence of poor health and nutritional status on achievement begins early in a child's life and have cumulative impact on pupils' achievement. Vegas and Petrow (2008) assert that although the mechanisms by which malnutrition affects academic performance are

not known, deficiencies in proteins, calories and micronutrients are believed to impair cognitive development. A local study on early primary school children in Malaysia showed a weak but significant association between poor nutritional intake and academic achievement (Ong, *et al.*, 2010)

2.1.4 Teacher-Side Factors

Several teacher factors influence academic performance. These include teacher attendance in school, teachers' interest and motivation, and teaching effectiveness and methods of teaching. Teacher regularity in school is important in terms of both children's access to education and the nature of that access. A widespread problem of teacher absenteeism is likely to contribute to poor pupil performance. The prevailing evidence is that teacher absenteeism at primary school level in Ghana appears to have worsened in the last fifteen years (World Bank, 2004). The World Bank impact evaluation of basic education in Ghana found that, "in 2003, nearly 13 % of teachers had been absent in the past month, compared to just over 4 % in 1988" (World Bank, 2004). It also observed that "in 1988, 85 % of schools did not suffer at all; whereas this figure has now fallen to 61 %, with 13 % of schools with over one-third of the teachers being absent for reasons other than sickness in the past month" (World Bank, 2004). The study also found absenteeism to be significantly worse in rural schools than in urban schools, and worse in public schools compared to private schools. Similarly the CARE (Cooperative for Assistance and Relief Everywhere) International (2003) report which looks at deprived rural areas in northern Ghana talks of chronic teacher absenteeism 'which adversely affects the learning environment' and Dunne and Leach (2005) talk about the low levels of professionalism in schools (especially low performing ones), with teachers having high rates of lateness, absenteeism and sometimes refusing to teach classes.

The World Bank (2004) report put forward a number of reasons for the increasing teacher absenteeism. These included teachers living long distances from schools and experiencing transportation difficulties; teachers having to travel to town once a month to collect their pay, which may or may not have arrived; and, rural teachers engaging in farming activities. Although factors will be context-specific, multivariate analysis on teacher survey data also showed that teacher absenteeism was more likely to occur if the following factors were prevalent: poor working conditions, low morale, and high pupil-teacher ratio, living with spouse, being in their home district, and having good social relations (World Bank, 2004). These last three factors were explained as possible causes of distraction from work. Barnes (2003) indicates how teachers are being encouraged in Ghana to facilitate local level development, which although it can have positive impact on schooling, can also lead to teacher absenteeism and lateness.

In another study, (Fobih *et al*., 1999) arrived unannounced in some 60 schools and found that about 85 % of teachers go to school late. Lateness ranged from five minutes up to one and a half hours. This meant teaching time was lost, teachers taught fewer school subjects (i.e. taught mainly English and Mathematics out of 10 subjects), and the shortening of the school day for pupils. Lateness and absenteeism affect completion of syllabi. When the syllabus is not completed, pupils find it difficult to understand content that is to be taught in the next class which foundation in most cases is based on the previous class (Etsey *et al*., 2004). This assertion supports Pryor and Ampiah's (2003) view that most children do not follow school work because they do not possess the understanding from previous work that is prerequisite for the syllabus of the higher grades of primary school and junior secondary school. Both absenteeism and lateness Bennell and Akyeampong (2007) point out are symptomatic of education systems that are unable to manage teachers effectively,

have weak teacher management structures, and are unable to provide incentives to motivate teachers to improve their attitudes to work.

Another factor is teacher motivation. A highly motivated person puts the maximum effort in his or her job. Ofoegbu (2004) linked poor academic performance of pupils to poor teachers' performance in terms of accomplishing the teaching task, negative attitudes to work and poor teaching habits which have been attributed to poor motivation (Ofoegbu, 2004).

The influence of effective teaching on pupils' academic performance has been the subject of several studies. Quality of teachers and commitment are key inputs in educational production to perform better achievement. A teacher's knowledge of the subject matter coupled with textbooks, instructional time and other learning materials have great influence on learning at the basic school level (Etsey *et al*., 2004). Agyemang (1993) reported that "a teacher who does not have both the academic and the professional teacher qualification would undoubtedly have a negative influence on the teaching and learning of his/her subject". According to Hedges (2002) many trained teachers are unwilling to accept postings to deprived communities in Ghana. As a result there is a tendency for less qualified teachers to be employed in these communities, which affects their academic performances negatively. Darling-Hammond (2000) found that teacher quality characteristics such as certification status and degrees in subject to be taught are very significant and positively correlated with subject outcomes in basic science and mathematics. Also, (Greenwald *et al*,1996) found academic achievement to be positively correlated with teacher qualification. Additionally, Abuseji (2007) found teacher's qualification to be the second most potent causal effect on students' achievement in

chemistry. Its direct and indirect effect accounted for 4.37 %, and 5.00 % of the total effect on students' achievement in chemistry in Lagos state, Nigeria.

Bilesanmi (1999) found that teachers' teaching experience had significant effect on pupils' achievement in science. Also, Okoruwa (1999) investigated the relationship between measures of teachers' experience and pupil achievement in science and mathematics. He found that teaching experience as measured by years of service correlated positively with pupil test results (Okoruwa, 1999).

Effective teaching embraces a variety of different aspects of teaching such as subject mastery, effective communication, lesson preparation and presentation, pacing the class to the pupils' level and taking into account individual differences, allowing pupils to practice and applying what they have learned, letting pupils know what is expected of them, and monitoring and evaluating performance so that pupils learn from their mistakes (Etsey *et al*, 2004). Jacob and Lefgren (2006) found a positive correlation between effective teaching and academic achievement. Similarly, Adediwura and Tayo (2007) suggest that effective teaching is a significant predictor of pupils' academic achievement and concludes that effective teaching produce pupils of higher academic quality. Akiri and Ugborugbo (2009) showed that effective teaching produced better performing pupils.

2.2 INFLUENCE OF PARENTS' LEVEL OF EDUCATION AND PUPILS' ACADEMIC PERFORMANCE

Many scholars defined education differently; with Odaet and Bbuye (1997) defining it as a process whereby some human being directs and guides the growth and development of some human being towards some end or goal in life. It deals with preparing the right type of environment for the individuals to allow them physically, mentally and spiritually so as

to develop harmoniously within themselves and together with their fellow human beings. Level of education of parents is the degree to which parents have acquired some knowledge, skills, attitudes and values of informal and formal education. Ezewu (1998) pointed out that children who join primary schools at early age also complete their primary education early (Ezewu, 1998).

Ezewu (1988) found that educated parents provide adequate learning materials for their children, which stimulate them to learn and perform better in all subjects. These parents are concerned over their children's education/performance, which sometimes makes them coach their children themselves or appoint part-time teachers for them. They send their children to the best nursery and primary schools which serves as sure gateways to secondary and university education which in turn leads to higher educational qualification to occupy higher positions in societies. Owen (1999) in her study exploring beliefs about academic achievement studied the relationship between parents' educational attainment and found that the educational attainment of parents have a relationship with educational achievement of their children (Owen, 1999).

According to Sentamu (2003), the educational attainment of parents determines the kind of schools to which their children go to. Such schools are near in kind to the ones their parents attended. This tends to lay a foundation for better performance of their children while at school. Considine and Zappala (2002) in their study in Australia on the influence of education disadvantages in the academic performance of school found that families where parents are educated foster a higher level of achievement in their children because of providing psychological support for their children. Combs (1985) found that virtually all nations, children of high parents on education have far better chances of getting into better secondary schools and universities than equally bright children of ordinary workers

or farmers. In other words, the highly educated parents tend to provide a more conducive learning environment that propels their children to go to schools and succeed (Combs, 1985).

Maani (1990) and Mugisha (1991) both attempted to analyze the relationship between children's performance at school and the level of their parents' education established that the more educated the parents are, the better the children's performance at school. Mugisha actually did his study on the primary school pupils in Kampala (Uganda) which also belongs to the same education system like in Paidha Town Council. According to Nabbumba (1988), parents' level of education influences pupils' performance in the sense that educated parents value education and they tend to encourage their own children to value and actively engage in receiving education. In a study conducted in Kenya discovered that the higher the levels of education of parents, the more likely it motivates children to learn and perform better. Kundu and Tuto (2000) found that home background has a significant influence on the achievement of children at school because educated parents tend to offer more psychological, social and financial support to their children, thus giving them the opportunity to excel in their studies (Kundu and Tuto, 2000).

2.3 LEVEL OF FAMILY INCOME AND PUPILS' PERFORMANCE AT SCHOOL

Income means money received over a certain period of time, which can be through payment for work or returns on investments while family income can be referred to the state at which a family receives money over a certain period of time (Oxford Advanced Learners' Dictionary 1994). In this study, level of family income includes money received by father, mother and Guardian. According to Farrant (1980), children from poor

home background usually suffer from serious diseases that lead to their poor performance at schools. In such homes parents are attempted to encourage their children for early marriages which affect their performance. While families with high financial background tend to support their children's education and encourage the importance of education rather than encouraging them for marriages. Heyman (1980) emphasized the importance of family income on pupils' performance that children born and reared from wealthier homes do better in many aspects of life and have high moral reasoning and better performance compared to children who come from poor home background who face a lot of problems in their education.

In a study conducted by Sentamu in Mukono District in 2003 on the influence of family income on pupils' performance at school, it was found that family income was the determinant of the kind of a school a child attends. This was in congruence with what Combs (1985) had established in several countries that children from high parents' occupation have far better opportunities of getting into better secondary schools and university than equally bright children of ordinary workers or farmers. The researcher is in total agreement with this assertion because in Uganda, it is generally the children of the rich who flock to the academically better performing schools. Family income, according to Escarce (2003) has positive influence on the education opportunities available to adolescence and on their chances of educational success. This is because richer parents are able to take their children to high-cost schools that generally tend to perform academically better.

2.4 PARENTS MARITAL STATUS AND PUPILS' PERFORMANCE AT SCHOOL

Marital status refers to the state of being together as a husband and a wife (Oxford Advanced Learners' Dictionary 1994). This state has both positive and negative effects on pupils' performance at school, depending on the organization of each family member. Kasirye (1995) observed that polygamous and extended families where income I low influence pupils' performance in a sense that big numbered of children over burden the parents, therefore, they fail to support their children's education adequately. He further observed that in homes where parents are quarrelsome, children are neglected hence affects their performance both in school and at home. The fact that no study has been carried out in the said schools has left a gap for the researcher to investigate the effect of marital status of parents on the performance of the pupils.

(Baron *et al*, 1991), pointed out that marriage is a bond that unites two families, two clans, even more, a bond that introduces families into another. One the full contract of marriage is broken it creates a great scar in the community and it is likely to be traumatic for the couple's children. According to Mbiti (1969), divorced parents exercise less control over their children. Medrich *et al.* (1982) , further said, children from single parent families receive less adult attention, affection, love, sympathy, guidance and security and they are emotionally disturbed. Bhati (1998) stressed that there is a link between parents' marital status and pupils' performance. For instance lack of cordial understanding in a family causes instability, lack of control in children's behaviour also influence performance. According to Gentlement and Markowitz (1974) they looked at separation of parents as a destructive event in a family, which affects performance in all aspects of life. Michael and Sheila (1989) found that level of parents' marital status

actually influences pupils' performance at school. Penny (2001) found that parents' marital status actually has effects on pupils' performance. She emphasized that children living with their stepmothers are targets of misdirected emotion and mistreatments while children from stable families tend to perform far better in schools.

2.5 NUTRITION

Nutrition is important at any time of development, but it is especially crucial during the first two years because the baby's brain and body are growing so rapidly. Pound for pound, an infant's energy needs are twice those of an adult. 25 % of babies' total caloric intake is devoted to growth, and infants need extra calories to keep their rapidly developing organs functioning properly (Meyer, 2009).

2.5.1 Breastfeeding versus Bottle-Feeding

Babies need not only enough food but also the right kind of food. In early infancy, breast milk is ideally suited to their needs, and bottled formulas try to imitate it. Breastfed babies in poverty-stricken regions are much less likely to be malnourished and 6 to 14 times more likely to survive the first year of life. The World Health Organization recommends breastfeeding until age 2 years, with solid foods added at 6 months. These practices, if widely followed, would save the lives of more than a million infants annually(Meyer, 2009).

Yet many mothers in the developing world do not know about the benefits of breastfeeding. In Africa, the Middle East, and Latin America,most babies get some breastfeeding, but fewer than 40 percent are exclusively breastfed for the first 6 months, and one-fourth are fully weaned from the breast by 1 year. In place of breast milk, mothers give their babies commercial formula or low-grade nutrients, such as rice water

or highly diluted cow or goat milk. Contamination of these foods as a result of poor sanitation is common and often leads to illness and infant death. The United Nations has encouraged all hospitals and maternity units in developing countries to promote breastfeeding as long as mothers do not have viral or bacterial infections (such as HIV or tuberculosis) that can be transmitted to the baby. Today, most developing countries have banned the practice of giving free or subsidized formula to new mothers (Meyer, 2009)..

Partly as a result of the natural childbirth movement, breastfeeding has become more common in industrialized nations, especially among well-educated women. Today, 75 percent of American mothers breastfeed, but more than half stop by 6 months (U.S. Centers forDisease Control and Prevention, 2011). And despite the health benefits of breast milk, only50 percent of preterm infants are breastfed at hospital discharge. Breastfeeding a preterm baby presents special challenges, including maintaining a sufficient milk supply with artificial pumping until the baby is mature enough to suck at the breast and providing the infantwith enough sucking experience to learn to feed successfully (Callen and Pinelli, 2005).

Because breast milk is so easily digestible, a breastfed infant becomes hungry every 1 to 2 hours, compared to every 3 or 4 hours for a bottle-fed baby. This makes breastfeeding inconvenient for many employed women. Not surprisingly, mothers who return to work sooner wean their babies from the breast earlier (Kimbro, 2006). But mothers who cannotbe with their babies all the time can still combine breast- and bottle-feeding.

2.5.2. Nutrition in Childhood and Adolescence

Around 1 year, infants' diets should include all the basic food groups. As children approach age 2, their appetites become unpredictable.Preschoolers eat well at one meal but barely touch their food at the next. And many become picky eaters. This decline in appetite occurs because growth has slowed. Furthermore,preschoolers' wariness of new foods is adaptive. If they stick to familiar foods, they are less likely to swallow dangerous substances when adults are not around to protect them(Birch and Fisher, 1995). Parents need not worry about variations in amount eaten from mealto meal. Over the course of a day, preschoolers compensate for eating little at one meal byeating more at a later one (KoivistoHursti, 1999).

Children tend to imitate the food choices and eating practices of people they admire, both adults and peers. For example, mothers who drink milk or soft drinks tend to have 5-year-old daughters with asimilar beverage preference (Fisher *et al*., 2001). In Mexico, where children see family members delighting in the taste of peppery foods,preschoolers enthusiastically eat chili peppers, whereas most U.S. children reject them (Birch *et al*., 1980).

Repeated, unpressured exposure to a new food also increases acceptance,serving broccoli or tofu increases children'sliking for these healthy foods. In contrast, offering sweet fruit orsoft drinks promotes "milk avoidance" (Black *et al*., 2002).

During puberty, rapid body growth leads to a dramatic rise infood intake. This increase in nutritional requirements comes at a timewhen eating habits are the poorest. Of all age groups, adolescents arethe most likely to skip breakfast (a practice linked to obesity), eat on the run, and consumeempty calories rather than nutrient-rich fruits and vegetables (Ritchie *et al*., 2007; Striegel-Moore*et al.*, 2006). Fast-food restaurants, where teenagers

often gather, have begun to offer some healthy menu options, but adolescents need guidance in choosing these alternatives.Eating fast food and school purchases from snack bars and vending machines isstrongly associated with consumption of high-fat foods and soft drinks (Bowman *et al.*,2004; Kubik *et al.*, 2003).

Frequency of family meals is a powerful predictor of healthy eating greater intake of fruits, vegetables, grains, and milk products and reduced soft drink and fast-food consumption(Burgess-Champoux *et al*., 2009; Fiese and Schwartz, 2008). But compared to families with children, those with adolescents eat fewer meals together. Finding ways to arrange family meals, despite busy schedules, can greatly improve teenagers' diets.

2.5.3 Malnutrition

In developing countries and war-torn areas where food resources are limited,malnutrition is widespread. Recent evidence indicates that about 27 percent of the world's children suffer from malnutrition before age 5.The 10 percent who are severely affected suffer from two dietary diseases.

i. **Marasmus** is a wasted condition of the body caused by a diet low in all essential nutrients. It usually appears in the first year of life when a baby's mother is too malnourished to produce enough breast milk and bottle-feeding is also inadequate. Her starving baby becomes painfully thin and is in danger of dying.
ii. **Kwashiorkor** is caused by an unbalanced diet very low in protein. The disease usually strikes after weaning, between 1 and 3 years of age. It is common in regions where children get just enough calories from starchy foods but little protein. The child's body responds by breaking down its own protein reserves. Soon the belly enlarges, the feet swell, the hair falls out, and a skin rash appears.

A once bright-eyed, curious youngster becomes irritable and listless (Stoch *et al*., 1982).

Children who survive these extreme forms of malnutrition often grow to be smaller in all body dimensions and suffer from lasting damage to the brain, heart, liver, or other organs (Müller and Krawinkel, 2005). When their diets do improve, they tend to gain excessive weight (Uauy *et al.,* 2008). A malnourished body protects itself by establishing a low basal metabolism rate, which may endure after nutrition improves. Also, malnutrition may disrupt appetite-control centers in the brain, causing the child to over eat when food becomes plentiful (Uauy *et al.,* 2008).

Learning and behavior are also seriously affected. In one long-term study of marasmic children, an improved diet led to some catch-up growth in height, but not in head size(Stoch *et al*., 1982). The malnutrition probably interfered with growth of neural fibers and myelination, causing a permanent loss in brain weight. And animal evidence reveals that a deficient diet alters the production of neurotransmitters in the brain an effect that can disrupt all aspects of development (Haller, 2005). These children score low on intelligence tests, show poor fine-motor coordination, and have difficulty paying attention (Bryce *et al*., 2008; Liu *et al*., 2003). They also display a more intense stress response to fear-arousing situations, perhaps caused by the constant, gnawing pain of hunger (Fernald and Grantham-McGregor, 1998).

2.5.4 Obesity

Today, 32 % of U.S. children are overweight, more than half of them extremely so: 17 % suffer from obesity**,** a greater-than-20-percent increaseover healthy weight, based on body mass index *(BMI)*- a ratio of weight to height associatedwith body fat. (A BMI above the

85th percentile for the child's age and sex is considered overweight, a BMI above the 95th percentile obese.) During the past several decades, a rise in overweight and obesity has occurred in many Western nations, with large increases in Canada, Germany, Israel, Greece, Ireland, New Zealand, the United Kingdom, and theUnited States (Ogden *et al*., 2010). Smaller increases have occurred in other industrialized nations, including Australia, Finland, the Netherlands, Norway, and Sweden.

Obesity rates are also increasing rapidly in developing countries as urbanization shifts the population toward sedentary lifestyles and diets high in meats and energy dense refined foods. In China, for example, where obesity was nearly non existent a generation ago, today 20 percent of children are overweight, with 7 percent obese a nearly fivefold increase over the past twenty-five years, with boys affected more than girls (Ding, 2008). Childhood obesity in China is especially high in cities, where it has reached 10 percent (Ji and Chen, 2008). In addition to lifestyle changes, a prevailing belief in Chinese culture that excess body fat represents prosperity and health carried over from a half century ago, when famine caused millions of deaths has contributed to this alarming upsurge. High valuing of sons may induce Chinese parents to offer boys especially generous portions of meat, dairy products, and other energy-dense foods that were once scarce but now are widely available.

Overweight rises with age, from 21 percent among U.S.preschoolers to 35 percent among school-age children and adolescents (Ogden *et al*., 2010). In a longitudinal study of morethan 1,000 U.S. children, overweight preschoolers were five times more likely than their normal-weight peers to be overweightat age 12 (Nader *et al*., 2006).

Besides serious emotional and social difficulties, obese children are at risk for life long health problems. Symptoms that begin to appear in the early school years high blood pressure,high cholesterol levels, respiratory abnormalities, and insulin resistance are powerful predictors of heart disease and other circulatory difficulties, type 2 diabetes, gall bladder disease, sleep and digestive disorders, many forms of cancer, and early death (Krishnamoorthy *et al*, 2006). Indeed, type 2 diabetes formerly also known as "adult-onset" diabetes because it was rarely seen in childhood is rising rapidly among overweight children, sometimes leading to early, severe complications,including stroke, kidney failure, and circulatory problems that heighten the risk of eventual blindness and leg amputation (Hannon *et al*., 2005).

Not all children are equally at risk for excessive weight gain. Overweight children tend to have overweight parents, and identical twins are more likely to share the disorder than fraternal twins. But heredity accounts for only a tendency to gain weight (Kraland Faith, 2009).The importance of environment is seen in the consistent relationship of low education and income to overweight and obesity in industrialized nations, especially among ethnic minorities in the United States, African-American, Hispanic, and Native-American childrenand adults (CDC, 2009; Ogden *et al*., 2010). Factors responsible include lack of knowledge about healthy diet; a tendency to buy high-fat, low-cost foods; neighborhoodsthat lack convenient access to affordable, healthy foods in grocery stores and restaurants; and family stress, which can prompt overeating (Ogden *et al*., 2010).

Furthermore, children who were undernourished in their early years are at risk for later excessive weight gain. In industrialized nations, many studies confirm that infants whose mothers smoked during pregnancy and who therefore are often born underweight are more likely to suffer from childhood overweight and obesity(Rogers, 2009).

Nevertheless, in the developing world (unlike in industrialized countries),obesity risk is greatest for individuals living in economically well-off households, probably because of greater food availability and reduced activity levels (Subramanian *et al*., 2011).

Parental feeding practices also contribute to childhood obesity. Overweight children are more likely to eat larger quantities of high-calorie sugary and fatty foods, perhaps because these foods are prominent in the diets offered by their parents, who also tend to be overweight.Interviews with more than 3,000 U.S. parents revealed that many served their 4- to 24-month-olds French fries, pizza, candy, sugary fruit drinks, and soda on a daily basis. On average, infants consumed 20 % and toddlers 30 % more calories than theyneeded (Briefel *et al.,* 2004). Recent research confirms a strengthening relationship betweenrapid weight gain in infancy and later obesity (Botton *et al*., 2008; Chomtho *et al*., 2008).

Some parents anxiously overfeed, interpreting almost all their child's discomforts as a desire for food. Others pressure their children to eat, a practice common among immigrant parents and grandparents who, as children themselves, survived periods of food deprivation.Still other parents are overly controlling, restricting when, what, and how much their child eats and worrying that the child will gain too much weight (Moens *et al*., 2007).In each case, parents fail to help children learn to regulate their own food intake. Also, parents of overweight children often use high-fat, sugary foods to reinforce other behaviors,leading children to attach great value to treats (Sherry *et al*., 2004). Another factor consistently associated with weight gain is insufficient sleep (Nielsen *et al*., 2011). Reduced sleep may increase time available for eating, leave children too fatigued for physical activity, or disrupt the brain's regulation of hunger and metabolism.Overweight children are less physically active than their normal-weight

peers. Inactivity is both cause and consequence of excessive weight gain. Research reveals that the risein childhood obesity is due in part to the many hours U.S.children spend watching television. In a study that tracked children's TV viewing from ages 4 to 11, the more TV children watched, the more body fat they added. Children who devoted more than 3 hours per day to TV accumulated 40percent more fat than those devoting less than 13 hours (Proctor *et al*., 2003). Watching TV reduces time devoted to physical exercise, and TV ads encourage children to eat fattening, unhealthy snacks. Children permitted to have a TV in their bedroom a practice linked to especially high TV viewing - are at even greater risk for overweight (Adachi-Mejia *et al*., 2007).

Finally, the broader food environment affects the incidenceof obesity. The Pima Indians of Arizona, who two decades ago changed from a traditional diet of plant foods toa high-fat, typically American diet, have one of the world's highest obesity rates. Compared with descendants of their.ancestors living in the remote Sierra Madre region of Mexico, the Arizona Pima have bodyweights 50 percent greater. Half the population has diabetes (eight times the national average),with many in their twenties and thirties already disabled by the disease blind, in wheel chairs, and on kidney dialysis. The Pima have a genetic susceptibility to overweight,but it emerges only under Western dietary conditions (Gladwell, 1998; Traurig *et al*., 2009).Other ethnic groups with a hereditary tendency to gain weight are the Pacific Islanders,including native Hawaiians and Samoans (Furusawa *et al*., 2010). Many now eat an Americanized diet of high-calorie processed and fast foods, and over 80 percent are overweight.

Unfortunately, physical attractiveness is a powerful predictor of social acceptance. In Western societies, both children and adults rate obese youngsters a sun likable, stereotyping them as lazy, sloppy, dirty, ugly, stupid, and deceitful (Kirkpatrick and

Sanders, 1978; Penny and Haddock, 2007; Tiggemann and Anesbury, 2000). In school, obese children are often socially isolated. They report more emotional, social,and school difficulties, including peer teasing and consequent low self-esteem, depression,and (among obese teenagers) suicidal thoughts and suicide attempts. Because unhappiness and over eating contribute to each other, the child remains overweight (Puhl and Latner, 2007; Zeller and Modi, 2006). Persistent obesity from childhood into adolescence predicts serious disorders, including defiance, aggression, and severe depression (Schwimmer *et al*., 2003; Young-Hyman *et al*., 2006).

The psychological consequences of obesity combine with continuing discrimination to result in reduced life chances. Overweight individuals are less likely than their normal-weight age mate sto receive financial aid for college, be rented apartments,find mates, and be offered jobs. And they report frequent mistreatmentby family members, peers, co-workers, and health-care professionals, which contributes further to physical and psychological health problems (Carr and Friedman, 2005; Puhl *et al*., 2010).

2.5.5 Infectious Disease

In well-nourished children, ordinary childhood illnesses have no effect on physical growth.But when children are poorly fed, disease interacts with malnutrition in a vicious spiral, withpotentially severe consequences.

2.5.6 Infectious Disease and Malnutrition

In developing nations where a large proportionof the population lives in poverty, children do not receive routine immunizations. As aresult, illnesses such as measles and chicken pox, which typically do not appear until afterage 3 in industrialized nations, occur much earlier. Poor diet depresses the body's immunesystem, making children far more

susceptible to disease. Of the 9 million annual deaths ofchildren under age 5 worldwide, 98 percent are in developing countries and 70 percent aredue to infectious diseases. Disease, in turn, is a major contributor to malnutrition, hindering both physical growthand cognitive development. Illness reduces appetite and limits the body's ability to absorbfoods, especially in children with intestinal infections. In developing countries, widespreaddiarrhea, resulting from unsafe water and contaminated foods, leads to growth stunting andnearly 3 million childhood deaths each year. Studies carried out in the slums and shanty towns of Brazil and Peru reveal that the more persistentdiarrhea is in early childhood, the shorter children are in height and the lower they score onmental tests during the school years (Checkley *et al*., 2003; Niehaus *et al*., 2002).

Most developmental impairments and deaths due to diarrhea can be prevented with nearly cost-free oral rehydration therapy *(ORT),* in which sick children are given a glucose,salt, and water solution that quickly replaces fluids the body loses. Since 1990, public healthworkers have taught nearly half the families in the developing world how to administer ORT.Also, supplements of zinc (essential for immune system functioning), which cost only 30cents for a month's supply, substantially reduce the incidence of severe and prolonged diarrhea (Aggarwal *et al*., 2007). Through these interventions, the lives of millions ofchildren are saved each year. Still, only a minority of children with diarrhea in the world'spoorest countries—such as Chad, Morocco, Somalia, and Togo-receive ORT.

2.5.7 Immunization

In industrialized nations, childhood diseases have declined dramatically during the past half-century, largely as a result of wide spread immunization of infants and young children. Nevertheless, about 20 percent of U.S.infants and toddlers are not fully

immunized. Of the 80 percent who receive a complete schedule of vaccinations in the first two years, some do not receive the immunizations they need later, in early childhood. Overall, 30 percent of U.S. preschoolers lack essential immunizations. The rate rises to 32 percent for poverty-stricken children, many of whom do not receive full protection until age 5 or 6, when it is required for school entry. In contrast, fewer than 10percent of preschoolers lack immunizations in Denmark and Norway, and fewer than 7 percent in Canada, the Netherlands, Sweden, and the United Kingdom (Aggarwal *et al*., 2007).

Inability to pay for vaccines is only one cause of inadequate immunization. Parents with little education and with stressful daily lives often fail to schedule vaccination appointments, and those without a primary care physician do not want to endure long waits in crowded U.S. public health clinics (Falagas and Zarkadoulia, 2008). Some parents have been influenced by media reports suggesting a link between a mercury-based preservative used for decades in vaccines and a rise in the number of children diagnosed with autism. But large-scale studies show no association with autism and no consistent effects on cognitive performance (Dales *et al*., 2001; Richler *et al*., 2006; Stehr-Green *et al*., 2003; Thompson *et al*., 2007). Still, as aprecautionary measure, mercury-free versions of childhood vaccinations are now available.

In areas where many parents have refused to immunize their children, out breaks of whooping cough, polio and rubella have occurred, with life-threatening consequences (Tuyen and Bisgard, 2014; Kennedy and Gust, 2008). Public education programs directed at increasing parental knowledge about the importance and safety of timely immunizations are badly needed (Kennedy and Gust, 2008).

CHAPTER THREE

3.0 MATERIAL AND METHODS

3.1 RESEARCH PARTICIPANTS

The subjects that participated in the study were Primary School Children and their parents from randomly selected primary schools in Zaria metropolis, Kaduna State.

3. 2 STUDY AREA

Random selection of Primary Schools within Zaria was made. Participants included pupils in primary three to primary six and their parents.

3.2.1 Kaduna State

Kaduna metropolis (fig. 3.1) is located at latitude 11º 3' N and longitude 7º 25' E (Akinbabijo, 2012). Kaduna State has a total land area of 45,711.188 sq. kilometres with a population of 6,113,503 persons (NPC, 2006) and therefore a population density of 134 persons per sq. kilometer. Kaduna State is divided into 19 Local Government Areas Birni-Gwari, Chikun, Giwa, Igabi, Kajuru, Ikara, Jaba, Kachia, Jema'a, Kaduna North, Kaduna South, Kagarko, Kaura, Kauru, Kubau, Kudan, Lere, Makarfi, Sabon-Gari, Sanga, Soba, Zango-Kataf, and Zaria.

3.2.2 Zaria

Zaria is a Hausa and Fulani land in northern Kaduna State, in the northern part of Nigeria and is located on latitude 11º04' north and longitude 7º 43' east. It is defined by a 15 Km radius from the PZ post office and is well connected by roads and rail with other regions of the country. Distances from Kaduna, Kano, Jos and Sokoto are approximately; 75 Km,

176 Km, 387 Km and 404 km respectively. Zaria is the second principal town in Kaduna state after Kaduna and home to the Ahmadu Bello University, established in 1962 and a host to several other federal government institutions like Federal Institute for Chemical and Leather Research, Federal College of Aviation and Industrial Development Corporation. The population of Zaria is approximately 975,153 (projections from 2006 national census).It is made up of two Local Government Councils, Zaria Local Government, consisting of two districts; Zaria walled city and Tudun Wada, and Sabongari Local Government which consists of three districts; Sabon Gari, Samaru, and the Government Reservation Area (Olamdimeji and Ojibo, 2012).

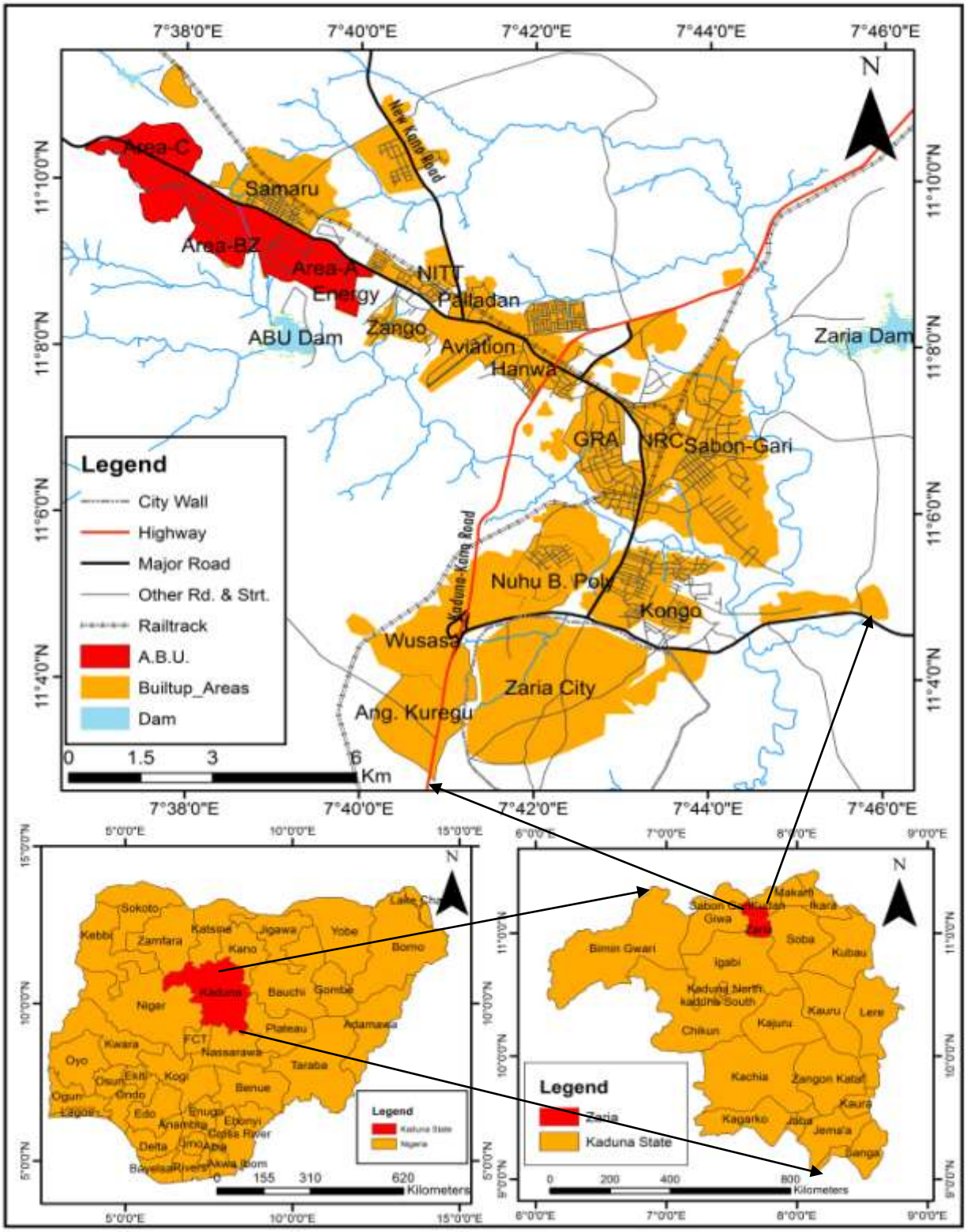

Figure 3.1: Map of Nigeria showing the study area (Zaria)
Source: Geographic and information systems (GIS)

3.2.3 Drainage

The Kubanni River has its source from the Kampagi hill in Shika near Zaria. It flows in a Southeast direction through the premises of Ahmadu Bello University. The Samaru stream which is one of the tributaries of Kubanni River has a stream length of 1.05km within an area of 2.28km2 and has drainage density of 0.4605 km/km^2 (Yusuf and Shuaib, 2012).

3.2.4 The climate of Zaria

The climate of the study area is a tropical savanna climate, with distinct wet and dry seasons (Aw climate Koppens classification). Zaria experiences six (6) months of rainy season and six (6) months of dry season. The rainy season is from May to late October, while the dry season is from early November to April, this is as a result of the interplay of the two dominant air masses within the region i.e. the tropical continental air messes (cT) and Tropical maritime air masses (mT) (Iguisi and Abubakar, 1998). Climate is an important factor that determines the form of any architecture. In Nigeria the Hausa live in northern Savannah type of climate (Moughtin, 1985). The rainfall intensity is very high between the months of July and August. As a result though the environment is generally dry, crops are frequently lost through too much rain. It also results in rapid surface run-off, soil erosion and water-logging (Udo, 1970). Dry season is the period of harmattan: a transition period between the wet and the hot seasons. It is a period when there is little or no rainfall (Ati, 2002). Daytime temperatures fluctuate between 16 and 32ºC in November with clear sky of sunshine hours of between 8.9 and 9.5 (DURP, 1979). December to January in Zaria is characterized by the suspension of fine dust particles in the air, due to Harmattan winds which cause surface turbulence. Visibility is poor, disrupting air navigation while sun's rays barely reach ground surface. This action

reduces night temperatures to 14ºC, with sunshine hours between 8.7 and 9.5. Daytime temperature may drop to 31ºC, giving a variation of 17ºC, and the highest in the year. This extreme diurnal temperature range is another characteristic of the Savanna type of climate (Areola *et al.*, 2005).

3.3 METHODOLOGY

Data for this study were collected from 759 participants (pupils) in three randomly selected primary schools, two public and one private: Ahmadu Bello Universty Staff School (private), Jethro Academy (private), Amina Primary school, LEA (Public). the public schools LEA represented the various socioeconomic classes, low, medium, and moderate while, the other private primary schools Ahmadu Bello Universty Staff School (private), Jethro Academy (private), represented low and moderate socioeconomic classes respectively. An informed written consent was taken from parents and authorities of participating schools. School Children in primaries 3 – 6, aged 7 – 15 years and willing to participate in the survey constitute the study participants. Data were collected through self-administered questionnaires. Each pupil was given a questionnaire with an attached copy of consent form for their parents to indicate interest to participate in the study through their signature. Only parents who signed and gave a written consent participated in the study. Information pertaining to ethnicity, socio-demographic variables, and child's birth weight were provided by parents or guardian.

In order to reduce observation errors, anthropometric measurements were read twice independently and the mean of the two measurements was taken as the actual value. A Child with a BMI of less than 20 were considered underweight; those with BMI in the range of 20-24.9 were considered normal, 25-29.9 over-weight, while those with BMI greater than 30 were considered obese (WHO, 2006).

Social status was analyzed according to parents' level of education, birth order, and the number of children in the family.

3.4 DATA COLLECTION TECHNIQUE

All children in primaries 3 – 6 whose parent indicated interest to participate in the study were included in the study.

3.5 SAMPLING SIZE DETERMINATION

The sample size for this study was obtained using the formula:

$[n = z^2pq/d^2]$ (Naing *et al.,* 2006)

Where:

n = the desired sample size

z= the standard normal deviation, usually set at 1.96 (≈2.0)

p= the proportion in the target population having the particular trait (when no estimate 50% is used; i.e. 0.5)

q = 1.0 - p

d= degree of accuracy desired, usually set at 0.04

Therefore, $n = (1.96)^2(0.5)\ (0.5)/\ (0.05)^2 = 384$ children per gender.

For the purpose of this study a total of 759 subjects for both gender was used. The name of Schools used include.

Ahmadu Bello University Staff School Zaria, total of 402 pupil participated in the research with 264 Males and 138 Females.

Jethro Academy Zaria, total of 84 pupil participated, 30 Males and 54 Females

Amina Primary school, LEA, total of 314 pupil participated, with 106 Males and 208 females. Making a total of 759 pupils.

3.6 ANTHROPOMETRY

All anthropometric measurements were carried out at school applying standardized procedures; the condition of the weighing balance and stadiometer were verified before measuring each subject.

i. **Weight (kg):** An overall measure of body size that does not distinguish between fat and muscle. Weight was measured to the nearest 0.1kg when the subject was standing and putting on light clothes.

ii. **Height (cm):** Standing height was measured taking the maximum distance from the floor to the highest point on the head, when the subject was facing forward. Shoes was put off, feet together, and arms by the sides. Heels, buttocks and upper back were in contact with the wall when the measurement was made. This measurement was carried out using a stadiometer**.**

iii. **Body Mass Index (BMI):** The BMI was calculated as follows: weight (kg)/ height^2 (m^2)**.** BMI percentile was used for children and teens, after BMI number was calculated, the BMI was plotted on CDC BMI - for -age growth charts for either girls or boy to obtain a percentile ranking. Percentiles were used for children and teens because the amount of body fat differs between boys and girls and body fats also changes with age. The percentiles indicate the relative position of the Childs BMI number among children of the same sex and age. The growth chart shows the weight

status categories used with children and teens; Uderweight, Healthyweight, Overweight and Obese (CDC, 2010).

Weight Status Category	**Percentile Range**
Uderweight	Less than 5th percentile
Healthy weight	5th percentile to less than the 85th percentile
Overweight	85th to less than 95th percentile
Obese	Equal to or greater than 95th percentile

Adapted from Center for Disease Control website (accessed 10/10/15)

iii. **Chest circumference (cm)**: This measurement was taken at the level of the middle of the sternum (breast-bone), with the tape passing under the arms. The tape was in position, with the arms relaxed by the side, and the measurement was taken at the end of a normal expiration.

iv. **Hip circumference (cm)**: The tape was wrapped over the largest part of the buttocks.

v. **Mid Upper Arm Circumference (cm)**: The bicep was flexed, while the tape was wrapped around the flexed bicep, half way between the shoulder and the elbow.

vi. **Thigh Circumference (cm)**: This circumference measure was taken at the level of the mid-point on the lateral (outer side) surface of the thigh, midway between trochanterion (top of the thigh bone, femur) and tibia lateral (top of the tibia bone).

vii. **Waist circumference (cm)**: The tape was used to circle the waist (like a belt would circle the waist) at the natural waistline, which is midpoint between the lowest rib and the iliac crest. The subject was asked to stand erect while measurements were taken.

viii. **Head circumference [HC (cm)]:** it was measured with a flexible, non-stretch tape with an accuracy of 0.1 cm. The head was steadied and the greatest head circumference measured, by placing the tape firmly round the frontal bones just superior to the supra-orbital ridges, passing it round the head at the same level on each side and laying it over the maximum occipital prominence at the back.

ix. **Hand Anthropometry:** The second and fourth digits was measured with a vainer calliper. The student was asked to flex their palm and the vainer calliper was placed to touch the tip and base of the finger. The reading was recorded at exactly where the reading is in contact with zero. This was done for both the left and right second and fourth digits.

3.7 BIRTHWEIGHT (kg)

The birth weight was filled by the parents and children that fall between 0 to 1.1kg were classified under Very low birth weight,1.8 to 2 were low birth weight,2.2 to 3kg were Normal birthweight,3kg to 4kg were Heavy birth weight according to (Cameron and Nadgdee, 1996).

3.8 ACADEMIC PERFORMANCE

Five basic subjects, Mathematics, English Language, Primary Science, Health Education and Social Studies were used to determine the Academic performance. The last term result of the school children was used, the total score in each of these subject was recorded and the total average performance in all the subject was calculated as the academic performance.

3.9 NUTRITIONAL STATUS

Height and weight were considered for physical stature in this study. Age of the child was calculated as the difference between his/her birth date and the date of assessment. Nutritional status was assessed by means of measurements of weight, height. Birth weight was used as an indicator of prenatal nutritional status which was recorded by child's parents/guardian from the child's birth certificate. BMI was used as an index of current nutritional status.

3.10 SOCIAL STATUS

Social status was assessed through parents' level of education (Tertiary, Secondary, Primary and None) occupation (Civil servants, Trader and Artisans) .

3.11 ETHICAL APPROVAL

Ethical approval was obtained from Ahmadu Bello University Teaching Hospital Health Research Ethics Committee and permission to conduct the study was obtained from the authorities of participating schools. Only subjects whose parent gave informed consent to participate with the research were included in this study.

3.12 INCLUSION AND EXCLUSION CRITERIA

3.12.1 Inclusion Criteria

The following was used as inclusion criteria

i. Only pupils whose parents/guardian gave their informed consent participated in the study.

ii. Subject must be primary school pupil.

iii. Subjects must be apparently healthy.

3.12.2 Exclusion Criteria

The following was used as exclusion criteria:

i. Pupils whose parents/guardian did not give their informed consent.

ii. Non-primary school children.

iii. Subjects that are apparently unhealthy.

3.13 STATISTICAL ANALYSES

Descriptive statistics were expressed as mean $\pm$ standard deviation. Student's t-test was used to test for difference in mean of all variables between female and male School children. One way analysis of variance (ANOVA) was used to evaluate difference in various characteristics according to nutritional status categories, parents Occupation, educational level, and ethnic group. Pearson's correlation coefficient was used to test the relationship between parametric variables, Regression was used to predict equations, Chi-square was used to test for association, $P<0.05$ was deemed statistically significant and SPSS version 20 (IBM Corp., New York) was used for the statistical analyses.

CHAPTER FOUR

4.0 RESULT

4.1 ANALYSIS OF STUDY POPULATION

A total of seven hundred and fifty nine (n =759) Primary School Pupils in Zaria, Kaduna State were used for the study. The study comprises of 374 boys 385 girls. The age range of the study subjects is 7- 15 years, with mean age of 10.81 $\pm$ 1.42 years.

4.2 NUTRITIONAL STATUS AND ANTHROPOMETRIC VARIABLES

Data was collected from subjects using a pre-designed questionnaire which was given to the pupils to take home for their parents or guardians to fill. Descriptive statistics of the entire sample population is shown in Table 4.1. The mean age of Boys and Girls was 10.86 ± 1.46 and 10.76 ± 1.39. The results showed that the Girls have higher values compared to the Boys except in Age, Neck circumference, Waist-hip ratio and Mid-upper arm circumference. The difference in Age was not statistically significant, but the difference in Neck circumference, Waist-hip ratio and thigh circumference was statistically significant ($P \leq 0.05$). Also from the table the girls perform better academically than the boys and the difference was significant with ($P \leq 0.05$).

Table 4.2 show the comparism of academic performance of School Children according to their nutritional status. The result showed that children that were overweight perform better academically with a total mean score of 66.19 $\pm$ 17.00 than obese, healthy weight

and underweight children, though the differences were not statistically significant as shown in Fig 4.1.

Table 4.1 Descriptive statistic of anthropometric parameters of all the subjects (n = 759) and according to the sex

	All (n = 759)		Boys (n = 374)		Girls (n = 385)			
Parameters	Mean ± SD	Min – Max	Mean ± SD	Min – Max	Mean ± SD	Min - Max	t	p
Age (yrs.)	10.81 ±1.42	7.00 – 15.00	10.86 ± 1.46	7.00-15.00	10.76 ± 1.39	7.00-15.00	1.03	0.56
Birth weight (kg)	2.57 ± 0.95	1.30 – 5.50	3.08 ± 0.59	1.30-5.50	3.11 ± 0.58	1.39-4.70	0.59	0.91
Weight (kg)	32.59 ± 6.65	20.00 – 75.00	32.22 ± 6.76	20.00-75.00	32.94 ± 6.54	21.00-63.00	1.49	0.14
Height (cm)	141.04 ± 8.23	1.18 – 1.69	140.66± 7.98	122.00169.00	141.41 ± 8.45	118.00-166.00	1.26	0.40
BMI (kgm^{-2})	16.30 ± 2.45	9.51 – 31.22	16.20 ± 2.43	9.51-31.22	16.40 ± 2.46	9.64-27.57	1.17	0.11
Head circumference (cm)	53.25 ± 2.20	34.00 – 60.00	52.93 ± 2.01	45.00-58.00	53.57 ± 2.34	34.00-60.00	4.07	0.10
Neck circumference (cm)	28.32 ± 2.48	20.00 – 47.60	28.50 ± 2.52	20.00-47.00	28.15 ± 2.44	20.00-39.00	1.97	0.03
Waist circumference (cm)	62.47 ± 7.41	18.00– 100.00	61.70 ± 7.90	18.00-100.00	63.22 ± 6.85	48.00-87.00	2.82	0.67
Hip circumference (cm)	71.92 ±7.76	51.00– 108.00	70.92 ± 8.56	20.00-108.00	72.73 ± 7.69	51.00-94.00	3.05	0.59
Waist-hip ratio	0.87 ± 0.069	0.30 – 1.11	0.88 ± 0.18	0.30-3.10	0.87 ± 0.06	0.67-1.11	0.94	0.04
MUAC (cm)	20.81 ± 4.21	14.80 – 76.00	20.98 ±5.30	15.00-76.00	20.66 ± 2.81	14.80-33.00	1.06	0.14
Chest circumference (cm)	63.86 ±6.76	25.00– 102.00	63.82 ± 6.80	25.00-102.00	63.91 ± 6.73	50.00-90.00	0.19	0.26
Thigh circumference (cm)	37.36 ± 4.64	23.00 – 58.00	37.23 ± 4.93	6.30-58.00	37.35 ± 4.88	23.00-53.00	0.34	0.01
R2D4D	0.95 ± 0.06	0.80 – 1.22	0.96 ± 0.55	0.83-1.16	0.96 ± 0.06	0.80-1.22	0.94	0.55
L2D4D	0.97 ± 0.05	0.81 – 1.15	0.96 ± 0.05	0.82-1.15	0.97 ± 0.05	0.81-1.13	1.66	0.49
Mathematics (%)	61.91 ±17.06	6.00 – 100.00	60.20± 17.42	6.00 -100.00	63.33 ± 15.62	19.33-100.00	2.60	0.07
English Language (%)	63.61± 16.81	4.00 – 100.00	62.10± 17.19	4.00-100.00	64.93 ± 16.05	12.00-100.00	2.35	0.18
Primary Science (%)	64.93 ± 16.61	17.00– 100.00	65.25± 17.85	2.60-100.00	66.35 ± 16.24	17.00-100.00	0.88	0.04
Social Studies (%)	65.19 ± 16.16	13.67– 100.00	65.88± 18.66	19.00-100.00	69.39 ± 16.83	18.00-100.00	2.73	0.01
Health Education (%)	65.68 ± 15.62	8.00 – 100.00	63.82± 16.14	9.33-100.00	67.93 ± 15.51	8.00-100.00	3.45	0.25
AP	64.26 ±16.45		63.45±17.45		66.39±16.05			**0.00**

P value 0.05, BMI- body mass index, MUAC- mid upper arm circumference, R2D4D –right 2nd digits and 4th digits, L2D4D – left 2nd digits and 4th digits. AP – Academic performance

Table 4.2: Academic performance of School Children in Zaria according to their nutritional status

	Underweight (n = 140) Mean ± SD	Healthy weight (n = 570) Mean ± SD	Overweight (n = 38) Mean ± SD	Obese (n = 11) Mean ± SD	F	P
Mathematics	60.66 ± 17.81	62.50 ± 16.74	66.49 ± 19.02	54.97 ± 14.83	1.79	0.15
English Language	61.17 ± 16.45	63.82 ± 16.69	69.85 ± 17.37	61.70 ± 21.86	2.83	0.04
Primary Science	67.27 ± 17.92	64.50 ± 16.34	62.94 ± 15.24	64.42 ± 17.60	1.24	0.30
Social Study	63.55 ± 15.22	65.52 ± 15.10	65.53 ± 20.43	60.27 ± 20.25	0.69	0.55
Health Education	64.12 ± 15.41	65.80 ± 15.93	66.14 ± 12.94	59.58 ± 8.89	0.73	0.54
AP	63.34±16.56	64.43±16.16	66.19±17.00	60.18 ±16.69	18.76	0.01

AP- Academic performance, P value 0.05,

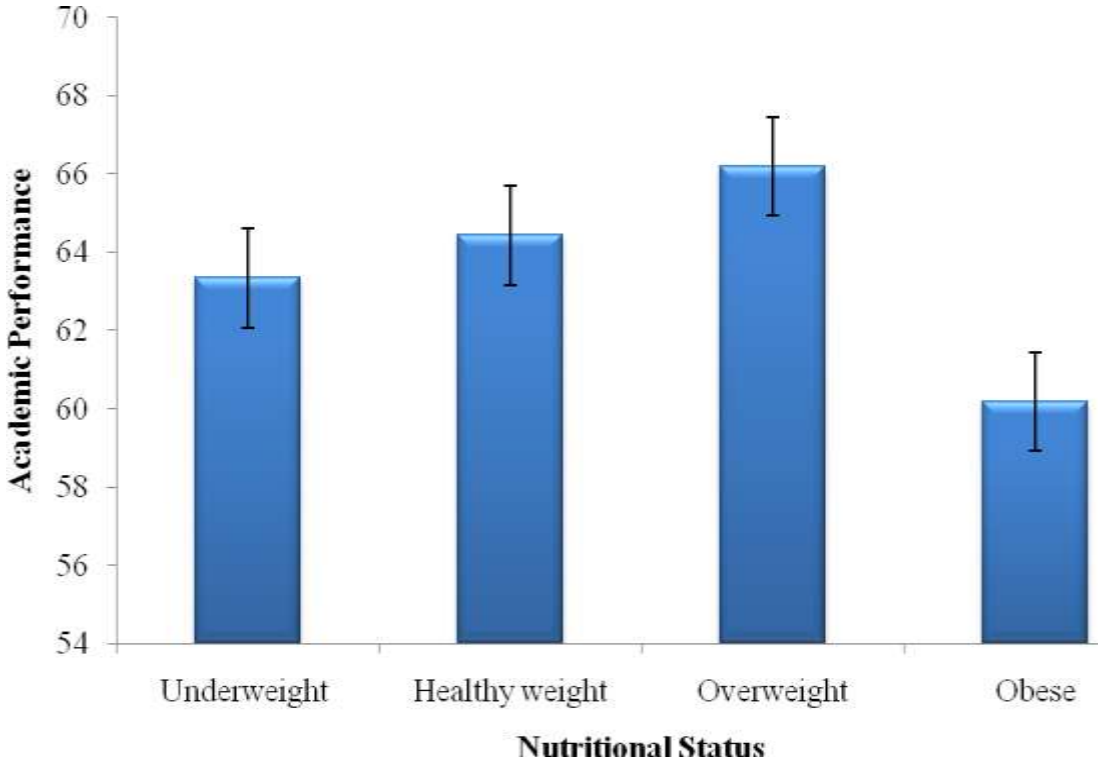

Fig 4.1: The relationship between Nutritional status and Academic Performance of primary school children.

4.3 PARENTS SOCIO ECONOMIC STATUTES

Table 4.3 described the influence of Fathers' level of education on the academic performance of the School Children. The result showed that the children whose fathers have tertiary education performed better academically than Children whose parents have Secondary, Primary or None Education as shown in Fig 4.2. Table 4.4 describes the influence of Mothers level of education on the academic performance of the School Children. The result showed that Children whose mother acquire Tertiary education performed better academically than children whose parent have only secondary, primary and none education as shown in Fig 4.3. Table 4.5 showed the influence of Mothers Occupation on Academic performance of the School Children. The result showed that children whose mothers are Civil servants have a high academic score than children whose mothers are Artisans or Traders. It showed statistical significant difference in almost all the subjects except in Social studies and Health education ($p< 0.05$). Table 4.7 describe the influence of Fathers occupation on Academic performance of the school children, it showed that children whose fathers are Civil servants perform better academically than those whose fathers are Artisans or Traders. Table 4.7 showed the influence of residence area and Academic Performance of these children, showed that children who lived in urban areas performed better academically than those that lived in suburb and rural area.

Table 4.3: Fathers level of education and Academic Performance of the School children

	Primary (n = 38) Mean ± SD	Secondary (n = 109) Mean ± SD	Tertiary (n = 580) Mean ± SD	None (n = 32) Mean ± SD	F	p-value
Mathematics	58.38±12.89	56.89±15.87	63.41±16.90	56.09±22.99	6.56	0.00
English	57.71±13.96	58.05±17.01	65.72±16.17	51.70±20.15	14.85	0.00
Primary science	69.20±16.57	67.29±15.56	64.03±16.62	68.12±18.07	2.54	0.06
Social studies	60.01±13.70	63.50±16.11	65.91±16.30	64.25±15.52	2.12	0.10
Health Education	70.01±12.70	65.90±15.45	65.17±15.81	69.01±15.35	1.67	0.17
AP	63.06 ±13.96	62.32 ±16.00	64.84 ±16.36	61.83 ±18.42	21.51	0.00

AP- Academic performance, $p<0.05$.

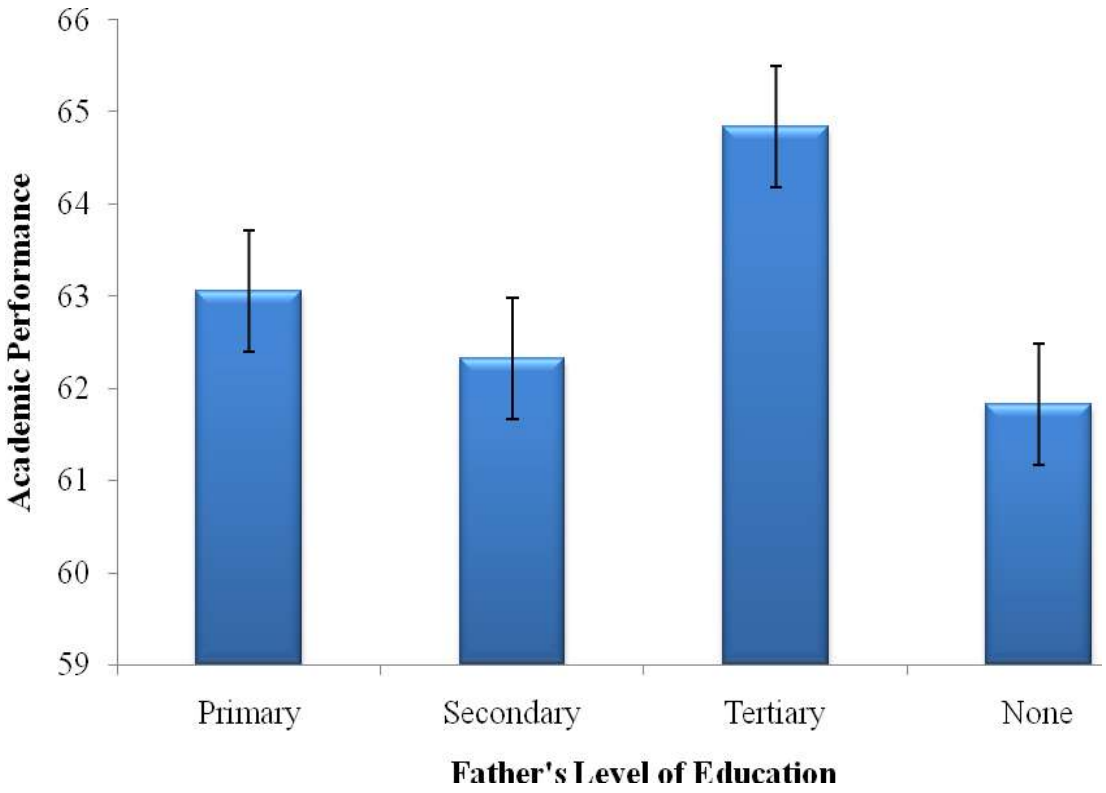

Fig 4.2: The relationship between Fathers level of Education and Academic Performance of Primary School Children.

Table 4.4: Mothers Level of Education and Academic Performance of the school children

	Primary (n = 90) Mean ± SD	Secondary (n = 228) Mean ± SD	Tertiary (n = 395) Mean ± SD	None (n = 46) Mean ± SD	F	p-value
Mathematics	56.66±14.66	59.47±16.47	65.16±17.14	56.39±18.12	11.21	0.00
English	57.35±15.19	61.62±16.41	67.36±16.14	53.51±18.50	18.50	0.00
Primary science	69.56±14.59	64.92±17.02	63.43±16.71	68.82±15.61	4.31	0.01
Social studies	64.81±15.47	63.91±15.24	66.16±16.92	63.99±15.10	1.05	0.37
Health Education	67.54±14.17	64.55±16.62	65.77±15.31	66.90±15.88	0.92	0.43
AP	63.18 ±14.82	62.89 ±16.35	65.57 ±16.44	61.92 ±16.64	17.84	0.00

AP- Academic performance, $p<0.05$.

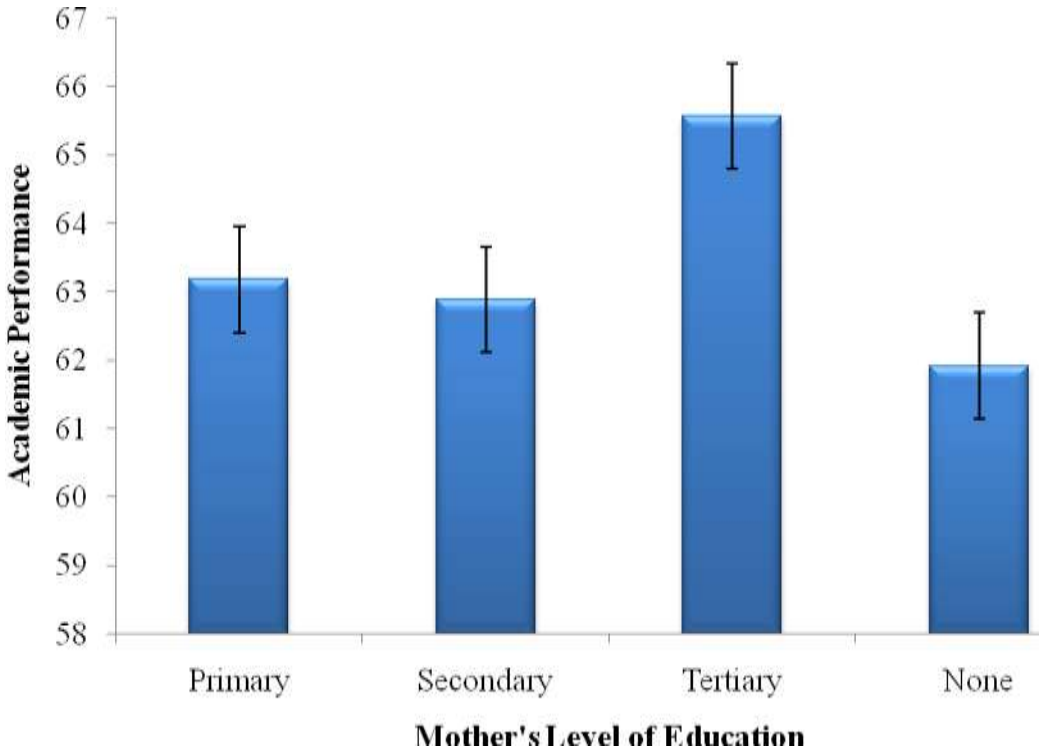

Fig 4.3: The relationship between Mothers level of Education and Academic Performance of Primary School Children.

Table 4.5: Mothers' occupation and Academic performance of school children

	Trader (n = 125) Mean ± SD	Civil servant (n = 303) Mean ± SD	Artisan (n = 331) Mean ± SD	F	p-value
Mathematics	59.71±17.78	66.37±17.07	58.66±15.90	18.19	0.00
English	62.32±16.61	68.95±16.68	59.20±15.65	29.03	0.00
Primary science	66.31±16.72	63.12±16.86	66.07±16.24	3.03	0.05
Social studies	66.56±16.07	65.43±17.03	66.16±16.92	0.81	0.44
Health Education	64.23±16.17	65.32±15.23	66.57±15.75	1.16	0.32
AP	63.83 ±16.67	65.82 ±16.57	63.33 ±16.09	21.50	0.00

AP- Academic performance, $p<0.05$

Table 4.6: Fathers occupation and Academic performance of school children

	Trader (n = 69) Mean ± SD	Civil servant (n = 554) Mean ± SD	Artisan (n = 136) Mean ± SD	F	p-value
Mathematics	60.57±19.08	63.58±16.60	55.80±16.52	11.90	0.00
English	62.99±18.33	65.70±16.17	55.41±16.20	21.59	0.00
Primary science	64.08±15.03	64.09±16.98	68.79±15.40	4.52	0.01
Social studies	63.83±17.78	65.64±16.16	64.08±15.28	0.78	0.46
Health Education	64.30±16.68	65.55±15.63	66.93±15.04	0.72	0.49
AP	63.15 ±17.38	64.91 ±16.31	62.20 ±15.67	19.75	0.00

AP- Academic performance, $p<0.05$

Table 4.7: Place of birth and Academic performance of school children

	Urban (n = 413) Mean ± SD	Suburb (n = 186) Mean ± SD	Rural (n = 160) Mean ± SD	F	p-value
Mathematics	62.98±16.81	60.54±16.74	60.75±17.97	1.78	0.17
English	66.13±16.54	61.22±16.22	59.88±17.19	10.73	0.00
Primary science	64.89±16.57	63.94±17.17	66.20±16.07	0.80	0.45
Social studies	65.99±16.07	64.21±16.26	64.28±16.25	1.10	0.33
Health Education	64.28±16.25	65.74±15.93	65.79±14.79	0.03	0.97
AP	64.85 ±16.45	63.13 ±16.46	63.17 ±16.45	10.82	0.00

AP – Academic performance, P value 0.05

4.4 SEX VARIATION

Table 4.8 show the relationship between sex and Academic performance, the table show that the female students performed better than the male students but the difference was not statistically significant.

Tables 4.9 show the relationship between sex variation and some anthropometric parameters from the table the mean age value for males was 10.86 ± 1.46, while the mean age value for females was 10.76 ± 1.39. The mean weight for males was 32.27 ± 6.10 while for females was 32.90 ± 7.14 but the difference was not statistically significant.

The mean birth weight for males was 2.54 ±0.95 while female was 2.59 ± 0.96, t-test indicate statistical significant difference between birth weight and sex (p = 0.00). Waist Hip ratio for males was 0.87 ± 0.07 while for females was 0.87 ± 0.07, t-test indicate statistical significant difference between birth weight and sex (p = 0.00)

4.5 NUTRITIONAL ASSESSMENT

Nutritional status of the population was assessed using Center for Diseases Control, (2007) reference values. Underweight was observed to be more prevalent amongst the males than females. On the other hand, overweight was more prominent in females than in males (Table 4.10). The total number of children that are underweight was 140 (71 males and 69 females) while total number of 38 children are overweight (12 male and 26 female). Chi- square analysis showed that there was no statistical significant between sex and Nutritional status (x^2= 5.88, p =0.12).

Table 4.8: Relationship between sex and Academic performance of school children

Subject	Male (n = 374) Mean ± SD	Female (n = 385) Mean ± SD	T	P
Mathematics	60.20±17.41	63.33±15.61	-2.35	0.01
English	62.10±17.19	65.09±16.30	0.89	0.38
Primary Science	64.25±17.84	66.34±16.24	-0.89	0.06
Social studies	64.92±17.73	67.83±15.30	-2.42	0.16
Health Education	63.82±16.13	67.19±15.51	3.46	0.001
AP	63.26±16.71	64.64±16.17	2.65	0.09

AP- Academic performance, $p<0.05$

Table 4.9: Sex variation and anthropometric parameters

Variable	Male (n = 374) Mean ± SD	t	P	Female (n = 385) Mean ± SD	t	p
Age(yrs)	10.86±1.46	1.04	0.30	10.76±1.39	-0.74	0.46
B_WT(kg)	2.54±0.95	3.36	0.00	2.59±0.96	-4.46	0.00
NOMales	2.56±1.23	-1.31	0.19	2.27±1.26	-0.86	0.39
NOFemales	2.08±1.11	-1.09	0.28	2.50±1.48	1.15	0.25
WT(kg)	32.27±6.10	-1.39	0.17	32.90±7.14	-1.77	0.08
HT(m)	1.41±0.08	-1.64	0.10	1.41±0.09	-0.37	0.71
BMI	16.21±2.21	-0.92	0.36	16.40±2.66	-1.74	0.08
HDC	53.35±2.11	-1.70	0.09	53.16±2.29	-0.49	0.62
NC	28.20±2.61	-0.45	0.65	28.45±2.36	-0.16	0.86
WC	61.99±7.18	0.18	0.86	62.94±7.62	-0.37	0.71
HC	71.55±7.27	1.00	0.32	72.38±8.19	1.04	0.30
WHR	0.87±0.07	-0.74	0.46	0.87±0.07	3.26	0.00
MUAC	20.67±4.46	-4.46	0.00	20.95±3.96	-1.39	0.19
CC	63.43±-6.16	-0.86	0.39	64.29±7.28	-1.09	0.28
TC	37.07±4.44	1.15	0.25	37.64±4.81	-1.39	0.17
RT_2D	6.04±0.53	-1.64	0.10	6.04±0.55	-1.64	0.10
RT_4D	6.31±0.56	-0.37	0.71	6.33±0.60	-0.92	0.36
R2D:4D	0.96±0.06	-1.74	0.08	0.96±0.06	-1.70	0.09
LT_2D	6.09±0.52	-0.49	0.62	6.08±0.58	-0.45	0.65
LT_4D	6.30±0.52	-0.16	0.87	6.31±0.56	0.18	0.86
LTD:4D	0.97±0.05	-0.37	0.71	0.96±0.05	1.00	0.32

P value 0.05, BMI- body mass index, MUAC- mid upper arm circumference, R2D4D –right 2nd digits and 4th digits, L2D4D – left 2nd digits and 4th digits. AP – Academic performance. WT- weight, HT-height,WHR-waist hip ratio, CC- chest circumference, TC-thigh circumference, NC-neck circumference, HC- hip circumference, HDC- head circumference, WC- waist circumference,

Table 4.10: Sex and Nutritional status

	Male (n = 374)	Female (n = 385)	Total	X^2	P
underweight (<5th pent)	71	69	140		
healthy weight (5th-<85th pent)	287	283	570		
overweight (85th-95th pent)	12	26	38		
obese (>95thpent)	04	07	11		
Total	374	387	759	5.88	0.12

$P < 0.05$

4.6 BIRTH WEIGHT, SEASONS OF BIRTH AND ACADEMIC PERFORMANCE

Table 4.11 showed the relationship between birth weight and academic performance of the School Children. From the table, the result showed that the total number of 37 children have a Heavy birth weight and tend to perform better than normal, low, very low birth weight with a total mean score of 66.27±18.11 and the difference was statistically significant.

Table 4.12 showed the relationship between seasons of birth and academic performance of the children. Total number of 413 children was born in the rainy season and 346 children were born in the dry season and children born in dry season performed better academically than children born in rainy season. Also from the table showed that the difference in seasons of birth and Academic Performance was not statistically significant.

Table 4.13 showed the relationship between ethnic group and Academic Performance. The result Showed that the Igbo children perform better academically than Hausa, Yoruba and others with a total score of 65.67±17.30 and not statistically significant.

Table 4.11: Birth weight and Academic performance of school children

Subject	VLBW (n = 225) Mean ± SD	LBW (n = 61) Mean ± SD	Normal (n = 436) Mean ± SD	HBW (n = 37) Mean ± SD	F	P
Mathematics	59.36±16.68	55.30±17.68	63.66±16.51	67.76±19.90	7.91	0.00
English	60.41±16.53	55.78±16.09	65.85±16.43	69.52±17.36	11.71	0.00
Primary Science	63.43±16.55	69.64±16.52	65.37±16.16	61.07±20.66	3.03	0.03
Social Studies	65.24±15.81	62.43±14.47	65.46±16.48	66.35±17.13	0.70	0.55
Health Education	66.08±14.78	66.79±18.82	65.24±15.60	66.69±15.49	0.32	0.81
AP	62.90±16.07	61.98±16.71	65.11±16.23	66.27±18.11	7.85	0.00

VLBW= very low birth weight, LBW=low birth weight, HBW= heavy birth weight, AP – Academic performance P value 0.05.

Table 4.12: Seasons of birth and Academic Performance

	Rainy (n = 413) Mean ± SD	Dry (n = 346) Mean ± SD	F	p
Mathematics	60.76±17.39	63.29±16.58	4.16	0.04
English	62.95±16.60	64.40±17.06	1.40	0.24
Primary science	65.65±16.53	64.08±16.70	1.68	0.20
Social studies	65.31±16.00	65.06±16.36	0.05	0.83
Health Education	65.34±15.79	66.09±15.42	0.44	051
AP	64.00±16.43	64.58±16.42	0.96	0.49

Table 4.13: Ethnic group and Academic performance

	Hausa (n = 201) Mean ± SD	Igbo (n = 147) Mean ± SD	Yoruba (n = 162) Mean ± SD	Others (n = 249) Mean ± SD	F	P
Mathematics	59.83±16.79	66.06±19.13	61.90±16.53	61.15±15.98	4.11	0.01
English	61.56±16.58	66.34±18.22	63.57±17.11	63.67±15.80	2.30	0.08
Primary science	64.96±16.81	63.96±17.17	65.60±15.04	65.05±17.16	0.26	0.86
Social studies	63.30±16.06	67.85±16.00	64.03±15.91	65.91±16.32	2.71	0.04
Health Education	66.62±15.06	64.15±15.98	67.46±15.64	64.67±15.77	1.77	0.15
AP	63.25±16.26	65.67±17.30	64.51±16.05	64.09±16.20	8.26	0.00

$P<0.05$

4.7 CORRELATIONS OF ANTHROPOMETRIC VARIABLES

Table 4.14 shows the overall correlation matrix of some anthropometric variables using Pearson's correlation coefficient. Academic performance correlate with Birth weight, body weight, body mass index and mid upper arm circumference while Age correlated significantly with almost all parameters except with Academic performance, thigh circumference, weight, Body mass index, waist circumference, waist hip ratio ($p < 0.05$). Left 2D:4D correlated significantly with only body weight, height, head circumference and waist circumference ($p \leq 0.05$). Height correlated significantly with all the parameters except with waist hip ratio and Academic performance. BMI, chest circumference, arm circumference and hip circumference, thigh circumference correlated significantly with all parameters except left and right 2D:4D ratio ($p \leq 0.05$).

4.8 MULTIIPLE REGRESSION MODEL

Table 4.15 show multiple regression equations for Academic performanc from some anthropometric variables. From the table, weight together with height was a strong possible predictor of Academic performance in children when compared to other variables. The R^2 value obtained for predicting Academic performance in children using weight and height was 0.01 respectively, likewise, BMI was a strong possible predictor of Nutritional staus in children when compared to other variables. The R^2 value obtained for predicting nutritional status in children using BMI was 0.01 respectively.

Table 4.14: Correlation matrix of anthropometric characteristics of study population

Z	AP	Age	BWT	WT	HT	BMI	HDC	NC	WC	HC	WHR	MUAC	CC	TC	R2D:4D	L2D:D4	NS
AP	-																
Age	- .05	-															
BWT	0.23*	0.00	-														
WT	0.11**	0.15**	0.13**	-													
HT	0.01	0.20**	0.06	0.63	-												
BMI	0.13**	0.04	0.13**	0.80**	- 0.07*	-											
HDC	0.03	0.08*	-0.00	0.33**	0.33**	0.18**	-										
NC	0.07	0.09**	0.08	0.44**	0.31**	0.35**	0.22**	-									
WC	0.02	0.06	0.10*	0.59**	0.36**	0.47**	0.27**	0.44**	-								
HC	0.02	0.13**	0.11**	0.65**	0.41**	0.53**	0.32**	0.39**	0.72**	-							
WHR	0.02	-0.01**	0.11	-0.02	-0.02	-0.00	-0.04	0.01	0.17**	-0.02**	-						
MUAC	0.11**	0.07*	0.09*	0.40**	0.28**	0.30**	0.08*	0.29**	0.31**	0.11**	0.46**	-					
CC	0.04	0.21**	0.13**	0.67**	0.44**	0.53**	0.24**	0.42**	0.62**	0.72**	-0.16**	0.21**	-				
TC	0.05	0.14**	0.08*	0.59**	0.35**	0.49**	0.16**	0.33**	0.52**	0.69**	-0.28**	0.09**	0.66**	-			
R2D:4D	0.02	0.04	0.03	0.05	0.05	0.03	0.05	0.11	- 0.01	0.08	-o.o6	0.01	0.24	0.34	-		
L2D:4D	0.03	0.03	0.01	0.07*	0.09**	0.01	0.06	0.01	0.07*	0.75*	-0.06	0.04	0.01	0.42	0.30	-	
NS	0.01	-0.15**	0.00	0.62**	0.05	0.77**	0.16**	0.28**	0.37**	0.45**	-0.07*	0.26**	0.43**	0.47**	0.03*	0.03	-

*AP = Academic performance , NS = Nutritional Status, WT = Weight (kg), HT = Height (cm), WC = Waist circumference (cm), HC = Hip circumference (cm), BMI = Body mass index (kg/m^2), MUAC = mid upper arm circumference (cm), NC = Neck circumference (cm), CC = Chest circumference (cm), TC = Thigh circumference (cm), R2D:4D = right second to fourth digit ratio, L2D:$D = left second to fourth digit ratio, WHR = waist-hip ratio . **. = correlation is significant at the 0.001 level (2-tailed), * = correlation is significant at the 0.05 level.*

Table 4.15: Regression Equation of the Population

	Predictive Equation	R	R^2	SEE	P
AP					
	(76.15) + (0.36 x WT) + (-0.16 x HT)	0.13	0.01	14.08	0.00
	(60.94) + (0.01 x WC) + (0.04 x HC)	0.29	0.00	14.21	0.00
	(-20.91)+(1.00 x HDC)	0.34	0.12	6.07	0.00
	(39.77)+(1.12 x BMI)	0.14	0.02	20.05	0.00
	(51.07)+(0.34 x MUAC)	0.07	0.01	20.20	0.00
	(53.80)+(0.11 x TC)	0.29	0.00	20.23	0.00
NS					
	(2.48)+(0.03 x BMI)	0.12	0.01	0.73	0.00
	(2.69)+(0.02 x MUAC)	0.10	0.01	0.73	0.01
	(5.39)+(0.15 x HC)	0.02	0.00	20.22	0.00
	(7.00)+(0.15 x WC)	0.45	0.21	2.12	0.00
	(16.38)+(-0.12 x WHR)	0.01	0.00	2.37	0.00
	(7.54)+(0.23 x HDC)	0.48	0.23	2.08	0.00

AP= Academic Performance, WT = Weight, HT = Height, , WC = Waist Circumference, HC = Hip Circumference, BMI = Body mass index, MUAC = Mid upper arm circumference, WHR = Waist hip ratio, B-WT = Birth weight, HDC = Head circumference, NS = Nutritional status, SEE = Standard error estimate

CHAPTER FIVE

5.0 DISCUSSION

Nutritional status is one of the important indicators to determine a Childs' academic performance, which is often defined as the fundamental pillar of human life, health and development across the entire life span (WHO, 1992). Improved nutritional status has a positive and direct impact on academic achievement. When children's basic nutritional and fitness needs were met, they have the cognitive energy to learn and achieve (Essien *et al.*, 2012). Primary education is a vital stage in the development of the consciousness and personality of the child as it is at this juncture that a whole new world of bright ideas and knowledge open up in front of their eyes (Hall *et al.*, 2001). At this stage children are extremely inquisitive and elementary education must encourage this tendency among the children.

In this study, there is a correlation between Nutritional status and Academic Performance the relationship is weak and not statistical significance. Genetics and nutrition may be responsible to the variation that occurred. Generally School Children living in the urban area perform better academically than those living in the rural places. This agreed with Oninla *et al*., (2006). Also there was difference based on sex in most variables, showing that the population exhibits sexual dimorphism. The boys had higher values than girls in only Age, Neck circumference, Waist-hip ratio and Mid-upper arm circumference. The mean height of the whole population is141.04 $\pm$8.23cm, this may be due to the fact that body physique is influenced by climatic, hereditary, nutritional and racial factors (Rastogi *et al*., 2008). It was reported that the ratios of various body parts to stature differ from one

population to another (Duyar and Pelin, 2010) and that ethnic differences and environmental factors can influence body proportion (Malina, 1991; Numan *et al*., 2013).

The prevalence of Underweight was 0.71 %(71) in boys and 0.69 %(69) in girls. These figures tallies with the prevalence of underweight between sexes in other reports (Jackson *et al.,* 2002; Venkaiah *et al*., 2002; Ukegbu *et al*., 2007; Wamani *et al.,* 2007, Ejike *et al*., 2010), reported that Underweight was more common in boys than in girls but the result was lower compared with some other studies (Abidoye and Ihebuzor, 2001; Badenhorst *et al*., 1993 : Rao *et* al., 2005; Som *et al*., 2007;Bose *et al.,* 2008; Ekpo *et al*., 2008; Dutta *et al*., 2009; Kandala *et al*., 2011). Who reported that Underweight is more in girls than in boys. The result of this study was also consistent with other studies in sub-Saharan Africa who reported that Underweight is higher in boys than in girls children (Ngare and Muttunga, 1999;Lwambo *et al.,* 2000; Espo *et al.,* 2002; Jackson *et al.,* 2002; Venkaiah *et al.,* 2002 Ukwuani and Suchindran, 2003; Wamani *et al.,* 2004; Rao *et* al., 2005 Semproli and Gualdi-Russo, 2007; Ukegbu *et al.,* 2007; Wamani *et al.,* 2007; Mikki *et al*., 2009; El Mouzan *et al.,* 2010; Fetuga *et al*., 2011; Akinpelu *et al*., 2014) and other parts of the world.

The comparison of the weight from this study showed that the mean weight of the boys was 32.27 kg, while the mean weight of the girls was 32.90kg respectively. This study was similar to other studies that showed girls were weightier than boys (Ejike *et al*., 2010; Maruf *et al.,* 2010; Fetuga *et al.,* 2011; Goon *et al*., 2011).

The comparison of the BMI of the present sample with international references (CDC 2000; WHO, 2007) indicated that boys from this study have lower BMI values than the girls but there was no wide differences as was noticed in weight and height comparisons.

The Prevalence of overweight/obesity in this study (0.12% for boys and 0.26% for girls) was low compared with other previous studies in Nigeria (Ben-Bassey *et al*, 2007; Fetuga *et al*, 2011; Akinpelu *et al*., 2014) and abroad (de-Onis and Blössner, 1997; Martorell *et al*., 1998). The present study also agrees with (Dietz, 1998; Jackson *et al*., 2002; and Monyeki *et al*., 2008), that reported higher prevalence of overweight and obesity in girls, but disagrees with the works of Ukegbu *et al*. (2007) and Ejike *et al.* (2011).The fact that considerably high percentage of the population was underweight and only a very small proportion was thin sugessted that the cause of the expressed undernutrition was as a result of chronic malnutrition. This may be as a result of inbalance in the food intake of the population in taking lots of starchy carbohydrates (rice, cassava, maize, yam) (Goon *et al*., 2011). Comparison of the BMI of the children showed that the girls had significantly higher values than the boys.

The hand anthropometry of the present study showed that boys and girls had almost similar values and this showed no statistically significant values. The mean values of right digit ratio in this study were 0.96 for boys and 0.96 for girls while left 2D:4D ratio was 0.96 for boys and 0.97 for girls. This result also shows that girls had significantly higher values compared with the boys in left 2D:4D ratio. It was observed from the present study that second digit length in males was shorter than fourth digit length which was not different when compared among the sexes. This finding agrees with the reports of Manning (1998), Manning et al. (2000); Mcfadden and Shubel, (2002); Holm *et al*. (2005), Danborno *et al*., (2007), Oladipo *et al*., (2009) and Ibegbu *et al.*, (2012)who reported that second digits in the males tend to be shorter than fourth digits. These digits lengths are influenced by testosterone and estrogen *in-utero* (Manning *et al*., 2000). This sexual dimorphism in 2D:4D ratios are influenced by prenatal testosterone

concentrations. This hormone is thought to modify developmental rate such as epidermal ridges of the digits during fourth week of fetal development (Geschwind and Galaburda, 1985; McFadden and Shubel, 2002; Neave *et al*., 2003;Manning *et al*., 2004;Wallien *et al*., 2008). High concentrations of fetal testosterone indicate a low 2D:4D ratios, which therefore indicate a high prenatal testicular activity which also influences higher long bone development and determines the height of the individual. On the other hand 2D:4D ratio is positively correlated with oestrogen in men and women (Williams *et al*., 2000;Malas *et al*., 2006; Paul *et al*., 2006).

The influence of Parents Socio-economic status on childrens' Academic performance in the present study showed that Fathers and Mothers who attained Tertiary Education , have their children performance better Academically than those who attained Secondary, primary and none Education. This agrees with (Vellymalay, 2012a) from the results it implied that a parent's socioeconomic status play an important role in providing these educational resources and it appears to impose the greatest impact on the child's educational outcomes. Parental involvement has a positive impact on student achievement at all socioeconomic levels, though involvement is probably more important for low socioeconomic schools, as they are more likely to have lower test scores and graduation rates. (Henderson, 1988) says that Regardless of income, ethnicity or background, students with involved parents are more likely to earn higher grades and test scores, have better attitudes, behavior and attendance, and graduate and go onto additional education. Higher parental involvement is associated with higher educational expectations, enrollment in gifted and talented programs, and positive perceptions of school While parent involvement positively affects a student's academic achievement, low Socioeconomic families are least likely to be involved in their students' education

(Turney and Kao, 2009; Ratcliff and Hunt, 2009; Van Velsor and Orozco,2007; Machen *et al*, 2005; Abdul-Adil and Farmer, 2006). Low Socioeconomic families are often working all of the time to take care of their families, and they have no time to participate in their child's education on campus (Ratcliff and Hunt, 2009). Based on a study involving low socioeconomic mothers, mothers want to be involved in their child's education, but the other problem is that they are less comfortable around teachers, and so they do not get involved (Machen *et al*, 2005).Recent educational developments in many countries have shown a growing importance of the concept of parental involvement. With the rise in educational fields, the wealth and wishes of parents appear to play a more dominant role in a child's education. Thus, the impact of the parent's socioeconomic status on parental involvement and their child's educational achievement has been of great concern to many researchers (Vellymalay, 2012b). Research in parent involvement, (Midraj and Midraj, 2011) shows that involvement at home has a more significant impact on children's attainment than parent involvement in school activities. (Christenson and Sheridan, 2001; Hickman *et al.* 1995; Izzo *et al.*, 1999; Trusty, 1999). Olaniyi and Mageshni (2008) studies shows that, Parental involvement positively correlated with students' academic achievement. Children of parents involved in the home-based learning support activities and direct communication with their children had superior school grades than those from less involved parents. Kingsley (2011) carried out a study to analyze the link between parental school involvement and the academic achievement of young students from diverse socio-economic backgrounds; the results indicate a positive and significant correlation between mothers' school involvement and the academic achievement of the students. Parental involvement in school activities may have a positive influence on children's learning and cognitive growth. Research found that when families who were not very involved in their children's school became more involved in

the school, their children's literacy improved (Dearing *et al*, 2006). Moreover, Xu *et al*. (2010) found that parental involvement at school positively affected self regulated learning. (Moosa *et al*., 2001), research results showed that Arab parents believe that they can assist their children with school if given guidance, and Arab mothers favored more personal forms of parental involvement than public forms (Midraj and Midraj , 2011). Singh and Vinod (2012) carried out a study aims to find out the extent of relationship between academic achievement and parental encouragement. The results revealed a significant positive relationship between academic achievement and parental encouragement. Many research's shows that parents' involvement in their children's education is an important component of student success and achievement (Compton-Lilly, 2003; Lareau, 2000; Shields *et al*, 1983; Walker *et al*, 2005). Greenwood and Hickman (1991) study shows that parental involvement enhances child's educational aspirations, sense of well-being, attitude, improving grades and readiness for school. Several other studies indicate that parent/family involvement has a lasting effect throughout the careers of students (Kellaghan *et al*, 1993; Trusty, 1999). Simon (1999) found that although study habits, attitudes, and behavior patterns may be set by a student's senior year, an adolescent's success is influenced by his or her family even through the last year of high school. In addition, Anderson, (2000) observed that parental involvement decreases the likelihood that students will be placed in special education, repeat a grade, and or drop out. Other studies have found that parental involvement increases student motivation (Gonzales-Haas *et al*, 2005). This study also agree with (Guerin *et al*, 2001; Hill *et al.*, 2004; Laosa *et al.*, 2005;Omoegun *et al.*, 2007; Oni *et al.*, 2007; Rothestein *et al.*, 2004). Who reported that there was significant relationship between the parental socio economic statuses and educational background on students' academic performance. This finding differs from what was obtained by other researchers.

Eze (2002), Hill *et al.* (2004) and Rothstein (2004) had reported that status of parents does not only affect the academic performance of students but also make it impossible for children from low socio-economic background to compete well with their counterpart from high socio-economic background under the same academic environment. The result of the present study showed that birth weight have strong influence on academic performance, from the whole sample size, the total number of 37 children are of Heavy birth weight (HBW) and tends to have the highest score academically. These results are in agreement with the findings of many authors, such as, studies in South Africa (Cameron and Nadgdee, 1996), also reported a higher academic performance among children that are of Heavy birth weight than later Normal, low, very low birth weight. However, Malina *et al.* (1997) suggested that the influence may not be unconnected to the time interval between births. Padez (2003) also reported that birth weight can be important indicators in determining a child's academic performance. Results from this study showed that children who were born during the rainy season performs relatively lower than that of those who were born during dry season this agree with the work of Bolk in (1993), Reymert and Jost (1947), Matsumoto *et al*. (1993). Findings on the influence of season of birth on Academic performance have not been consistent. However, if children perform more frequently in one season than in the other in the year, it is likely that the influence of season is mediated by the annual cycle of varying length of day.

CHAPTER SIX

6.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 SUMMARY

The present cross sectional study investigated the relationship between Nutritional Status and Academic performance in Primary School Children in Zaria metropolis, Kaduna state.;[‘ the influence of some anthropometric measurements on Academic performance was studied, an estimate was made of the mean age of the respondents while also assess their nutritional status. Materials used in the study included weighing scale, Viener caliper, myo tape and the Tanner staging scale. Results of the Academic Performance and anthropometric measurements of the children showed statistical significant difference based on Nutritional status, parents level of education and parents Occupation, also there was statistical significant difference based on sex in most of the variables, showing that the population exhibits sexual dimorphism. The girls had higher values than boys in almost all the variables.

The BMI, height and weight of the population with international references showed that the boys had lower values than the reference population while the girls had values similar and in some cases such as BMI higher than the reference population.

The nutritional assessment of the population also showed that the prevalence of Underweight, Healthy weight, Overweight and Obese among boys and girls was 0.71%,2.87%, 0.12% and 0.04% in boys, and 0.69%, 2.83% and 0.26%,0.07% in girls respectively. Comparison of the sexual maturation with height and weight of this study population showed that girls weigh more than the boys . The girls of this study also had BMI values significantly higher than the boys.

The present study also investigates the influence of parents background on academic performance of the primary school children in Zaria. The effects of birth weight, season of birth, ethnic group, and school type on academic performance were explored. The results of the study revealed that these factors have strong influence on academic performance except for seasons of birth which shows no statistical significant in the value with p value 0.49 meaning that there is no relationship between seasons of birth and academic performance of the children. It was found that children whose parent or guardian have tertiary education performs academically better than those whose parents or guardians have primary or none education and the difference is statistically significant with p value 0.00. likewise children whose parents are Civil servants performs better academically than those whose parents or guardians are Traders or Artisans, which is statistically significant with a p value of < 0.001.

This study shows that the residence area have influence on the children's Academic performance, from the result it shows that children who live in the urban areas performs better than those that lived in suburb and rural areas with a p value of <0.001 which implies that the influence of residence area on academic performance is significant.

6.2 CONCLUSION

In this study of the relationship between Nutritional status and academic performance of primary school children in Zaria metropolis Kaduna state, anthropometric measurements showed statistical significant difference based on sex in most of the variables, showing that the population exhibits sexual dimorphism.

The result of this study has shown that the weight and BMI of girls is significantly higher than the boys, while boys had higher values for Age, Head circumference, waist hip ratio than the girls, this difference was statiscally significant.

Comparison of the height, weight and BMI of the population with international reference showed that the boys had very low values compared with these references, while the girls had values that were close to the reference and even exceeding the reference values.

The mean age of girls was 10.76 ± 1.39 and boys was 10.86 ± 1.46 respectively. the girls had lower age than the boys, but this difference was not statistically significant. Also, a significant relationship was found between parents or guardians occupation and student's academic performance, it means that the kind of job the parents or guardian do is a great factor which plays important role in student's academic performance. Low income of parents is a major Hindrance to academic success and development on the parts of the students. The academic performances of those students were better whose parents or guardians were highly educated. While no significant relationship was found between academic performance of the primary school children and seasons of birth.

This study shows that a high percentage of the population was Healthy weight, while only a small proportion was obese. This could be as a result of inbalance in the food intake of the population which feeds mainly on high energy starchy carbohydrates (rice, maize,

yam). And from the result the total number of children that are overweight performs better academically than the healthy weight , underweight and obesed and the difference is statistically significant. Which mean that children that are well fed and well nourished tends to do better than those that are not well fed and nourished.

6.3 RECOMMENDATIONS

Based on the findings of the present study, the following recommendations are made:

i. Further studies should be conducted on how to improve on children's nutritional status so that they can perform better academically. More studies should are needed to investigate the association between birth weight and academic performance of children.

ii. socio-economic variable has a big change that has affected student's academic performance, so more researches should be conducted to explore and analyze other factors which may influence student's academic performance.

6.4 CONTRIBTIONS TO KNOWLEDGE

Regression equation for estimation of Nutritional status from BMI, Mid arm, Head, waist and hip, circumferences, weight and height was generated in the total study population. Also alternative means of predicting Academic performance from weight, height, waist and hop circumferences was achieved among the primary school children in Zaria Kaduna state.

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APPENDIX

INFORMATION SHEET

Questionnaire for the Study of Some Anthropometric Parameters, Nutritional Status, Academic Performance of Primary School Children in Zaria Kaduna State.

INTRODUCTION

You are kindly being asked to participate in a research study conducted by Florence Opoola for a Master of Science degree under the supervision of Prof.S.S.Adebisi, and Dr. Austin Ibegbu, from the Department of Human Anatomy, Faculty of medicine, Ahmadu Bello University, Zaria.

If you have any questions or concerns about the research, please feel free to contact: Florence Opoola Faculty of Medicine, Tel: 08065553812, Prof S. S.Adebisi, Faculty of Medicine, Tel: 08100448722; .Dr. Austin Ibegbu 08032188042

PURPOSE OF THE STUDY

The purpose of this preliminary study is primarily toestablish the Relationship between Nutritional Status and Academic Performance of Primary School Children in Zaria Metropolis.

However, it is also expected that the results might implicate certain anthropometric indices, ethnicity, demography, nutrition, physical activities and socio-economic factors that affect the Academic Performance of Primary School Children in Zaria Metropolis.

This study is a partial requirement for the award of MSc degree in Department of Human Anatomy in Ahmadu Bello University, Zaria.

WHY ARE YOU BEING ASKED TO PARTICIPATE?

You are being invited because you are the parents of the student.

What will happen during this study?

Information pertaining to Academic Performance demographics (i.e. age, ethnicity, etc.), and Nutritional status will be collected using a questionnaire. The childrens anthropometric measurement will also be taken.

POTENTIAL RISKS AND DISCOMFORT

This study does not pose any form of physical, emotional or psychological risks to you as no sharp or dangerous objects will be used.

POTENTIAL BENEFITS TO PARTICIPANTS

The result of this study, when published will help in establishing theRelationship between Nutritional Status and Academic Performance of Primary School Children in Zaria Metropolis and how it is influenced by anthropometric indices, ethnicity, demography, nutrition, physical activities and parental level of education.. The conclusions that will be drawn will suggest whether the current age at menarche and the effect of settlement may likely predispose the participants to some ailments later in life or not.

WILL THERE BE ANY COSTS TO ME?

Aside from your time, there are no costs for taking part in the study.

PAYMENT FOR PARTICIPATION

Participation will not attract any financial benefit.

CONFIDENTIALITY

Every effort will be made to ensure confidentiality of any identifying information provided by participants in this study. You will not be identified in any reports or publications resulting from the study.

PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may exercise the option of removing your data from the study. You may also refuse to answer any questions you do not want to answer and still remain in the study. The investigator may withdraw you from this research, if circumstances arise that warrant doing so.

RIGHTS OF RESEARCH PARTICIPANTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your

participation in this research. This study has been reviewed and received ethical clearance through Ahmadu Bello University Research Ethics Board. If you have any questions regarding your rights as a research participant, you can obtain further information about the research or voice your concerns to:

Prof.S.S.Adebisi,

Department of Anatomy,

Faculty of Medicine,

Ahmadu Bello University.

Tel: 08100448722

E-mail: ssadebisi@yahoo.com

SIGNATURE OF RESEARCH PARTICIPANT/LEGAL REPRESENTATIVE

I have read the information provided for the study "Relationship between Nutritional Status, Birth Order, Social Status and Academic Performance of Primary School Children in Zaria Metropolis" as described herein. I have been given a copy of this form.

_____

Name of Participant

_____ _____

Signature of Participant Date

SIGNATURE OF WITNESS

_____

Name of Witness

_____ _____

Signature of Witness date

A study of the Relationship between Nutritional Status and Academic Performance of Primary School Children in Zaria Metropolis, Kaduna State.

Name: Florence Opoola

Position: MSc Student

Contact Address: Department of Anatomy, Faculty of Medicine, Ahmadu Bello University, Zaria

1. I confirm that I have read and understood the information sheet for the above study and have had the opportunity to ask questions. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason. ☐
3. I agree to take part in the above study. ☐
4. I agree to the use of anonymised quotes in the publications. ☐

_____	_____	_____
Name of Participant	Date	Signature

_____	_____	_____
Name of Researcher	Date	Signature

Please tick or circle the appropriate letter where necessary below:

DEMOGRAPHY OF PARTICIPANT

1. Research I.D _____
2. Sex: Female [ ] Male [ ]
3. Age of the child _____ (e.g. 15 yrs.)
4. Date of birthof the child _____/_____/_____(DD/MM/YYYY)
5. Birthweight of the child_____ kg
6. Place of birth of the child: A. rural B. semi-urban C. Urban

a. Number of children: A. Females _____ B. Males _____

7. Child's birth order:

   A. Firstborn [ ]B. Second born [ ] C. Third born [ ] D. Later born [ ]

8. Type of school attending:

A. Private [ ]

B. Public [ ]

ETHNIC BACKGROUND

9. Child's maternal ethnic group _____

10. Child's ground mother's ethnic group _____

11. Child's paternal ethnic group _____

12. Child's ground father's ethnic group _____

PARENTS' EDUCATIONAL BACKGROUND

13. Father's level of education

A. None [ ] B Primary [ ]
C Secondary [ ] D Tertiary [ ]

14. Mother's level of education

A. None [ ] B Primary [ ]
C Secondary [ ] D Tertiary [ ]

PARENTS' OCCUPATION

15. Mother's occupation _____

16. Father's occupation _____

17. **PARENTS' MONTHLY INCOME (Naira ₦)**

A. Less than 20 000 [ ] **B.** 21 000 to 80 000 [ ] **C.** 81 000 to 150 000 [ ]

D. 151 000 to 300 000 [ ] **D.** Greater than 300 000 [ ]

18. Grade earned on the following subjects in the previous session:

	Grade (%)		
Subjects	1st Term	2nd Term	3rd Term
Mathematics			
English Language			
Primary Science			
Social Studies			
Health Education			
Verbal Reasoning			
Quantitative Reasoning			

ANTHROPOMETRIC MEASUREMENTS

19. Weight _____ (kg)

20. Height _____ (m)

21. Head circumference _____ (cm)

22. Neck circumference _____ (cm)

23. Waist circumference _____ (cm)

24. Hip circumference _____ (cm)

25. Mid upper arm circumference_____ (cm)

26. Triceps skin fold _____ (cm)

27. Subscapular skin fold _____(cm)

28. Chest circumference _____ (cm)

29. Umbilical skin fold _____(cm)

30. Thigh circumference _____ (cm)

HAND ANTHROPOMETRY

31. Length of digits (mm)

Hand	**Fingers**				
	I	**II**	**III**	**IV**	**V**
Right					
Left					