

**PREVALENCE AND CORRELATES OF OBESITY AMONG PRIVATE DAY  
PRIMARY SCHOOL GOING CHILDREN (9-12 YEARS) IN  
KAMPALA CITY – CENTRAL UGANDA**

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**2016/HD07/2420U**

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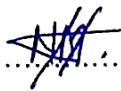
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**A DISSERTATION SUBMITTED TO GRADUATE STUDIES IN PARTIAL FULFILLMENT  
OF THE REQUIREMENTS FOR THE AWARD OF A MASTERS DEGREE OF PUBLIC  
HEALTH NUTRITION OF MAKERERE UNIVERSITY**

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**DECLARATION**


I, **Nassaazi Mourice**, hereby declare that, this is my original work and has not been presented to any University or Institution of higher learning for any academic award. Where secondary sources of information were used in this work, they have been acknowledged.

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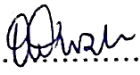
**APPROVAL**

This dissertation was written under our supervision and is hereby submitted for the award of the Degree of Masters of Public Health Nutrition with our approval as Makerere University, College of Health Sciences, School of Public Health supervisors.

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## **DEDICATION**

This dissertation is dedicated to my dear husband Mr. Kalema Abdul Mulondo and my dear father Lukyamuzi Matia for their love and support.

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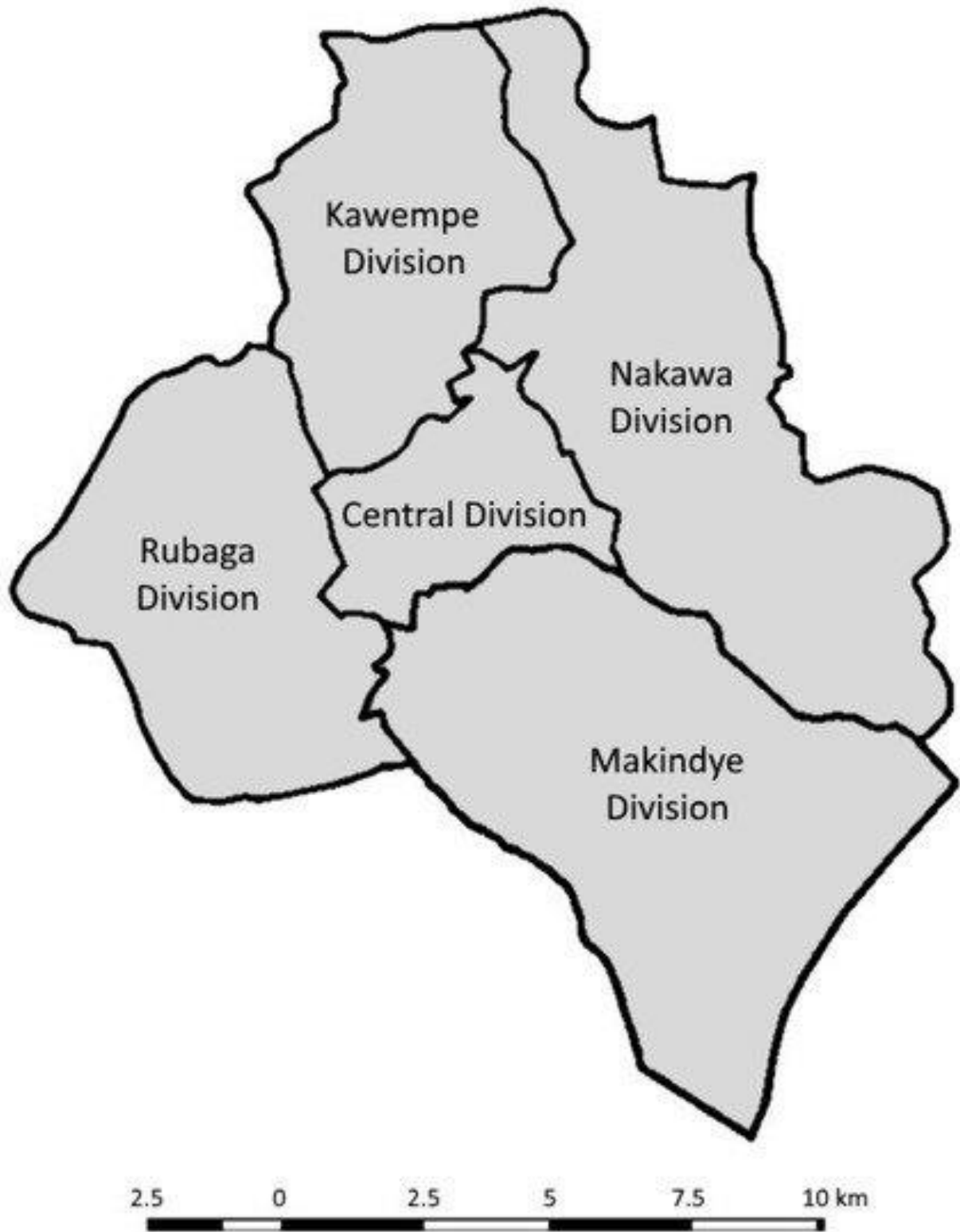
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## LIST OF ACRONYMS

AO	Abdominal obesity
BMI	Body Mass Index
CDC	Centers for Disease Control and Prevention
COSI	Childhood Obesity Surveillance Initiative
IOTF	International Obesity Task Force
PE	Physical Education
SDGs	Sustainable Development Goals
SEP	Socio-Economic Position
SLP	School Lunch Programs
SSA	Sub Saharan Africa
UN	United Nations
UNICEF	United Nations International Children's Emergency Fund
WC	Waist Circumference
WHO	World Health Organization

## OPERATIONAL DEFINITIONS

**Intra-household correlates:** This term was used to refer to the characteristics of the household from which a private day primary school going child lives, which had a significant relationship with the incidence of obesity.

**Intra-personal correlates:** This term was used to refer to the individual characteristics of a private day primary school going child, which had a significant relationship with the incidence of obesity. The characteristics ranged from socio-demographic, personal, lifestyle and dietary characteristics.

**Obesity:** This is a health condition that occurs when a person carries excess weight or body fat. In this study, the term was used to refer to a health condition when a private day primary school going child had a body mass index percentile that exceeds 95%.

## ABSTRACT

**Introduction:** Childhood obesity is one of the greatest public health challenges of our time and whereas it affects all children, it greatly affects primary school going children. More than one third of children are affected by overweight or obesity by the time they leave primary school, and severe obesity within this group has reached its highest point yet and this problem is prominent in private primary school going children. The purpose of this study was to assess the prevalence and correlates of obesity among private day primary school going children (9-12 years) in Kampala city.

**Methodology:** An analytical cross-sectional study design was adopted targeting 383 pupils in private day primary schools of Kampala city. The divisions were stratified, and simple random sampling used to sample two schools per division, within which systematic random sampling was used to sample the pupils who participated in this study. A structured questionnaire and anthropometry were used to collect the study data. Data was analyzed using SPSS version 25.0 and findings presented using tables and figures.

**Results:** The prevalence of obesity among private day primary school going children (9-12 years) in Kampala city was 4.7% (n = 18). Snacking (AOR = 9.26, CI = 2.19 -19.15, P = 0.03), playing of computer games\mobile games (AOR = 3.65, CI = 1.20 - 11.12, P = 0.02) were the intrapersonal correlates that increased chances of being obese. Encouragement by parents to participate in physical activity at home was the intra-household correlate which (AOR = 0.31, CI = 0.11 - 0.86 - 0.03) decreased chances of being obese.

**Conclusion and recommendation:** Obesity among private day primary school going children in Kampala city is prevalent, at almost 5%, which is substantial. It is associated to mainly some intrapersonal and intra-household characteristics. Interventions to prevent childhood obesity should therefore target

those two levels of influence. Considering that a small sample of schools was considered, there is a need for further inquiry with a larger sample size and using triangulated data sources.



## CHAPTER ONE: INTRODUCTION

### 1.0 Introduction

Childhood obesity is one of the most serious global public health challenges of the 21st century WHO, (2019) affecting every country in the world. It is a health challenge so significant especially among children, to the extent that in just 40 years, the number of school-age children and adolescents with obesity rose more than 10-fold, from 11 million to 340 million (2016 estimates) (WHO, 2020; WHO, 2018). In response, all countries have agreed to a set of global targets for halting the increase in obesity especially among children. The main global agenda for preventing childhood obesity is captured in the sustainable development agenda of 2015 to 2030 (SDG 3), in which childhood obesity is recognized as a major public health problem globally, with the potential to undermine progress towards achieving the SDGs (World Health Organization, 2018).

Target 3.4 (by 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being) includes the prevention of obesity as one of the priority areas (Ralston et al., 2021). The other global non-communicable disease targets (Target 6) calls for no increase in overweight among children under age of 5, school-age children or adolescents by 2025 (from 2010 levels) (WHO, 2020). In addition, action to reverse the epidemic is the focus of the recommendations made by the WHO Commission on Ending Childhood Obesity and is one of the main objectives of the Decade of Action on Nutrition (World Health Organization, 2018). However, the fact that achievement of the aforementioned targets is hinged on prevention implies that there are key populations that can by no means be side-lined, given their risk of obesity and the fact that they can even be obese for a lifetime. That population is that of school going children who currently number at over 500 million globally (Szmigiera, 2021; UNICEF, 2018; Lloyd et al., 2018).

## 1.1 Background of the study

Overweight and obesity were until recently considered to be diseases of the developed world, with malnutrition considered to be a health problem of the developing world. This is however not the case anymore, given that obesity especially among children disproportionately affects children globally, across the development divide (UNICEF-WHO-The world bank group, 2018). Childhood obesity is one of the greatest public health challenges of our time Aljassim & Jradi, (2021); WHO, (2020) and whereas it affects all children, it greatly affects primary school going children (Chapman et al., 2020).

More than one third of children are affected by overweight or obesity by the time they leave primary school, and severe obesity within this group has reached its highest point yet (Rudolf, 2019). However, among the primary school going children, one category has been reported to be even at greater risk of obesity, that is those who go to private primary schools (Singh et al., 2018; Oinam et al., 2019; Gebrie et al., 2018). That is premised on the fact that private schools are associated with socio-economic status and more sedentary lifestyle of children therein such as having better meals, junk foods and these have left most of the primary school children obese (Ayala-Marín et al., 2020). Some private schools have been found to have obese children because of lack of enough space for play grounds and consumption of foods with high fat content (Bongomin, 2012). Findings from a study by (Morton et al., 2016) showed that low physical activity and dietary intake among factors associated with obesity among private primary school children.

Nonetheless, obesity in early childhood cannot be ignored because it is likely to persist into adulthood, thereby further increasing risk of overweight-related chronic disease sequelae especially among older children (>10 years) (Llewellyn et al., 2016; Simmonds et al., 2016). The health burden of childhood obesity is borne from the fact that it occurs in conjunction with the increase in the prevalence of other

comorbidities. Those include glucose intolerance, type 2 diabetes, hypertension, and hyper-lipidaemia (Spinelli et al., 2019; Atay & Bereket, 2016). Children with obesity are already at risk of cardiovascular disease as they have a high prevalence of comorbidities such as hypertension, dyslipidemia, and insulin resistance Brady, (2017); Llewellyn et al., (2016), including a worse cardiometabolic risk profile, earlier signs of vascular dysfunction, and subclinical atherosclerosis. Childhood obesity is also linked to the incidence of conditions not limited to, fatty liver disease, sleep apnea, asthma, hepatic steatosis (fatty liver disease), cholelithiasis (gallstones), glucose intolerance and insulin resistance, skin conditions, menstrual abnormalities, impaired balance, and orthopedic problems (American Academy of Pediatrics, 2019). Until recently, many of the above health conditions had only been found in adults; now they are extremely prevalent in obese children (Bhadoria et al., 2015).

Besides that, they are also more likely to suffer from an array of psychological disorders including depression that may arise in part from stigma, further increasing the risk of adverse health outcomes (Blasco et al., 2020). Obesity has been described as one of the most stigmatizing and least socially acceptable conditions in childhood Palad et al., (2019); Pont et al., (2017), in which negative stereotypes, discrimination, and social marginalization has also been noted (American Academy of Pediatrics, 2019). That alone can further exacerbate the condition, as stigmatized obese children tend to engage in binge eating (McCuen-Wurst et al., 2018).

Further still, childhood obesity has economic implications as well, on health systems; childhood overweight is associated with adverse effects on adult outcomes resulting in an unhealthy workforce, increased cost of health care, and limiting total population productivity (Chaturvedi, 2019; Aryeetey et al., 2017). It is estimated that the health consequences of the obesity costed more than \$850 billion in 2018 alone World Economic Forum, (2018), and that it will rise to 1.2 trillion dollars by 2025, if no significant reduction occurs, threatening to put the SDGs decisively beyond our reach.

It is therefore important that strategies to address overweight and obesity start among children and adolescents Aryeetey et al., (2017), and indeed there has been substantial interest in identifying effective interventions to prevent excess weight gain in young people (Bleich et al., 2018). Interventions including Primordial prevention (keeping a healthy weight and a normal BMI throughout childhood and into the teens), primary prevention (prevent overweight children from becoming obese); and secondary prevention (treatment of obesity to reduce the comorbidities and reverse overweight and obesity if possible) are currently on going (Pandita et al., 2016). Nonetheless, childhood obesity levels have increased; globally, an estimated 10 per cent of school-aged children between 5 and 17 years of age are overweight or obese (Sunil et al., 2019). The epidemic has been growing most rapidly in low and middle-income countries, particularly in Northern and Southern Africa, the Middle East, and the Pacific Islands (WHO, 2018).

In Africa, the prevalence of overweight and obesity among children under five years of age was 5% (9.7 million) in 2017, and according to absolute numbers provided by (UNICEF-WHO-The world bank group, 2018). Moreover, some parts of the African continent are more severely affected than others; as of 2017 the prevalence of overweight or obesity among children under five years of age in North Africa and Southern Africa was 10.3% and 13.7% respectively (UNICEF-WHO-The world bank group, 2018).

In Uganda, Chebet et al., (2014), conducted a study to assess the prevalence of overweight and obesity among primary children aged 8-12 years in Kampala central, in which they reported a prevalence of underweight, overweight and obesity to be 8.0%, 32.3% and 21.7%, respectively. The precise prevalence of obesity or overweight among private day primary school going children in Kampala is not well documented, but available evidence points to it being substantially high.

In Uganda, private schools were inaugurated in the year 2008 and this was done to restructure the Ministry of Education and sports in order to cater for the vibrant and expanding private investments in the training

and education sector. The Private Schools and Institutions department is charged with the overall coordination, regulation, policy formulation and guidance on all matters regarding these private schools and institutions. It is specifically vested with the powers to address issues and concerns in private primary and secondary schools as well as private technical and vocational education and training institutions (Ministry of Education & sports, 2021).

In Kampala Private Schools have become more prominent in the education sector (Joanna et al., 2017). Estimates show that about 2,282 private schools exist in Kampala and serve about 502,000 pupils and the private schools every year increase by about 6%. The private schools have served at all levels and usually account for 84% of school enrollments in Kampala. Associations also in the private primary schools have been made such as Kampala Primary Schools Head Teachers Association (Joanna et al., 2017). Private schools in Kampala also have few space to create play areas for pupils than those in rural areas where space is adequate (Joanna et al., 2017), this could impact on the physical appearance of the pupils. A sample observation done in the selected schools in Kampala showed that some schools never had play grounds for physical activities, children were also feeding on high fat foods and were served too much food and on a daily basis such as rice, milk, red meat among others which would affect their weight and health. Results also showed that parents prefer to see their children healthy and seeing them fat and others ignored even talking about the weight.

The government and the Ministry of Education of Uganda have implemented the physical activities in the primary school education curriculum such as Physical education so as to enable children do physical exercises (Otaala et al., 2013). The government also recommends licensing for schools that meet the education requirements which among others is the need for more space for play grounds with goal posts in the grounds (Ministry of Education & sports, 2014). Government commitment to address the obesity among children has been through co-curricular activities and physical exercises in schools so as to

promote physical fitness among children (Ngaruiya et al., 2017). This has also been addressed through the Nutrition Policy where over nutrition among children was a problem and no Policy/strategy/action plan exists in Uganda targeted to reduce obesity and overweight among children in Uganda (World Health Organization, 2016).

This study target was in line with the sustainable development Goal 3 which is to “ensure healthy lives and promote wellbeing for all ages” and Goal 2 which looks at putting an end to hunger through food security and improved nutrition and promotion of sustainable agriculture. Obesity has been found to be both a non communication disease and also leads to other diseases such as diabetes and according to the SDGs, it’s a target that by 2030, there should be a reduction in premature mortality from NCDs and this will help in prevention and treatment of mental health and well being of individuals (United Nations, 2015). Goal 2 was also preferred because it highlights on improved nutrition which could be taking nutrients which are adequate for the body but not over consumption and intake of nutrients that lead to obesity.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.0 Introduction**

This chapter presents a review of literature, organized into two main sections; section 2.1 covering literature to do with the prevalence of obesity among school going children, section 2.2 covering the correlates of obesity among school going children. To obtain the literature, a comprehensive search of key bibliographic databases including MEDLINE (PubMed), MEDLINE (EbscoHost), CINAHL (EbscoHost), Academic Search Complete (EbscoHost) and ISI Web of Science (Science Citation Index) was conducted for published literature.

### **2.1 Prevalence of obesity among school going children**

Childhood obesity is a globally acknowledged health challenge WHO, (2018), which has thus called for several prevention interventions at various levels. However, the prevalence of obesity has been recorded to be rising annually, with some regions including Africa, reporting prevalence's of up to 25% (WHO, 2018). Developed nations are however home to most obese children. According to the latest Childhood Obesity Surveillance Initiative (COSI) wave that was conducted in the Republic of Ireland in 2015/2016, one in five children (20%) aged 6–12 years were overweight or obese (Bel-Serrat et al.,2017). Keaver et al., (2013), had earlier reported that although Irish childhood obesity rates are not among the highest in Europe, Ireland is the country with the 8th highest childhood overweight and obesity prevalence in Europe. In fact, it was projected that by 2030 the prevalence of overweight and obesity in adults will reach levels of 89% and 85% in Irish males and females, respectively (Keaver et al., 2013). Spinelli et al., (2019), conducted a study aiming at presenting the prevalence of severe obesity in school-aged children from 21 countries participating in Childhood Obesity Surveillance Initiative (COSI) in Europe. In that multicounty study, a total of 636,933 children were included in the analysis (323,648 boys and 313,285

girls), and according to the WHO definition, severe obesity was reported to range from 1.0% in Swedish and Moldovan children to 5.5% (95% CI 4.9-6.1) in Maltese children.

### **2.2.1 Prevalence of obesity among school going children in Asian**

In Asia, Sunil et al., (2019), conducted a school based cross sectional study among students aged 6 to 16 in India, and it was reported that overall, the prevalence of overweight and obesity among the students were 7.09% and 4.08%. The authors also reported that the prevalence of overweight and obesity amongst boys were 3.19% and 2.04%, and that the prevalence of overweight and obesity amongst girls were 3.90% and 2.04%.

In India, Singh et al., (2018), conducted a study among 800 female children who were randomly from four private schools and four government schools. The findings of that study showed that the prevalence of obesity was 11.37%, overweight was 9.75%, and underweight was 3.25% among female children of Private schools. In Bangladesh, Ma, (2018), conducted a cross sectional study encompassing 504 primary school children between 9 -14 years of age. In that study, it was reported that about 13.0% of them were underweight, 63.5% normal weight, 12.9% overweight and 10.9% obese.

In Vietnam, Do et al., (2015), also conducted a cross-sectional study among 2,677 children and reported prevalences of overweight and obesity of 21.1% in the urban area and 7.6% in the rural.



### **2.2.2 Prevalence of obesity among school going children in the Middle East**

Elkum et al., (2016) whose study was conducted among 6–18 years old school children, with overweight and obesity defined in accordance with the Centres for Disease Control and Prevention (CDC), International Obesity Task Force (IOTF) and (WHO) 2007 criteria, found that the prevalence estimate of overweight based on the three different systems were (CDC = 17.7%, IOTF = 23.3%, WHO = 21.6%). The prevalence of obesity was (CDC = 33.9%, IOTF = 28.2%, WHO = 30.5%).

### **2.2.3 Prevalence of obesity among school going children in Africa**

Africa has also had studies done, reporting obesity prevalence that, in some cases, is higher than that in developing countries in the western world. In Africa, despite the higher burden of under nutrition, the magnitude of overweight and obesity is increasing at an alarming rate (Ng et al., 2014); Gebremedhin, 2015; Manyanga et al., 2014). In Sub-Saharan Africa, about 10.6% of school aged children were overweight or obese; of which 2.5% were obese Muthuri et al., (2014), five years ago.

In Ethiopia, Desalew et al., (2017), also conducted a school based cross-sectional study and reported that the prevalence of overweight and obesity were 14.7% and 5.8% respectively. In a cross-sectional study done in Ethiopia among 431 school adolescents and reported the magnitudes of overweight and obesity to be 12.3% and 4.4%, respectively, and the combined prevalence of overweight and obesity together was 16.7% Anteneh et al., (2015). However, Mekonnen et al., (2018), reported an overall prevalence of overweight and/or obesity of 11.9% (out of which 8.8% were overweight and 3.1% were obese) in Ethiopia.

Gebrie et al., (2018), conducted a study with an aim of determining the pooled prevalence of overweight/obesity among children and adolescents in Ethiopia. The combined pooled prevalence of overweight and obesity among children and adolescents in Ethiopia was reported to be 11.30%. The

author reported also that the separate pooled prevalence of overweight and obesity were 8.92 and 2.39%, respectively. In South Africa, Negash et al., (2017), collected cross-sectional data from 7 to 18-year-old South African school learners attending 14 schools, and among the 1559 participants, the overall prevalence of overweight/obesity was 22.9%.

In West Africa, the prevalence of obesity has been put at 15% among children in Ghana. Aryeetey et al., (2017) conducted a study among 3089 children (9–15 years) in Accra and Kumasi, Ghana and reported that the prevalence of overweight (including obesity) was 15%. One North African study by El Kabbaoui et al., (2018), in Morocco showed that the prevalence of overweight was 7.69% and that of obesity was 3.41%.

East Africa has also had reports of high child obesity incidence; pocket studies done in Tanzania and Kenya showed that the prevalence of overweight and obesity is also increasing in these two countries, Kimario (2015); Muhihi et al., (2013); Kyallo et al., (2013); Tluway et al., (2018), conducted a study in Tanzania among 619 students and reported that the overall prevalence of overweight and obesity was 9.2% with more girls being overweight and obese than boys. The observed prevalence of obesity in that study had also been collaborated with the prevalence of overweight and obesity reported among school children in urban areas of Tanzania in other studies (Mushengezi & Chillo, 2014; Muhihi et al., 2013; Mpenbeni et al., 2014; Mwaikambo et al., 2015).

In Uganda, Chebet et al., (2014), conducted a study to assess the prevalence of overweight and obesity among primary children aged 8-12 years in Kampala central, in which they reported a prevalence of underweight, overweight and obesity to be 8.0%, 32.3% and 21.7%, respectively.

## **2.2 Correlates of obesity among school going children.**

### **2.2.1 Intrapersonal correlates of obesity among school going children**

Gender has been widely studied as a potential correlate of obesity with varying findings. Desalew et al., (2017), reported that the prevalence of overweight and obesity among male and female children were 14.7 and 5.8%, respectively. The authors added that males were more obese than female children. Spinelli et al., (2019), also reported that the prevalence was generally higher among boys compared to girls. Chebet et al., (2014), also reported that girls had higher percentage of overweight (64.4%) and obesity (52.9%) than boys (35.6%; and 47.1%, respectively) whereas underweight occurred more among the males (57.1%) compared with the females (42.9%). Pienaar, (2015), also reported that the prevalence in obesity increased more in boys (3.2%) compared to girls (2.4%), although girls showed a higher overall prevalence (18.5%). However, Aryeetey et al., (2017), reported that female children were twice as likely to be overweight or obese compared to male children. Negash et al., (2017), also found that gender (being female) significantly increased the likelihood of being overweight / obese. Similar, Oinam et al., (2019), reported that the overall mean fat % was  $19.4 \pm 6.1$  and girls have higher fat% than boys. They added that overall, obesity prevalence was more among girls than boys (1.6% vs 1.0%).

Age has also been found to be significant in some studies; Do et al., (2015), reported that at the individual level, the risk of obesity increased with increased child age. Singh et al., (2018), however revealed that the prevalence of obesity was higher in age group of 9 years among female children of Private schools and revealed that Obesity was higher in age group of 6 years age group of female children of Government schools.

Many of the studies have also considered dietary habits of individual children as antecedents of obesity. Some documented risk drivers of childhood obesity related to food, eating behaviors, intake, and feeding

practices are as follows: shorter duration of breastfeeding or no breastfeeding; ready availability of calorie-dense food; preference to and increased consumption of sweet and fatty/fried food snacks; skipping the breakfast; and child's food environment at home (Kiranmala et al., 2013). Obese and overweight children have been found to have a higher preference for sweet and fatty snacks compared to children with normal weight (Chaturvedi, 2019). Do et al., (2015), reported that at the individual level, consuming large amounts of food, eating fast were risk factors of obesity. El Kabbaoui et al., (2018), on the other hand found that overweight and obesity in adolescents was positively correlated to using a computer for > 4 h/day and frequent consumption of soda and soft drinks were also correlated with an increased risk for overweight and obesity.

Cross-sectional studies have consistently shown the frequency of breakfast consumption to be inversely associated with measures of overweight and obesity Brown et al., (2013), although it has been reported that evidence is not conclusive yet (Betts et al., 2014; Dhurandhar et al., 2014; Brown et al., 2013). According to Zakrzewski et al., (2015), it may be expected that more frequent breakfast consumption would add to daily energy intake and thus be associated with a higher BMI in some cases. It is possible that associations between breakfast consumption and BMI may not be consistent across different regions of the world in children with diverse cultural and socioeconomic backgrounds (Zakrzewski et al., 2015). Multinational studies have however shown that the inverse relationship between breakfast frequency and measures of overweight and obesity is consistent among adolescents from nine European countries, (Hallström et al., 2013), and that 'daily' compared with 'less than daily' breakfast consumption was the only dietary factor of those assessed (that is, daily fruit, vegetable and soft drink consumption) to be consistently and inversely associated with overweight in 11–15-year olds from 41 countries, including Europe, the United States, Canada and Israel. In a study by Zakrzewski et al., (2015), frequent breakfast consumption was associated with lower BMI z-scores compared with occasional and rare consumption,

as well as lower BF compared with occasional and rare. Similarly, Błaszczyk-Bębenek et al., (2019), also found that obesity was significantly lower among adolescents who eat first breakfasts.

Nonetheless, El Kabbaoui et al., (2018), in his study showed that, there were no statistically significant associations between adolescents who were overweight and those of normal weight, who regularly ate breakfast, lunch, dinner or ate between meals. A study by Aryeetey et al., (2017), however found that none of the dietary habits that were assessed was significantly associated the risk of overweight or obesity.

Some research findings have provided evidence supporting the presence of a relationship between birth weight and overweight/obesity. (Reuter et al., 2018), indicated that school children who were overweight at birth had an 18% higher prevalence of overweight/obesity than those who had a normal weight at birth. A study carried out with 470 school children in Salvador, Bahia, showed that high birth weight was associated with high BMI and complications such as obesity, changes in lipid profile, and cardiovascular diseases (Sousa, 2013). Thus, the authors have previously argued that both low birth weight and high birth weight may be associated with elevated health risks among schoolchildren (Pellanda, 2014). A study conducted in Michigan, USA, with two to five-year-old children and their mothers showed similar findings, indicating that newborn children with a BMI above the 90th percentile had a 2.5-fold higher prevalence of obesity (Stansfield et al., 2016).

Lifestyle characteristics of the children at a personal level have also been found to predict obesity among them. Aryeetey et al., (2017), found that physical activity was a determinant of over nutrition among the children. They reported that children who engaged in sports for less than three times a week were at 44% higher odds of being overweight or obese when compared to those who were involved in sporting activities at least three times a week.

Oinam et al., (2019), reported that private schooling, playing games (outdoor), mode of transport to school, sleeping hours watching television were associated with obesity. Desalew et al., (2017) also reported that children who had not engaged in regular physical exercise, had experienced sedentary lifestyle, played computer games, and were not having close friends were significantly associated with overweight/obesity risk.

Anteneh et al., (2015) also reported that frequency of eating food out of home, vigorous physical activity, and frequency of vigorous physical activity were statistically significant predictors of overweight and obesity among children. Błaszczuk-Bębenek et al., (2019) also found that adolescents in total whose physical activity was over 1h/7 times per week had 61% less risk of abdominal obesity according to Waist Circumference (WC) especially in the girls' group. In Ethiopia, Mekonnen et al., (2018), showed that use of transportation to and from school, fast food intake, lack of moderate physical activity, and low intake of fruit and vegetable were significant factors associated with overweight and obesity.

In Ethiopia, a cross-sectional study done to find out the factors associated with obesity among primary school children revealed that studying in a private school, preferring sweet foods, limited engagement in physical exercises, having sedentary life like being all time on TV watching playing computer games and not having close friends were associated factors of obesity/overweight. Majority of the children also had more than one meal a day, they used to eat snacks and other junk foods with mixture of cakes, biscuits, ice cream and chocolate (Desalew et al., 2017) and these foods can lead to obesity.

A study done in Uganda by Mworosi and Amaniyo (2018) revealed that the prevalence of obesity had increased from 4.8% to 6.1%. The prevalence was high in girls in rural areas than boys and high among those who were in private primary schools compared to those in public schools. The factors identified to be associated with obesity and overweight were being female gender, low physical activity, sedentary

lifestyle, dietary intake and social isolation. Another study done in Eastern Uganda similarly showed that overweight/obesity was associated with being female and being an urban resident (Kirunda et al., 2015).

### **2.2.2 Intra-household correlates of obesity among school going children**

The increase in the prevalence of the childhood obesity has been attributed in part to the changing lifestyle of families with increased purchasing power, increasing hours of inactivity due to television, video games, and computers, which are replacing outdoor games and other social activities (Ranjani et al., 2016). Since parents provide the contextual environment, including them in prevention efforts could be playing a big role in the incidence of obesity. From previous studies, parental influence is a key risk factor for childhood weight gain and obesity (Philippe et al., 2021; Al Yazeedi et al., 2021). That influence can control the obesogenic environment by affecting the child's dietary habits, physical activity, the accessibility and availability of foods and food-related processes.

Parents usually recognize the importance of physical activity and limiting screen time, but often model sedentary lifestyles including excessive TV viewing and computer use (Minges et al., 2015). The influence of parental modeling is typically assessed by examining associations between the same parent and child health behaviour. Ranjani et al., (2016), found that parent's attitude of controlling child's diet were the major risk factors for the prevalence of obesity and overweight.

Among numerous factors that underlie childhood obesity; parental and family history of obesity can have strong influences through genetic as well as environmental factors (Albuquerque et al., 2017). Family factors play a huge role because family members are likely to have similar diets, screen time and physical activity behaviour as well as a major influence by perceptions and attitudes concerning diet and activity that leads to obesity (Grant-Guimaraes et al., 2016). Reuter et al., (2018) found an association between obesity in children and adolescents and familial history of diabetes, with school children who had an

obese father and obese maternal grandmother. Similar findings were previously observed in Tuscany, Italy; in a cross-sectional study of 1,751 children between eight and nine years of age, findings showed that the prevalence of obesity among children with mothers of normal weight was only 1.4%, whereas the prevalence of obesity among children with obese mothers was 30.3% (Parrino et al., 2016). Also, Parrino et al., (2016), found that in the cities of Catania and Sicily, in Italy, excess birth weight ( $\geq 4.0$  kg), overweight or obese mother, obese father, and low/medium parental education level were associated with increased odds of youth obesity development.

Błaszczyk-Bębenek et al., (2019), also found that abdominal obesity (AO) was significantly associated with family history of excess body weight and higher economic status of the family. He further found that obesity was associated with prevalence of overweight and obesity in parents or grandparents of the subjects. The odds of abdominal obesity (WC) in the girls' group were 2.56 times higher for those with obesity in family history.

Parental education as an indicator of socioeconomic position (SEP) has one of the most consistent, inverse association with childhood obesity (Parikka et al., 2015). Other SEP indicators such as parental occupation and family income were more inconsistent. According to Albuquerque et al., (2017), parental educational level is more consistently inversely associated with childhood obesity than other indicators as an important socioeconomic indicator, parental educational level influences the family's knowledge and beliefs, and these are considered important for healthy lifestyles and the development of obesity. Children from more educated parents are more likely to eat breakfast and consume fewer snacks, and they are less likely to eat foods with high-energy content, such as sweetened beverages and more fruit and vegetable intake (Kant A. K, Graubard, B.I., 2013).



In a meta-analysis, Wu et al., (2015) found that low SEP is associated with a 10% higher risk for overweight and 41% higher risk of obesity in children aged 0–15 years in high-income countries more specifically in North America and Europe. El Kabbaoui et al., (2018) also found that overweight and obesity in adolescents was positively correlated to having a father or a mother with higher education, high family income, and motorized transport to school.

Aryeetey et al., (2017) also reported that high maternal education and household SES were risk factors for overweight and obesity. Children of mothers who received formal education beyond the secondary level were more likely to be overweight or obese compared to those whose mothers had no education. The authors added that being educated up to the secondary level was not linked with overweight. Children living in households in the third SES percentile had 56% higher odds of being overweight or obese when compared to those from households in the first tertile (lowest SES). Anteneh et al., (2015) reported that family monthly income, and family having vehicle, were statistically significant predictors of overweight and obesity. El Kabbaoui et al., (2018) in his study found that the prevalence of overweight and obesity was higher among adolescents who went to school in motor vehicles than among those who walked to school.

Muthuri et al., (2014) conducted a study in Kenya on Correlates of objectively measured overweight/obesity and physical activity in Kenyan school children and found out that increasing parental education, higher socio economic status and limited children physical activity engagement was associated with obesity. That is to say, children with parents with higher education and with higher social economic status had high chances of being obese. Higher parental body mass index was also associated with high chances of children being obese (Muthuri et al., 2014). It was also found out that in Kenya relatively a large number of children do not do physical exercises and they are accompanied to school with their parents on a daily basis in vehicles which made them become obese. Therefore obesity could also be

influenced by the nature of transport used to get to school. Gewa (2010) also stressed out that obesity among Kenyan children was associated with maternal overweight, higher maternal education and larger household size.

In Uganda, a study done by Turi et al. (2013) found out that higher social economic status of parents was associated with obesity and overweight among children. Also similar studies were done in Ethiopia and also found out the higher social economic status was associated with obesity/overweight (Mekonnen et al., 2018; Moges et al., 2018; Sorrie et al., 2017).

### **2.2.3 Institutional correlates of obesity among school going children.**

A growing body of research suggests that human behaviour is not only driven by deliberation (e.g., knowledge, attitudes, and beliefs) but can also be automatic, cued by environmental stimuli (Marteau et al., 2012). These environmental factors may be physical (e.g., physical structures and facilities), social (e.g., social support and social norms) or institutional (e.g., within school rules and policies). The fact that young people spend approximately half of their waking day at school, schools represent an important setting for promoting physical activity and reducing sedentary behaviour but can also be environments that can promote behaviour that increases the risk of obesity.

One of the institutional (school) characteristics that have been known to affect obesity includes institutional policies. Some studies have discussed the policies that limit physical activity during breaks. El Kabbaoui et al., (2018) in their study however found no statistically significant relation between the prevalence of overweight and obesity and practice of sports at school. Among Malaysian children, Wafa & Ghazalli, (2020) found that there was a lower risk of being overweight among children who attended schools that had physical activity routines before classes.

Heelan et al., (2015) implemented comprehensive school physical activity programs, school food environment, and supportive/promotional strategies at individual schools, and reported an absolute change in prevalence of obesity (BMI  $\geq$ 95th percentile) decreased from 16.4% to 13.9%, indicating a 15.2% relative change in prevalence of obesity in 6 years. The study also reported that there was an inverse relationship between the number of strategies implemented and prevalence of overweight and obesity over time. Ip et al., (2017) found a relationship between higher teachers' perceived physical activity benefits, school campus size, physical activity ethos at school, number of physical activity programs at school and physical activity facilities and obesity among the pupils. The findings also showed that students in schools with at least 3 physical activity-friendly environmental factors had a much lower risk of obesity than those without.

School lunch programs (SLP) have also been studied, for instance in Japan; the SLP in Japan has long been part of dietary education, designed to achieve children's sound development, convey an understanding of portion size and meal balance, and nationwide serve managed and uniform meals based on adequately regulated nutrition standards (Asakura & Sasaki, 2017). A Japanese study by Miyawaki et al., (2019) reported that a 10-percentage point increase in the school lunch coverage rate was associated with a 0.37 percentage point decrease in the overweight percentage and a 0.23 percentage point decrease in the obesity percentage, with statistical significance among boys. Ortega Hinojosa et al., (2018) reported that in addition to individual-level race and gender, what ranked as the most important model contributors to obesity were; fewer physical education (PE) and fully credentialed teachers, which were positively associated with obesity.

Globally, it is recommended for children to engage in physical activities and according to the global physical activity guideline, the exercises are supposed to last for an average of 60 minutes daily in order to improve on the health, fitness and body profile (World Health Organization, 2010). However, a study

done in Kenya found out that most of the schools did not meet the requirement of the global physical activity guidelines on physical exercises (Muthuri et al., 2014).

A study done in Uganda showed that lack of physical engagement in exercises in different schools have led to increase in weight/Obesity. Similarly, the findings also showed that provision of school buses that pick and take children to school and from school respectively was associated with high chances of obesity among children (J Baalwa et al., 2010a). Similar results have been published in Kenya showing that the increasing level of obesity among school going children is as a result of limited physical education in schools as many children also lack knowledge on physical exercises (Onywera et al., 2016).

### **2.3 Literature gap**

The literature cited in this chapter is evidence of the fact that many studies have been conducted all over the world to assess the prevalence and correlates of obesity among school going children. Despite that fact however, it is also evident that gaps in literature are also still apparent, especially when it comes to the intrapersonal correlates of obesity among school children, were intrapersonal characteristics tested have so far been skewed towards lifestyle and dietary habits, and not so much on the personal traits of demography for instance. Most importantly, very few studies have been conducted in Uganda, to assess the correlates of obesity among school going children at intrapersonal, institutional, or interpersonal level, despite being reported to have a substantial prevalence level of obesity in that population.

## CHAPTER THREE

### 3.1 Statement of the Problem

Obesity among school children, especially those that are private day primary school going has drastically increased by 2.5% point over the years all over the world (de Onis et al., 2010). The same is overtly true in Kampala city, where almost half of the private primary schools are found, although little evidence exists to that effect despite of the fact that anecdotal evidence that supports that postulation is enormous (provide reference). The Ministry of Health has for the past 10 years noted with concern, the rising prevalence of obesity by about 4.2% among school going children especially in urban areas like Kampala city (MOH 2019). In the year 2019, the public health threat posed by obesity among children that go to Kampala based private day primary schools made the ministry of health to establish its commitment to lower the prevalence of childhood obesity, by engaging parents of such children, to encourage them in getting physically active (Ampurire P, 2019). As another indicator of a possibility that childhood obesity is an apparent health burden among children in Kampala, it has been noted that the number of pediatric cardiovascular surgeries have increased at the Uganda Heart Institute from 10 in 2010 to 35 in 2015, all of which have been linked to obesity among school going children in Kampala (Aliku et al., (2017).

A study by Chebet et al. (2014) done in Kampala Uganda among primary school going children revealed that overweight and obesity was 32.3% and 21.7% respectively and it concluded that there is high level of obesity and overweight among school going children in Kampala. Obesity and overweight can lead to increased risk of many diseases and complications to children such as heart diseases (Kevin, 2013) and these can lead to death (CDC, 2022).

However, despite abounding evidence (Aliku et al., 2017; J. Baalwa et al., 2010b) pointing to the fact that obesity among school going children in Kampala is a reality, there is paucity information regarding the prevalence and correlates of obesity among private day primary school children in Kampala city, and what its correlates are. What is known about the correlates of obesity among children is by and large anecdotal and skewed towards only intrapersonal characteristics. Without the establishment of the prevalence and correlates of obesity among private day primary school going children in Kampala city, interventions meant to reverse and prevent obesity such as Home-based interventions with family involvement in Nutrition, physical activity (Narzisi & Simons, 2020) might not be effective, as they will not be based on evidence data which could make Uganda miss out on achieving target 3.4 of the health sustainable goal. Therefore, this study aimed at assessing the prevalence and correlates of obesity among school going children (9-12 years) attending private day primary schools in Kampala city.

### **3.2 Justification of the study**

The World Health Organization considers Childhood obesity to be one of the most serious public health challenges worldwide for the 21st century (WHO, 2020). Although previously underestimated in terms of potential effect on health and global development, childhood obesity is now recognized as a health condition that can have not only devastating effects of the health of persons across generations, but also on global development (WHO, 2020; Danquah et al., 2020). Research has therefore largely focused on preventive approaches to prevent childhood obesity, with great focus on primary school going children, especially those in private schools. Many governments now view primary schools as central to tackling the obesity crisis because they are an ideal setting in which to actively engage children and their families across the socioeconomic spectrum to improve diet and physical activity behaviour (Lloyd et al., 2018). That is in addition to the fact that they are daily convergent areas for above 500 million children worldwide (UNICEF, 2018).

However, a critical step towards addressing overweight and obesity among that demographic is a better understanding of the scope of the problem, and as well as its correlates Aryeetey et al., (2017), which in many countries including Uganda, has not been extensively done. What is evident is that although many in-country studies have been conducted regarding the issue of obesity Kabwama et al., (2018); Kirunda et al., (2015); Turi et al., (2013); Peltzer & Pengpid, (2011); Chebet et al., (2014); Baalwa et al., (2010), very few of them have dwelt on the prevalence and correlates of obesity among private primary school going children, despite evidence of higher prevalence among children in those settings (Singh et al., 2018; Mekonnen et al., 2018; Oinam J et al, 2019; Aryeetey et al., 2017; Gebrie et al., 2018; Elías-Boneta et al., 2015; Muthuri et al., 2014). Available studies have focused on the survey of overweight and obesity and the associated factors among adults Kirunda et al., (2015); Turi et al., (2013); adolescents Peltzer & Pengpid, (2011), and young adults (Baalwa et al., 2010).

### **3.3 Significance of the study**

This study has highlighted the prevalence of obesity among private primary school going children in Kampala district, a finding which will probably bring the health challenge of childhood obesity to the attention of school heads and proprietors, and possibly then stimulate them to act accordingly, in the direction of lending a hand in preventing the escalation of the epidemic. The same will also apply to the ministry of health, who despite of being already in the know of the existence of the problem may further appreciate its incidence in communities such as private day primary schools.

That will be because the study has highlighted the institutional characteristics that have both a positive and negative correlation with obesity prevalence, and in essence will enable the school heads to intervene appropriately, that is to minimize the effects of the negative correlates and maximize the effects of the positive correlates.

The findings of the study may also be of benefit to the parents of private primary school going children in Kampala district, as the findings have highlighted the intra-household characteristics (including parental attributes) that have a significant correlation with the incidence of obesity among their children. With those findings, parents with obese children will get to know which of their own characteristics or those of their households predisposed their children to obesity so that they get empowered to modify the negative intra-household correlates of obesity. Parents of private day primary school going children who are neither obese nor overweight will also be empowered to know which intra-household characteristics increase chances of obesity so that they can avoid them or modify them if already existent.

Being among the few studies that have tackled the aspect of prevalence and correlates among private day primary school going children in Kampala district, this study may be a trigger for further and similar research in other districts in Uganda. These study findings will be an addition to the source literature for similar studies.

### **3.4 Conceptual framework**

Figure 1 below shows all the variables that were included as explanatory or outcome, in this study. The study had three independent / explanatory variables, all of which were informed by the socio-ecological theory (Bronfenbrenner & Morris, 1998) and literature (Spinelli et al., 2019; Desalew et al., 2017; Do et al., 2015; Singh et al., 2018; Chaturvedi, 2019; El Kabbaoui et al., 2018; Reuter et al., 2018; Błaszczuk-Bębenek et al., 2019; Miyawaki et al., 2019; (Wafa & Ghazalli, 2020). The variables were intrapersonal, intra-household and institutional characteristics, all of which have their attributes listed in the figure. The dependent variable was obesity status, which was indicated by having a BMI percentile equal to or greater than the 95th percentile) (Obese) and having a BMI percentile that was less than the 95th percentile). Percentiles were used because recent analyses suggest that BMI SD scores (z scores) poorly reflect



adiposity among children and adolescents with severe obesity (Freedman et al., 2017; Flegal et al., 2009). The Centers for Disease Control and Prevention (CDC) recommend using a relative BMI measure to describe youth with severe obesity (Freedman et al., 2017). A new classification system recognizes BMI  $\geq 95$ th percentile as class I obesity, BMI  $\geq 120\%$  of the 95th percentile as class II obesity, and BMI  $\geq 140\%$  of the 95th percentile as class III obesity (CDC, 2020), and so that system was used to measure the dependent variable.

### **Independent variable**

#### **Intrapersonal correlates**

- Physical activity
- Fruit and vegetable consumption
- Snacking habits
- Number of meals/day
- Intake of fast food
- Form of transport used for going to

25

### **Independent variable**

#### **Institutional correlates**

- Availability of play time infrastructure
- Break periods for physical activity.
- Meal provision at school
- Number of meals provided at school.
- Availability of play area
- Sign of

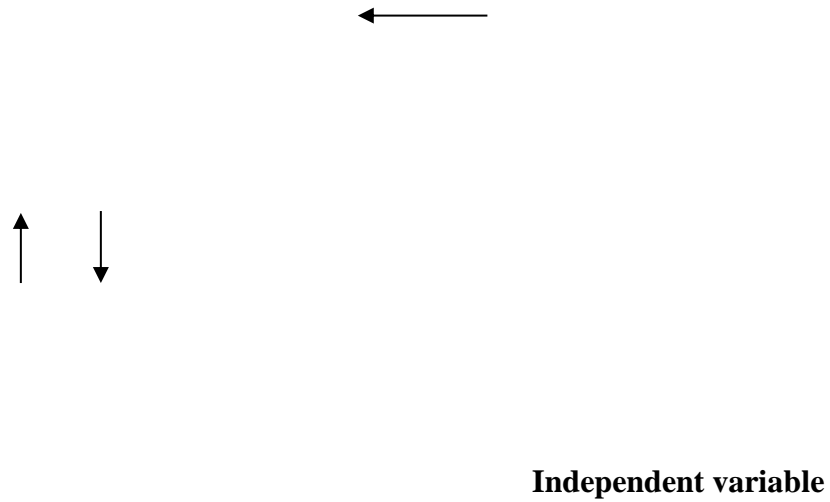


Figure 1: Conceptual framework adapted and modified from the socio ecological theory.

## CHAPTER FOUR

### 4.1 Objectives of the study

#### 4.1.1 General objective

To assess the prevalence and correlates of obesity among school going children (9-12 years) attending private day primary schools in Kampala city.

#### **4.1.2 Specific objectives**

1. To determine the prevalence of obesity among private day primary school going children (9-12 years) attending private day primary schools in Kampala city.
2. To determine the correlates of obesity among private day primary school going children (9-12 years) attending private day primary schools in Kampala city.

#### **4.1.3 Research questions**

1. What is the prevalence of obesity of school going children (9-12 years) attending private day primary schools in Kampala city?
2. What are the correlates of obesity among school going children (9-12 years) attending private day primary schools in Kampala city?

#### **4.2 Research Hypothesis**

1. There is a relationship between Intrapersonal correlates and obesity status among school going children
2. There is a relationship between intra-household correlates and obesity status among school going children
3. There is a relationship between institutional correlates and obesity status among school going children

## **CHAPTER FIVE: METHODS**

### **5.0 Introduction**

This chapter presents the description of the research process. It provides information concerning the methods that were used in undertaking this research as well as a justification for the use of each of the methods. The Chapter also describes the various stages of the research, which includes the study design, population, and selection of participants, sample size calculation, the data collection methods, data collection tools, quality control techniques, data management and data analysis, and ethical considerations. The Chapter ends with a discussion of the ethical considerations and a how the findings will be disseminated.

### **5.1 Study area**

The study was conducted in private day primary schools in Kampala city. Kampala city was chosen as a study district following evidence that most cases of pediatric non-communicable diseases, particularly childhood obesity diagnosed at hospitals within the city are among children that are residents therein (Health Facility records 2019, unpublished). The city is divided into five divisions, including Kampala Central, Kawempe, Makindye, Nakawa and Rubaga divisions. The city is home to about 229 private day primary schools Uganda Schools Guide, (2019), distributed across the five divisions that constitute it, with a primary school child population exceeding 250,000 pupils. The fact that the sampling frame of the schools was enormous, only a few schools were sampled per division. The schools were particularly two per division, making a total of ten schools (Table 1).

**Table 1: Schools that were study sites.**

<b>School</b>	<b>Division</b>	<b>Location</b>
City Parents	Kampala Central	Old Kampala Parish, Kampala Central Sub-county,
Lohana Primary School - Old Kampala	Kampala Central	Old Kampala Parish, Kampala Central Subcounty, Kampala District of Uganda.
Sir Apollo Kagwa Primary School - Mengo	Rubaga Division	Namirembe Parish, Rubaga Division Sub county
Cardinal Nsubuga Primary School	Rubaga Division	Rubaga Parish, Rubaga Division Subcounty, Kampala District of Uganda.
Bright Angels Junior School - Luzira	Nakawa division	Butabika Parish, Nakawa Subcounty, Kampala District of Uganda.
Bukoto Muslim Primary School I	Nakawa division	Bukoto ii Parish, Nakawa Subcounty, Kampala District Of Uganda. .
Erina Bright School	Makindye Division	Kibuye i Parish, Makindye Division Subcounty, Kampala District of Uganda.
Greenhill Junior Academy	Makindye Division	Kibuli Parish, Makindye Division Subcounty, Kampala District of Uganda.
Bright Angles Education Centre	Kawempe Division	Mulago iii Parish, Kawempe Division Subcounty, Kampala District of Uganda
Pic Hill Primary School	Kawempe Division	Kawempe i Parish, Kawempe Division Subcounty, Kampala District of Uganda.

## 5.2 Study design

This study adopted a school based cross-sectional study design to obtain data that could be used to answer the study objectives. With the cross-sectional study design, it was possible to describe the population of respondents with respect to their nutritional status, individual characteristics, and the characteristics of the environment in which they stay, and to analyze the relationship between them. Using the cross-sectional design was also of an advantage because it allowed for the study to be conducted at one point in time in which data was collected once from the sample of pupils, without need for follow up. A school-based approach was used because it was at a given school that a substantial pool of private day primary school going children could be obtained at one instance, with very minimal traversing.

### **5.3 Study population**

The study population was private day primary school going children in Kampala, who were between the ages of 9 – 12 years. This population was studied because, as earlier mentioned, children in private day primary schools have been reported to be at a higher risk of obesity Karki et al., (2019); Joshi & Kumar, (2019), and as well as those in the age bracket of 9 – 12 years. Also, there is scanty information on the prevalence and correlates of obesity among private day primary school going children in Kampala. It was therefore rationale to assess the prevalence and correlates of obesity in that population.

### **5.4 Selection criteria**

#### **5.4.1 Inclusion**

- The study included private day primary school going children aged 9 to 12 years sampled from private schools in Kampala Capital City and assented to participate.

#### **5.4.2 Exclusion**

- All those children aged 9 to 12 years of age who were ill.

### **5.5 Sample size calculation**

The formula for the sample size of this study was chosen based on two assumptions; one was the prevalence of obesity among private primary school going children was not known, and two, the population size was known. Therefore, it was possible to base the sampled size calculation on a formula that bases its estimation of return sample size on the consideration of both assumptions. One such formula is a formula by, (Charan & Biswas, 2013) stated as;  $n = N * X / (X + N - 1)$ , where;

$X = Z_{\alpha/2} * p * (1-p) / MOE^2$ ,  $Z_{\alpha/2}$  is the critical value of the normal distribution at  $\alpha/2$  (e.g., for a confidence level of 95%,  $\alpha$  is 0.05 and the critical value is 1.96), MOE is the margin of error,  $p$  is the sample proportion, and,

$N$  is the population size (139, 812 pupils) (Uganda Schools Guide, 2019).

Sample size for this study was calculated from a sample proportion of overweight or obesity of 50% among private day primary school going children (Unknown,  $P$ ), with 95% confidence intervals (CIs) and a margin error of 0.05. The sample proportion was assumed to be 0.50, which gave the maximum possible sample size required. With that, the sample size was calculated as follows.

$$n = N * X / (X + N - 1),$$

$$n = 139,812 * 0.50 / (0.50 + 139,812 - 1)$$

$$n = 139812 * 0.50 / (140195)$$

$$n = 383 \text{ Pupils}$$

## 5.6 Sampling procedures

The sampling procedures for this study took a multistage approach, in which sampling was done at three stages, that is at division level, at school level, and then at pupil level. As earlier mentioned, Kampala district is home to 229 private primary schools distributed across the five divisions that make it up. Therefore, it was infeasible to practically sample an ideal number of schools that could be considered representative of that school population, which would have 50% (115 schools). Simple random sampling technique, using ballot papers was used to sample a cross section of schools per division of the city. That cross section was of two schools per division, making it a total of 10 schools that were sampled. Two

schools from each division were selected so as to get a representative sample from each of the divisions and to also avoid selection biasness. The sampling process to that effect was commenced by obtaining a digital list of all private primary schools in Uganda, (Uganda Schools Guide, 2019). On this list, the private primary schools in Kampala city were filtered out electronically, and a list of only such schools was made. A second filter of private primary schools per division of Kampala was then generated, which was then followed by the conduction of a simple random sampling procedure to sample the two schools per division.

The names of all schools in a particular division were printed, and the names of the imprints cutout, following which they were folded and put in a box. They were ruffled, shuffled and then one paper picked, and then ruffled again, and another piece of paper picked, to represent the two schools. The papers were unfolded and then the names they bore were taken as the schools that were sampled per division. The same procedure was done for all the remaining four divisions until the remaining 8 schools had been sampled.

In each of the sampled schools, necessary permissions were sought, and offices of the secretaries of the respective schools reached, then access to the pupil enrollment data was requested. Given that all the schools sampled were maintaining a spreadsheet of the pupils in school, the generated lists of pupils who were between 9 to 12 years were obtained. These were generated using filter functions, and after doing so, the next stage of sampling pupils was embarked on.

At this stage, systematic random sampling technique was used. The method involved determining a sampling interval for each school as shown in table 1.

The sampling interval for each school was calculated using the formula;  $K = N/ n$



Where;

K = Interval

N = Population size = number of eligible pupils available per school (9 – 12 years)

n = sample size = 387

On the list of pupils generated, the first name was selected from the first names of the interval using simple random sampling, by use of ballot papers as a starting point, and then the interval was skipped, with the subsequent name being taken, until the number required per school was selected on the list. The number of pupils that was required per school was determined using a formula for probability proportionate to size according to population size; the formula is given by;

$$N = N1 / N2 \times n$$

Where;

N = Number of pupils required from a given school

N1 = Number of eligible pupils available in each school

N2 = Total number of eligible pupils in the sampled schools

n = Sample size of the study

**Table 2: Number of pupils that were required from each of the sampled schools.**

School	N 1	N2	n	N
City Parents	887	7369	387	47
Lohana Primary School - Old Kampala	320	7369	387	17
Sir Apollo Kaggwa Primary School - Mengo	1270	7369	387	67
Cardinal Nsubuga Primary School	701	7369	387	37
Bright Angels Junior School - Luzira	780	7369	387	41
Bukoto Muslim Primary School I	540	7369	387	28
Erina Bright School	570	7369	387	30
Greenhill Junior Academy	890	7369	387	47
Bright Angles Education Centre	540	7369	387	28
Pic Hill Primary School	871	7369	387	46

The selected pupils were traced within their respective classrooms, with the help of a designated teacher. Once a given pupil was not present, the next pupil was ticked on the list, still observing the interval, and then traced, taken through the ascent process, and interviewed.

### **5.7 Study variables**

Table 4 below shows each of the variables that were included in the study, including the attributes and/or indicators for each of them. It is shown that the study had three independent variables (intrapersonal, household, and institutional characteristics), and one dependent variable (Childhood obesity). The dependent variable had both nominal and ordinal type variables, while the independent variables also had nominal and ordinal type variables in their indicators. Data generated in the dependent variable was analyzed using only descriptive statistics, while that from the independent variables was analyzed using, descriptive, binomial logistic regression (Bivariate) and binomial logistic regression (Multivariate) statistics.

**Table 3: Study variable description**

<b>Variable</b>	<b>Indicators</b>	<b>Type of variables</b>	<b>Analysis plan</b>
<b>Dependent</b>			
<b>Obesity status</b>	Obese Equal to or greater than the 95th percentile) (Obese) Not obese Less than the 95th percentile)	Nominal variable Ordinal	Descriptive only
<b>Independent 1</b>			
<b>Intrapersonal correlates</b>	Physical activity Fruit and vegetable consumption Snacking habits Number of meals/days Form of transport used for going to school. Sport activity Number minutes at sport activity Extra home activity Computer game\mobile game Time at computer\mobile game Time at television/day	Categorical Ordinal	Descriptive Binomial logistic regression (Bivariate) Binomial logistic regression (Multivariate)
<b>Independent 2</b>			
<b>Intra-household correlates</b>	Parents stayed with Weight status of father Weight status of mother Restrictions on Television watching Video games availability Engagement in home chores Education level of mother Education level of father Have meals with parents concurrently. Mode of transport to school	Categorical Ordinal	Descriptive Binomial logistic regression (Bivariate) Binomial logistic regression (Multivariate)
<b>Independent 2</b>			
<b>Institutional correlates</b>	Availability of play time infrastructure Break periods for physical activity. Meal provision at school	Categorical	Descriptive

	Number of meals provided at school. Availability of play area Size of play area Physical education part of syllabus Teacher attitude towards physical activity Designated sports time at school	Ordinal	Binomial logistic regression (Bivariate)  Binomial logistic regression (Multivariate)
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**5.8 Data collection methods**

This study used two data collection methods: structured interviews and anthropometry measurements to answer the two study objectives.

**Objective one: To determine the prevalence of obesity among private day primary school going children (9-12 years) in Kampala city – central Uganda.**

Anthropometry assessments were done to obtain data that could answer objective one. This data included the weights and heights of the pupils, which were later used to compute each of their BMI percentiles. According to the standardized procedures stipulated by the Food and Nutrition Technical Assistance (FANTA) ‘Anthropometric Indicators Measurement Guide Cogill, (2003), height was measured to the nearest 0.1 cm in standing position with the occipital, shoulder and the buttock touching the vertical stand using a stadiometer secca (Germany). Weight was measured to the nearest 0.1 kg using electronic weighing scale with wearing light clothes and with no shoes and head gear. The Percentile values for BMI-for-age (BAZ) of children were generated from the CDC BMI Percentile Calculator for Child and Teen (CDC, 2018).

**Objective Two: To identify the correlates of obesity among private day primary school going children (9-12 years) in Kampala city – central Uganda.**

Data was collected using structured interviews, which involved asking respondents a series of pre-determined response format questions as the main data collection method. Using these interviews, there was direct control over the flow of primary data collection process and a chance to clarify certain issues during the process when need arose. Most importantly, since structured interviews collect close ended responses, the data collected by them could be easily quantified, which was an advantage in this study since all the two study objectives required quantitative data to be answered.

### **5.9 Data collection tools**

The study used three data collection tools to capture the data that had been collected using the methods described in the previous section. A structured questionnaire was used to capture the data that had been collected using structured interviews, which was interviewer administered. The instructions in the structured questionnaire were made quite simple, clear, and concisely written. The sections in the tool were constructed in such a way to answer the research question and the questions were also constructed to obtain honest answers and details from respondents. The structured questionnaire was employed in this study also because of its simplicity and probability to obtain relevant information within a short span of time. In designing the questionnaire, several questions were adapted from the WHO stepwise questionnaire for Chronic Disease Risk Factor Surveillance (Cogill, 2003). Anthropometric measurements were done by trained data collectors using standard procedures and calibrated equipment that included a stadiometer, and a weight scale.

### **5.10 Quality control**

This study employed a set of four quality control techniques in its quest to ensure that valid and reliable data was obtained. The techniques included research assistants training, pretesting of the study tools, field editing, questionnaire validity testing, and reliability testing.

### **5.10.1 Research assistant training**

This study was conducted in 10 schools across the divisions of Kampala city, which required to use some data collection assistants to cover more ground. In addition, the study was conducted during a period of time when the normal school term was running, and so there was need to sample a school, and conduct interviews in the shortest time possible so as not to antagonize the normal school program in any way. To do, therefore, assistants were also needed, so that the required pupils per school could be interviewed in a short time. Thus, three research assistants were recruited for the above-mentioned purpose. They were three graduates of both genders with prior experience in survey data collection. Regardless of their prior experience however, they were still trained for 3 days and taken through orientation training so to acquaint them with the study at hand. The training included a session in which the assistants were first and foremost told what the topic at hand was, a background of the study, the specific objectives, and the methods that were to be used in executing the study, especially the sampling procedures, and the data collection techniques. Assistants were taken through the entire questionnaire, after which role plays were organized in which simulated interview sessions were held by the assistants to ascertain their readiness for the main study.

### **5.10.2 Pretesting**

Pretesting of the study was done among a section of 38 pupils meeting the inclusion criteria of children aged 9 to 12 years, in two private day primary schools, in Kampala city. A sample of 38 people were preferred because its ample for better results and also selecting a small sample below 30 may fail to uncover the common problems (Perneger et al., 2015). The two schools were Kawempe Junior School and Kampala Quality primary school. To ensure that the pre-test exercise yielded data and experience that could precisely inform the main study, the same sampling procedures, and data collection methods, that were to be used in the main study, were used during the pre-test. The errors that were found in the

questionnaire were corrected and other questions not well stated were paraphrased. To access the pre-test sample of pupils in those schools, the pre-test was conducted after permission from KCCA had been sought. Questionnaire pretesting enabled the researcher to identify inappropriate terms in question wording, inappropriate order, and other errors in the questionnaires and these were corrected.

### 5.10.3 Reliability of the Instrument

In this study, tool reliability was assessed using the internal consistency approach. In this study, the Cronbach’s alpha statistics was used to check for internal consistency, and the acceptable value for a reliable construct was 0.7 (Gliem & Gliem, 2003). This was analyzed using the scale statistical tool in SPSS version 23, in which data from the 38 pre-test questionnaires was used. The alpha obtained was 0.75, meaning that the tool was reliable.

### 5.10.4 Content Validity

The content validity is the degree to which the content of the items adequately represents the universe of all relevant items under study (Olshansky et al., 2012). The questionnaire was subjected to a panel of four experts for their evaluation. The panel in this case consisted of both practitioners and academicians all of whom had experience in nutritional status dynamics and data analysis. These experts were given the study objectives and a rating scale as follows; (4) Very relevant, (3) quite relevant, (2) somewhat relevant and (1) not relevant. Validity as determined using Content Validity Index (C.V.I), was computed as indicated in table 5

**Table 4: Content Validity testing results**

<b>Expert number</b>	<b>Number of items rated as 3 or 4</b>
<b>1</b>	41
<b>2</b>	42

<b>3</b>	40
<b>4</b>	41
Average number of items rated 3 or 4 = $41+42+40+41=164/4=41$	

Therefore, the CVI =  $41/43 = 0.953$  meaning the tool was valid

### **5.11 Measurement of variables**

Measurement of nutritional status was done using BMI percentiles embedded in the Centres for Disease Control and Prevention BMI Calculator for Child and Teens (CDC, 2018). Body Mass Index percentiles were used instead of BMI z score because it has recently been established that as the prevalence of pediatric severe obesity continues to increase, BMI z-scores are increasingly proving less reliable data in certain circumstances and in many cases can be misleading (Woo & Cole, 2017; Freedman et al., 2017; Kelly & Daniels, 2017). Therefore, for accuracy, BMI percentiles were used in this study, to find out which child was obese and which child was not. After taking the height and weight measurements of each child, and establishing their age, all the three indices were entered into the CDC BMI percentile calculator and the percentiles computed. The following scale was used to categories the percentiles; Less than the 5th percentile (Underweight), 5th percentile up to the 85th percentile (Normal weight), 85th to less than 95th percentile (Overweight), and equal to or greater than the 95th percentile) (Obese).

### **5.12 Data management and analysis**

#### **5.12.1 Data management**

All questionnaires were collected from the research assistants and consolidated for final perusal, with an aim of looking out for any response indication errors, omissions and/or commissions that might have happened during data collection. During this process, no such errors were noticed, and so, the next step was to enter the data into the variable view screen of SPSS version 23. Each of the variable labels was



entered and given their appropriate values during coding. After entry, the code screen was looked through, cell by cell, to find out if there had been any code entry errors. Two entry errors were noticed, and corrected, following which the data analysis process commenced.

### **5.12.2 Data analysis**

Data analysis was performed using SPSS 23.0 for Windows software (IBM, USA), and the first level of analysis that was done was the univariate analysis, in which descriptive statistics were run for each of the variables in all the three objectives that had been included in the study scope.

**Objective one: To determine the prevalence of obesity among private day primary school going children (9-12 years) in Kampala city.**

The analysis for the first objective involved analysis of frequencies and percentages (valid) for each of the variables; that was the final level of analysis for that objective given that the aim was to determine the prevalence of childhood obesity, which was descriptive. That implied that only univariate analysis had to be done for the first objective.

**Objective Two: To identify the correlates of obesity among private day primary school going children (9-12 years) in Kampala city.**

For this objective, descriptive analysis was also first done for all the variables (intrapersonal, institutional and intra-household), following which inferential analysis was also done. Relationship analysis between the independent variables (intrapersonal, intra-household and institutional characteristics) and the dependent variable (obesity) was conducted. This was done using the logistic regression model; given that the outcome was less than 10%, and so could be analyzed using odds ratios and 95% confidence

intervals (CIs), which were calculated to measure the strength of associations, of which significance was set at 5% alpha (0.05).

To elucidate the relations among several variables and find out which of them correlated with obesity among the private day primary school going children, a multivariate analysis was conducted using logistic regression. Consideration was given to variables that were found to be significant at bivariate analysis, the level of significance was set at  $P < 0.05$  and adjustment for confounders was done for each variable to obtain adjusted odds ratios.

### **5.13 Ethical considerations**

#### **Approval and permissions**

Before rolling out this study in Kampala city, approval was first sought from Makerere University Higher Degrees Research and Ethics Committee, which issued an introductory letter (Appendix D), addressed to the Directorate of education and social services, Kampala Capital City Authority. The researcher sought permission from the education directorate of Kampala Capital City Authority, who then gave humble instructions to the respective head teachers at the private day primary schools in the city to provide all necessary assistance. That letter was provided to each of the heads of schools that were sampled, and they were requested to allow the team to access the required pupils.

#### **Informed consent**

The fact that the study population in its entirety was below 18 years meant that none of them could legally consent to participate in this study, so it was the school administration representative (head teacher) who was taken through the main consenting process, so that they could consent on behalf of the pupils. Head teachers before consenting, they sent letters to parents requesting to allow their children to participate

which they did through writing to head teachers accepting their children to participate. Parents who were unable to write accepted their children to participate verbally and children informed the head teachers. The consenting process included informing the heads teachers about the objectives of the study, and its purpose, the procedures of the study, the benefits of them being participants, the risks involved in participating, the issues of confidentiality, voluntary participation, and privacy and how they were to be upheld. After all that, head teachers consented on behalf of pupils to participate in the study. At this point they were requested to append their signatures on the consent forms or thumb prints as confirmation and evidence of permitting their pupils to participate in the study (APPENDIX A). Each individual pupil sampled was briefed about the study using an assent form (Appendix B) and made a verbal assent to participate in the study.

### **Confidentiality and anonymity**

Confidentiality and anonymity of the participant interviews was maintained throughout the study to ensure that comments cannot be traced back to any of the participants. Even during reporting, the researcher further concealed the participants' personal details where necessary, without distorting the important elements of the data, to ensure that participants could not be identified from their responses quoted in the presentation of the findings. The identifying information of the Participants was removed from the data as soon as it was no longer necessary. The questionnaires were kept under lock for security purposes. The head teachers and the pupils were also assured that the questionnaires were labeled anonymously, using numbers and not their names.

### **Privacy**

Although the interviews were conducted within school premises, care was taken to ensure that the interviews were done in a private place (private place in school compound) within the premises of the

sampled schools where no third party was able to tap into the interview information or the responses of the respondent. Each of the sampled pupils was escorted out of their classrooms, to a designated area in the school compound where the interviews were privately conducted.

### **Right to withdraw**

The heads of the schools who consented on behalf of the pupils, and the pupils as well were informed about the voluntary nature of this study, and the fact that they had the liberty to withdraw from participating in the study at any stage if they so wished, without being prejudiced or without any consequences whatsoever.

### **5.14 Dissemination plan**

At study completion, the researcher plans to disseminate the findings to numerous platforms, including the university, the directorate of education at Kampala Capital City Authority, and the respective heads of schools that were sampled. There is also a plan to prepare a copy for online publication in appropriate journals.

## **CHAPTER SIX: RESULTS**

### **6.0 Introduction**

This chapter presents the study findings. It has been arranged according to the specific objectives of the study and results presented in form of figures and tables, with a narrative in words.

## 6.1 Pupil Socio-demographics

The findings in table 6 indicate the socio demographic profiles of the pupils who participated in this study.

**Table 5: Socio demographic characteristics of the pupils (Gender, age and class of study)**

Variable	Attribute	Frequency	%
<b>Gender</b>	Male	173	45.2
	Female	210	54.8
<b>Age</b>	Nine	31	8.1
	Ten	123	32.1
	Eleven	145	37.9
	Twelve	84	21.9
<b>Class of study</b>	Primary three	28	7.3
	Primary four	102	26.6
	Primary Five	128	33.4
	Primary six	107	27.9
	Primary seven	18	4.7

More than half of them were female 54.8% (210/383). More than a third of the pupils who were interviewed were eleven years old 37.9% (145/383), and a third of the participants were in primary five 33.4% (128/383).

## 6.2 Prevalence of obesity

The results presented in Table 7 shows the nutritional status of the private primary school going children from the schools that were included in the study.

**Table 6: Nutritional status assessment of the private primary school going children.**

Variable	Attribute/ Percentile	Frequency	%
<b>Nutrition Status</b>	Less than the 5th percentile (Underweight)	22	5.7

5th percentile up to the 85th percentile (Normal weight)	302	78.9
85th to less than 95th percentile (Overweight)	41	10.7
Equal to or greater than the 95th percentile (Obese)*	18	4.7
<b>Total</b>	<b>383</b>	<b>100.0</b>

After taking the height and weight measurements of each pupil that was sampled, and calculating the BMI percentiles for each, it was found that more than three quarters of them had BMI percentiles that were between the 5th and 85th percentile and so had Normal weight 78.9% (302/383). A tenth of the pupils had BMIs between the 85th and 95th percentile (Overweight) 10.7% (41/383). One seventeenth of the pupils had BMI percentiles that were less than the 5th percentile and so were Underweight 5.7% (22/383), while the least proportion was obese 4.7% (18/383).

The findings showed that the prevalence of obesity among private day primary school going children (9-12 years) in Kampala city was 4.7% (18).

### 6.3 Socio-demographic characteristics of private day primary school going children

The findings in table 7 indicate that more than half of participants were females 54.8% (210/383). More than a third of the pupils who were interviewed were eleven years old 37.9% (145/383), and a third of the participants were in primary five 33.4% (128/383). Only age was associated with the prevalence of obesity.

**Table 7: Distribution of Pupils' nutrition status by demographic characteristics.**

Variable	N	%	Status		cOR (95% at CI)	P value
			Obese [n = 14]	Not obese [n = 369]		

<b>Gender</b>						
Female	173	45.2	9(5.2%)	164(94.8%)	0.71 (0.27 - 1.90)	0.50
Male	210	54.8	9(4.3%)	201(95.7%)	1.000	
<b>Age</b>						
Nine	31	8.1	6(19.4%)	25(80.6%)	6.48 (1.51 -27.81)	0.01*
Ten	123	32.1	3(2.4%)	120(97.6%)	0.68 (0.13 - 3.43)	0.64
Eleven	145	37.9	6(4.1%)	139(95.9%)	1.17 (0.28 -4.79)	0.83
Twelve	84	21.9	3(3.6%)	81(96.4%)	1.00	
<b>Class belonged to</b>						
Primary three	28	7.3	0(0.0%)	28(100.0%)	0.06 (1.01 - 5.44)	0.06
Primary four	102	26.6	4(3.9%)	98(96.1%)	0.69 (0.07 - 6.59)	0.75
Primary Five	128	33.4	7(5.5%)	121(94.5%)	0.98 (0.11 - 8.49)	0.99
Primary six	107	27.9	6(5.6%)	101(94.4%)	1.01 (0.11 - 8.92)	0.99
Primary seven	18	4.7	1(5.6%)	17(94.4%)	1.00	

## 6.4 Correlates of obesity among private day primary school going children.

### 6.4.1 Intra-personal correlates of obesity among private day primary school going children.

The findings in table 9 below show that three intra-personal variables were associated with obesity, they were; engagement in any form of physical activity, playing of computer game/mobile games and snacking frequency.

**Table 8: Intra-personal correlates of obesity among private day primary school going children.**

Intra-personal variable	n (%)	Obesity Status		cOR (95% at CI)	P value
		Obese [n = 14]	Not obese [n = 369]		
<b>Engagement in any form of physical activity</b>					
Yes	125 (32.6%)	8(6.4%)	117(93.6%)	0.368(0.1420.95)	0.040*
No	258 (67.4 %)	10(3.9%)	248(96.1%)	1.000	
<b>Form of physical activity usually engage in</b>					
Foot ball	13(10.4 %)	0(0.0%)	13(100.0%)	1.21 (0.34 -2.12)	0.09
Playing with Swings and seesaws	28 (22.4)	1(3.6%)	27(96.4%)	0.24 (0.03 -2.22)	0.21
Riding bike	46 (36.8 %)	6(13.0%)	40(87.0%)	0.99 (0.28 -3.54)	0.99

Running around	38(30.4 %)	5(13.2%)	33(86.8%)	1.00	
<b>Duration of sport activities at home or at school</b>					
Less than 30 minutes	42 (28.2 %)	1(2.4%)	41(97.6%)	0.19 (0.02 - 1.53)	0.12
More than 30 minutes	107(71.8 %)	12(11.2%)	95(88.8%)	1.00	
<b>Eats fruits and vegetables</b>					
Yes	213 (55.6 %)	13(6.1%)	200(93.9%)	0.61 (0.22 - 1.66)	0.34
No	170 (44.4%)	5(2.9%)	165(97.1%)	1.00	
<b>Frequency of eating fruits</b>					
Always (Daily)	49 (12.8 %)	2(4.1%)	47(95.9%)	0.50 (0.04 - 5.70)	0.58
Sometimes	286 (74.7 %)	15(5.2%)	271(94.8%)	0.38(0.05 - 2.98)	0.36
Rarely	48 (12.5 %)	1(2.1%)	47(97.9%)	1.00	
<b>Has snacks between main meals</b>					
Yes	241 (62.9 %)	11(4.6%)	230(95.4%)	0.640 (0.22- 1.84)	0.40
No	142 (37.1 %)	7(4.9%)	135(95.1%)	1.00	
<b>Frequency of snacking</b>					
Always (Daily)	142(58.9%)	14(9.9%)	128(90.1%)	10.37(1.35- 19.51)	0.02*
Sometimes	95 (39.4%)	1(1.1%)	94(98.9%)	2.27(1.48 - 10.74)	0.03*
Rarely	4 (1.7%)	0(0.0%)	4(100.0%)	1.00	
<b>Form of snacks usually had</b>					
Fried treats (e.g Crisps, pancakes, samosas)	72 (29.9%)	3(4.2%)	69(95.8%)	0.34(0.04 - 3.14)	0.34
Confectionery (Sweets, chocolate)	118(49.0%)	10(8.5%)	108(91.5%)	0.22 (0.03 - 1.73)	0.15
Baked snacks (e.g cakes, bread)	51(21.2%)	2(3.9%)	49(96.1%)	1.00	
<b>Meal frequency at school</b>					
One	135(35.2%)	10(7.4%)	125(92.6%)	0.52 (0.162-1.67)	0.27
Two	165(43.1%)	4(2.4%)	161(97.6%)	4.13(0.74 - 23.01)	0.11
Three	83(21.7%)	4(4.8%)	79(95.2%)	1.00	
<b>Have enough sleep at night</b>					
Yes	99(25.8%)	4(4.0%)	95(96.0%)	0.68(0.25 - 1.87)	0.46
No	284(74.2%)	14(4.9%)	270(95.1%)	1.00	
<b>Form of transport use for going to school, usually</b>					
Walk to school	54(14.1%)	2(3.7%)	52(96.3%)	0.85(0.15 - 4.76)	0.85
Driven to school	202(52.7%)	12(5.9%)	190(94.1%)	0.52(0.162 - 1.63)	0.26
Ridden to school	127(33.2%)	4(3.1%)	123(96.9%)	1.00	



<b>Plays computer game\mobile games</b>					
Yes	216(56.4%)	5(2.3%)	211(97.7%)	3.56(1.24 - 10.20)	0.02*
No	167(43.6%)	13(7.8%)	154(92.2%)	1.00	
<b>Frequency of playing computer games</b>					
Always	63(29.2%)	8(12.7%)	55(87.3%)	2.33(0.27 - 20.02)	0.44
Sometimes	136(63.0%)	6(4.4%)	130(95.6%)	0.74(0.08 - 6.53)	0.79
Rarely	17(7.9%)	1(5.9%)	16(94.1%)	1.00	
<b>Duration of playing computer\mobile games per sitting</b>					
Less than 5-hour minutes	129(59.7%)	7(5.4%)	122(94.6%)	0.57(0.19 - 1.62)	0.29
More than 5 hours	87(40.3%)	8(9.2%)	79(90.8%)	1.00	
<b>Duration of watching television a day per sitting</b>					
Less than 5-hour minutes	221(57.7%)	9(4.1%)	212(95.9%)	0.72(0.68 - 4.54)	0.25
More than 5 hours	162(42.3%)	9(5.6%)	153(94.4%)	1.00	

### 6.3.2: Intra-household correlates associated with obesity among private day primary school going children.

The findings in table 10 show the relationship between intra-household variables and obesity.

**Table 9: Intra-household correlates associated with obesity**

Intra-household Variable	n (%)	Obesity status		cOR (95% at CI)	P value
		Obese [n = 14]	Not obese [n = 369]		
<b>Stay with both parents</b>					
Yes	327(85.4%)	16(4.9%)	311(95.1%)	0.72(0.16 - 3.22)	0.67
No	56(14.6%)	2(3.6%)	54(96.4%)	1.00	
<b>Parent stayed with if not both</b>					
Mother only	35(62.5%)	4(11.4%)	31(88.6%)	4.77(1.22- 18.65)	0.03*
Father only	21(37.5%)	7(33.3%)	14(66.7%)	1.00	

<b>Weight status of father</b>					
He is visibly fat	29(7.6%)	0(0.0%)	29(100.0%)	3.48(0.05 - 27.29)	0.58
He is not visibly fat	354(92.4%)	18(5.1%)	336(94.9%)	1.00	
<b>Weight status of mother</b>					
She is visibly fat	40(10.4%)	4(10.0%)	36(90.0%)	2.61(0.82 - 8.36)	0.11
She is not visibly fat	343(89.6%)	14(4.1%)	329(95.9%)	1.00	
<b>Parents put restrictions on television watching</b>					
Yes	114(29.8%)	8(7.0%)	106(93.0%)	1.94(0.75 - 5.09)	0.17
No	269(70.2%)	10(3.7%)	259(96.3%)	1.00	
<b>Have video games at home</b>					
Yes	123(32.1%)	8(6.5%)	115(93.5%)	0.732(0.28 - 1.94)	0.53
No	260(67.9%)	10(3.8%)	250(96.2%)	1.00	
<b>Parents encourage participation in physical activity at home</b>					
Yes	113(29.5%)	10(8.8%)	103(91.2%)	<b>0.19</b> (0.07 - .52)	0.001*
No	270(70.5%)	8(3.0%)	262(97.0%)	1.00	
<b>Engage in home chores</b>					
Yes	308(80.4%)	14(4.5%)	294(95.5%)	1.62 (0.56 - 4.69)	0.37
No	75(19.6%)	4(5.3%)	71(94.7%)	1.00	
<b>Mother educated</b>					
Yes	324(84.6%)	18(5.6%)	306(94.4%)	0.88 (0.19 - 4.03)	0.86
No	59(15.4%)	0(0.0%)	59(100.0%)	1.000	
<b>Father educated</b>					
Yes	331(86.4%)	17(5.1%)	314(94.9%)	0.79 (0.18 - 3.53)	0.76
No	52(13.6%)	1(1.9%)	51(98.1%)	1.00	
<b>Have meals with parents at the same time</b>					
Yes	174(45.4%)	5(2.9%)	169(97.1%)	2.24 (0.78 - 6.42)	0.13
No	209(54.6%)	13(6.2%)	196(93.8%)	1.000	
<b>Person responsible for daily food consumption habits at home</b>					
Mother only	257(67.1%)	13(5.1%)	244(94.9%)	2.02 (0.06- 72.02)	0.70
Father only	40(10.4%)	3(7.5%)	37(92.5%)	1.36 (0.06 - 29.12)	0.85
Both mother and father	55(14.4%)	2(3.6%)	53(96.4%)	0.05 (0.002 - 1.43)	0.08
Other household members	31(8.1%)	0(0.0%)	31(100.0%)	1.00	

Two Intra-household characteristics were found to have a positive association with obesity among the pupils sampled and these were; the parent stayed with if not both parents and parental encouragement to participate in physical activity while at home.

### 6.3.3 Institutional correlates associated with obesity among private day primary school going children.

Table 10 shows the results from the measure of relationship between institutional correlates and childhood obesity among private school going children. The table shows the influence of school infrastructure equipment for play time, provision of meals to pupils, availability of play field area, size of play field area, physical education, time schools dedicate to sports and their influence on childhood obesity. None of the Institutional characteristics was found to be associated with obesity among private day primary school going children (Unadjusted) (Table 10).

**Table 10: Institutional correlates associated with childhood obesity (Unadjusted).**

Institutional variable	n (%)	Obesity status		cOR (95% at CI)	P Value
		Obese [n = 14]	Not obese [n = 369]		
<b>School has infrastructure or equipment for play time</b>					
Yes	220(57.4%)	10(4.5%)	210(95.5%)	1.08 (0.42 - 2.81)	0.87
No	163(42.6%)	8(4.9%)	155(95.1%)	1.00	
<b>School provides meals for pupils</b>					
Yes	340(88.8%)	15(4.4%)	325(95.6%)	2.39 (0.75 - 7.62)	0.14
No	43(11.2%)	3(7.0%)	40(93.0%)	1.00	
<b>Meals does it provide</b>					
Breakfast only	92(27.1%)	4(4.3%)	88(95.7%)	0.29 (0.02 - 3.92)	0.37
Breakfast, and lunch	158(46.5%)	9(5.7%)	149(94.3%)	0.53 (0.05 - 5.89)	0.60
Lunch only	71(20.9%)	3(4.2%)	68(95.8%)	0.83 (0.04 - 16.72)	0.90

Breakfast, lunch, and snacks	19(5.6%)	0(.0%)	19(100.0%)	1.00	
<b>School has a play designated play area for pupils</b>					
Yes	375(97.9%)	18(4.8%)	357(95.2%)	0.42 (0.04 - 12.23)	0.49
No	8(2.1%)	0(.0%)	8(100.0%)	1.00	
<b>Size of the play area</b>					
It is large enough to accommodate all pupils	280(74.7%)	15(5.4%)	265(94.6%)	0.84 (0.27 - 2.60)	0.76
It is small, cannot accommodate all pupils	95(25.3%)	3(3.2%)	92(96.8%)	1.00	
<b>Taught about physical education in school</b>					
Yes	286(74.7%)	12(4.2%)	274(95.8%)	1.51 (0.55 - 4.13)	0.43
No	97(25.3%)	6(6.2%)	91(93.8%)	1.00	
<b>Teachers are interested in physical education and activity for pupils</b>					
Yes	222(58.0%)	12(5.4%)	210(94.6%)	0.68 (0.25 - 1.85)	0.45
No	161(42.0%)	6(3.7%)	155(96.3%)	1.00	
<b>School has designated sports time for pupils</b>					
Yes	327(85.4%)	15(4.6%)	312(95.4%)	1.72 (0.55 - 5.43)	0.36
No	56(14.6%)	3(5.4%)	53(94.6%)	1.00	

### 6.3.4 Correlates associated with obesity among private day primary school going children

The findings in table 11 showed that private day primary school going children who always snacked were 9 times more likely to be obese compared to those who rarely snacked. Children who reported that they played computer game/mobile games were 3.6 times more likely to be obese compared to those who reported not playing computer games. Children whose parents encouraged to participate in physical activity at home were 69.5% less likely to be obese compared to those whose parents did not encourage to participate in physical activity.

**Table 11: Correlates associated with childhood obesity.**

Variable	cOR (CI at 95%)	P Value	aOR (CI at 95%)	P value
<b>Engage in any form of physical activity, at school or at home</b>				
Yes	0.37 (0.14 - 0.96)	0.04*	2.53 (0.93 - 6.87)	0.07
No	1.00		1.00	
<b>Frequency of snacking</b>				
Always (Daily)	10.370 (1.35 - 19.51)	0.02*	9.26 (2.19 - 19.15)	0.03*
Sometimes	2.27 (1.48 - 10.74)	0.03*	1.98 (1.31 - 7.81)	0.04*
Rarely	1.00		1.00	
<b>Play computer game/mobile games</b>				
Yes	3.562 (1.244 - 10.201)	0.02*	3.65 (1.20 - 11.11)	0.02*
No	1.000		1.00	
<b>Age</b>				
Nine	6.48 (1.51 - 27.81)	0.01*	0.19 (1.04 - 0.85)	0.06
Ten	0.68 (0.13 - 3.43)	0.64	1.53 (0.29 - 7.92)	0.61
Eleven	1.16 (0.28 - 4.79)	0.83	0.86 (0.21 - 3.54)	0.84
Twelve	1.00		1.00	
<b>Parents encourage physical activity</b>				
Yes	0.19 (0.07 - 0.52)	0.001*	0.31(0.11 - 0.86)	0.03*
No	1.00		1.00	
<b>Stay with both parents</b>				
Yes	4.77 (1.22- 18.65)	0.03*	0.89 (0.19 - 4.13)	0.89
No	1.00		1.00	

At multivariate logistic regression, variables that remained significant were the correlates of obesity; they included frequency of snacking, play computer game/mobile games and parents encouraging children to participate in physical activity at home.

## **CHAPTER SEVEN: DISCUSSION**

### **7.0 Introduction**

This chapter presents a discussion of the significant findings that were obtained from each of the study objective. The discussion is done in such a way that the findings are presented first, followed by its implications and justification, and then a comparison and contrast between the findings and the findings of other studies.

### **7.1 The prevalence of obesity among private day primary school going children**

In the context of private day primary school going children in Kampala city, this study found that obesity was at 4.7% (18). Although seemingly small a prevalence, it was one of the highest prevalence among private primary school going children in the world (going by the findings obtained in studies conducted in various countries). The finding means that of every 100 private day primary school going children in Kampala city, 5 are obese. It thus follows that 5 of every 100 private day primary school going children in Kampala city are at a risk of hypertension, dyslipidemia and insulin resistance Brady, (2017); Llewellyn, et al., (2016), including a worse cardiometabolic risk profile, earlier signs of vascular dysfunction, and subclinical atherosclerosis, fatty liver disease, sleep apnea, asthma, hepatic steatosis (fatty liver disease), cholelithiasis (gallstones), glucose intolerance and insulin resistance, skin conditions, menstrual abnormalities, impaired balance, and orthopedic problems, (American Academy of Pediatrics, (2019) and depression Quek et al., (2017); Rankin et al., (2016), on top of growing into obese adults, were cases of mortality rise.

It should also be noted that overweight was also found to be high, doubling the prevalence of obesity; a tenth of the pupils (10.7%) had BMIs which were between the 85th and 95th percentile and so were overweight. This implies that whereas 5 children are obese, close to 11% of the rest are at risk of getting

obese, and so without intervention, at intrapersonal and intra-house levels, the number of children becoming obese may increase in the more coming years (Sahoo et al., 2015).

Nonetheless, the prevalence of childhood obesity, that was found in this study is lower than what has been reported among children by Bel-Serrat et al., (2017) (20%) in a study done in Europe, Singh, (2018) (11.37%), Hasanat et al, (2018) (10.9%), Do et al., (2015) (21.1%), Elkum et al., (2016) (30.5%), Desalew et al., (2017) (5.8%), Aryeetey et al., (2017) 5%, Tluway et al., (2018) ) (9.2%), Chebet et al., (2014) (21.7%). The difference in the findings between the current study and the aforementioned studies is because of three main factors; one is the difference in population demography studied, sample sizes and study locations. For instance, in a study done in Netherlands by Singh, (2018), only female children were studied, a gender that has been known to have the highest risk of obesity between the two genders as cited in the literature section. Other studies Hasanat et al, (2018) *in Dhaka City of Bangladesh*; Do et al., (2015) in Vietnam; Elkum et al., (2016) in state of Kuwait; Desalew et al., (2017) in eastern Ethiopia; Aryeetey et al., (2017) in urban Ghana; Tluway et al., (2018);, involved relatively larger sample sizes (between 500 – 2500 children), across districts, than the one in the current study . The study by Chebet et al., (2014) was conducted among private school children in Kampala central, the most urbanized division of Kampala city, where children were most likely exposed to obesity risk factors including, unhealthy lifestyles, and snacking.

However, some studies have reported lower prevalence of obesity for instance Gebrie et al., (2018) (2.39%), El Kabbaoui et al., (2018) (3.41%), Spinelli et al., (2019) in Sweden (1%), Sunil et al., (2019) (2.04%), Muthuri et al., (2014) (2.5%), Anteneh et al., (2015) (4.4%), and Mekonnen et al., (2018) (3.1%). The difference in the findings between the current study and the aforementioned studies is also because of two factors, all of which are methodological. One is that some of those studies Gebrie et al., (2018); El Kabbaoui et al., (2018); Sunil et al., (2019); Anteneh et al., (2015), involved both children and adolescents

of which the latter have been known to have a lower prevalence of obesity, which made including them to lower the prevalence in those studies, while some included children who were below 7 years El Kabbaoui et al., (2018); Muthuri et al., (2014); Mekonnen et al., (2018), an age group that has been known to have a lower prevalence of obesity as well. Including them in those studies, therefore, might have greatly lowered prevalence in those studies.

It should however be noted that the prevalence of overweight among the private day primary school going children in Kampala city more than doubled (10.7%) that of obesity (4.7%), higher than, what has been reported in many other studies. In the study by Sunil et al., 2019 it was also found out that the prevalence of overweight and obesity was 7.09% and 4.08%. The current study percentages are higher than the findings by Sunil et al., 2019 which means that the prevalence is still high in Uganda. Results from a study by Singh et al., (2018) exhibited a higher percentage for overweight and obesity among students in India than the findings of the current study. The findings of their study showed that overweight was 9.75% and obesity among students was 11.37%. However, the prevalence of the current study is a representative of few schools in Kampala Uganda and not the entire country. Although overweight is associated with less health effects than obesity, it is a precursor for obesity. Therefore, it is possible that in the future, obesity among the private day primary school going children in Kampala city might double, as a result of some of the overweight ones progressing into obesity.

## **7.2 The correlates of obesity among private day primary school going children (9-12 years)**

In this study, one of the findings was that private day primary school going children who always snacked were 9 times more likely to be obese compared to those who rarely snacked. This shows that snacking by the private day primary school going children (9-12 years) in Kampala city had a correlation with the prevalence of obesity among them. The relationship between snacking frequency and obesity can be



justified on the front of the caloric density that comes with frequent snacking. Private day primary school going children (9-12 years) in Kampala city are usually given snacks for instance cakes, crisps, chocolate biscuits, buttered bread, and juice made from concentrate or chocolate milk to accompany them for eating .

Most of the above-mentioned snacks among others have calories that are more than 100 calorie Fat Secret, (2019), implying that eating them frequently throughout a single day, coupled with the three main meals can greatly increase calorie intake. Such a level of intake for children, the majority of whom reported not to be physically active, increases accumulation of adipose tissue, and hence the development of obesity. The findings of this study are in consistent with findings from numerous studies such as a study by Kiranmala et al., (2013) which also showed that obesity was as a result of poor dietary intake among children.

Similarly a study done by Chaturvedi, (2019) in India to find out the drivers of childhood obesity found out that having different dietary patterns had an influence on obesity. Child behavior patterns on food such as shorter breastfeeding, consumption of sweet and fatty foods, fried foods were all factors associated with obesity among children. However, the study reviewed literature of other scholars to generate conclusions and which is not the case in the current study. Similar findings were also seen in a study by Do et al., (2015) in Vietnam, however, their study looked at eating large quantity of food, eating fast and eating fatty foods as factors associated with obesity.

The findings of this study showed that children who reported that they played computer games/mobile games were 3.6 times more likely to be obese compared to those who reported not playing computer games. Computer games/mobile games have been known to result into three scenarios that have all been linked to progression into obesity. One of them is a life of little or no physical activity, given that video

games are usually played for 5 hours or more per sitting, which has been linked to obesity in many studies (Aryeetey et al., 2017). Oinam, et al., (2019) in their study in North Eastern India also looked at the prevalence and associated factors of obesity among children and found out that children who spent too much time indoor playing indoor games had higher chances of being obese compared to those who spent their time in outdoor activities. The findings by Oinam, et al., (2019) support the current study findings. Similar results were expressed in a study done in Ethiopia among primary school children by Desalew et al., (2017) which found out that children who were obese had sedentary lifestyle of staying indoors watching TV and did not engage themselves in any physical exercise/activity. All these increased the likelihood of obesity.

Turel et al., (2016) have also established that gamers usually have short sleep durations compared to non-gamers. Shorter sleep duration is related to elevated blood pressure, low-density lipoprotein cholesterol, high triglycerides, and high insulin resistance, which are all characteristics of obesity. Further still, gaming among children has also been linked to meal skipping, especially breakfast skipping, which has been associated with obesity in some studies such as a study by Brown et al., (2013) which showed that most people who were obese mentioned that they skipped a meal so as to reduce on fatness and weight, however, these were engaged in gaming and sitting for long which increased body weight. Błaszczyk-Bębenek et al., (2019) also found out that nutritional behavior among children was associated with obesity. This could be that when they skip breakfast, they tend to have frequent bites throughout the day, which as earlier mentioned, correlates with obesity prevalence (Wadolowska et al., 2019). The findings of this study are consistent with findings by other scholars such as El Kabbaoui et al., (2018) and Oinam, et al., (2019) who also found out that sedentary lifestyle of children such as use of a computer was associated with obesity.

Furthermore, the findings of the study showed that children whose parents encouraged to participate in physical activity at home were 69.1% less likely to be obese compared to those whose parents did not encourage to participate (table 12). Parental encouragement of a child to participate in any form of physical activity, can take three forms, that is, verbal, practical and passive (Pyper et al., 2016). In the verbal encouragement form, parental participation can be a source of behaviour change in which mere talking about the goodness of physical activities a child can decide to do so consistently (Eather et al., 2013).

Actively, parents can themselves engage in physical activity in full view of their children, and then later join them, especially if the activity being engaged in is within the household premises (Zecevic et al., 2010). Passively, the parent might not be practically involved in physical activity but decide to encourage the child to participate by buying for them sports equipment to use for instance a kid bike, a ball, or things of the sort (Kohl III & Cook, 2013). That alone can be encouraging enough to motivate the child into physical activity. Given the protective effects of physical activity on obesity, parental encouragement in any of its forms will reduce the prevalence of obesity among children encouraged. It has been postulated that parental influence is a key risk factor for childhood weight gain and obesity Ranjani et al., (2016), by way of controlling the obesogenic environment in which the child's dietary habits, and physical activity can be hampered or promoted. The findings of this study regarding the intra-house correlates of obesity concur with that postulation.

### **Strengths and limitations of the study.**

The strengths of this study are twofold; one is that the sampling procedure was bent on ensuring that each of the five divisions in Kampala city are represented in terms of having a cross section of schools from each of them sampled. Therefore, it can be said that the study had considerable external validity.

Secondly, the assessment of obesity was based on the current guidelines for assessing body mass index, suggested by the CDC, where percentiles are used and not z-scores. That therefore makes the estimation of obesity in this study accurate (CDC, 2018).

The limitations that this study had were; all information related to the independent variables, particularly intra-household characteristics had to be assessed based on self-reporting given that the study was school based. That meant that any exaggerations about intra-household characteristics could have been made unchecked, making the significant intra-household characteristics less credible. However, efforts were made to probe the children as much as possible on each question asked, related to intra-household characteristics.

Another limitation was the nature of the study design used; cross-sectional design cannot infer causal relationship between the dependent variable and independent variables. Furthermore, since the study was conducted in Kampala city and only limited to private day primary schools, the findings cannot be generalized to other parts of Uganda and other school sections like boarding pupils and government school. Also, the study never had triangulated data sources, since parents and school administrators were not interviewed, some findings may not be explained.

The study also never included the design effect and this must have created some limitation. However, the researcher managed to get all the required sample size without the utilization of the design effect.

## **CHAPTER EIGHT: CONCLUSION AND RECOMMENDATIONS**

### **8.1 Conclusion**

Obesity among private day primary school going children in Kampala city is a reality; almost 5% (1 in every 20) are obese, which is substantial. Whereas 1 in 20 of them are obese, 1 in every 10 of them are overweight. Therefore, it is concluded that close to 5 of every 100 private day primary school going children in Kampala city are obese, while 10 in every 100 are overweight.

The study found out that frequency of snacking and playing computer games as the only two intrapersonal correlates that were associated with obesity among school going children in Kampala. The study also found out that parental encouragement of children to participate in physical activities while at home had an influence on Obesity and this was the only intra-household characteristic correlates.

There were also no institutional correlates found to be associated with childhood obesity among school going children. Therefore, the study concludes that its some of the intrapersonal and intra-household correlates that have an influence on obesity among private school going children.

### **8.2 Recommendations**

Obesity among private day primary school going children was at 5% and might increase even more given that 10% of these children are at risk of becoming obese. Therefore, interventions for preventing obesity among those who are already overweight and those with normal weight and interventions for enabling those who are obese revert to normal weight are necessary. What should be done at the intrapersonal level include the following;

Parents and/or guardians of private day primary school going children should consider refraining from packing large quantities of snacks for their children, when sending them to school. They are advised that

if they are to pack snacks for their children (which are okay), they should only pack one sort of item (one bite and one drink) so that if they are to be eaten at school, it is done at ago, and not frequently throughout the day. In addition, the parents are also urged to consider advising their children against buying more snack items besides those packed for them, at school or on their way to school, as another measure of preventing frequent snacking. As a long-term measure however, it is suggested that parents consider paying for lunch for their children at school, or at least start packing real food for them, which can be snacked on frequently but with relatively low caloric intake. This will lower the risk of obesity among them. Parents should consider walking their children to school sometimes, if possible, for the sake of engaging them in some form of physical activity, and not always driving them to school.

Whereas playing video games could be within the right of a child, parents who have bought them for their children, or parents whose children have bought video games are urged to put some restrictions on the use of those gaming devices. Such restrictions should include putting time limits and demarcating periods within which video games should be played, for example in the afternoon only, for not more than an hour. That will most certainly reduce prolonged periods of inactivity that are usually associated with computer games, and thus reduce the risk of obesity. Better still, parents who enforce such restrictions, should also accompany them with a secondary rule that is engagement in any sort of outdoor games, such that video gaming is not again followed up by another period of inactivity.

Finally, parents of private day primary school going children are also urged to always encourage their children to engage in any form of physical activity. That encouragement can take many forms, including verbal, where the parents simply educate their children about the importance of physical activity and why they should engage in it, and practical, where actual equipment that is used in exercise are bought by a parent, and they demonstrate how they can be used as exercise tools.

### **8.3 Recommendations for further studies**

Given that this study focused on a cross section of 10 schools out the available 229 private day primary schools in Kampala city, it is recommended that other studies are conducted to assess the prevalence and correlates of obesity among private day primary school going children in Kampala city, focusing on another or bigger cross section of schools. Also, studies can be conducted either regionally or across Uganda to establish the general prevalence of obesity in the country. These studies should involve parents and school administrators to obtain qualitative data to enable them to explain all the findings.

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## **APPENDIX A: CONSENT FORM (SCHOOL ADMINISTRATION)**

### **Introduction**

Good morning/afternoon. My name is Nassaazi Mourice and I would like to first thank you for agreeing to meet with me. I am conducting a study to analyze the prevalence and correlates of obesity among private day primary school going children aged 9 -12 years in Kampala city. This form provides you with information about the study so that you can decide on whether your pupils can participate or not. After you have listened to this information you may ask questions about the study, what you are expected to do and anything else that is not clear to you.

**Purpose of the study:**

This study is aimed at collecting information that will help us know the prevalence and correlates of obesity among private day primary school going children aged 9 -12 years in Kampala city.

**If you decide on behalf of your pupils, to take part.**

I will request each of the sampled pupils to be interviewed and this interview will take about 25 minutes. During this interview, they will be asked about their demographic characteristics, their heights and weights will be measured; they will be asked about their individual characteristics, about some characteristics of their households, and about those in the school environment.

**Confidentiality**

The interview is strictly confidential. Any information they give will not be shared with anyone else and our records and report will not contain any name. All the information collected and recorded will be kept in a locked cabinet and no one else will have access to it. They will be told that they will be free to stop the interview at any time or not answer any questions they feel uncomfortable with. There is no right or wrong answer; we are interested in their opinion, so they will be able to talk freely.

**Risks and benefits**

There are no risks to the pupil for taking part in this study. There are also no direct benefits to you. However, the information they will give will be to the benefit of many persons at different levels, including policy, community, individual, and at academic levels (Academia). This study will highlight the prevalence of obesity among private day primary school going children in Kampala district, a finding which will probably bring the health challenge of childhood obesity to the attention of school heads and proprietors, and possibly will stimulate you to act accordingly, in the direction of lending a hand in preventing the escalation of the epidemic. The same will also apply to the ministry of health, who despite of being already in the know of the existence of the problem may further appreciate its incidence in communities such as private day primary schools.

This study will highlight the institutional correlates of obesity among private day primary school going children in Kampala district, the findings may be of benefit to the head teachers and proprietors of the schools that were sampled, and as well as those with a similar ownership status (Private). That will be because the study will highlight the institutional characteristics that have both a positive and negative correlation with obesity prevalence, and in essence will enable the school heads to intervene appropriately, that is to minimize the effects of the negative correlates and maximize the effects of the positive correlates.

The findings of the study may also be beneficial to the parents of private day primary school going children in Kampala district, and perhaps the country at large, as the findings will highlight the intra-household characteristics (including parental attributes) that have a significant correlation with the incidence of obesity among your children. With those findings, parents with obese children will get to know which of their own characteristics or those of their households predisposed your children to obesity so that they get empowered to modify the negative intra-household correlates of obesity. Parents of private day primary school going children who are neither obese nor overweight will also be empowered to know

which intra-household characteristics increase chances of obesity so that they can avoid or modify them if already existent.

**Are there any incentives for participating?**

The pupils will not receive any payment for participating in this study, participating is strictly voluntary.

**Voluntary participation and withdraw.**

Participation in this study is voluntary, the participation of the pupils is based on solely their discretion, and if they decide to stop their participation even in the middle of the interview for any reason, they will not be penalized for that whatsoever. Their position of services they receive will not be affected, due to non-participation.

**Problems or questions**

If you have any questions about this study, please contact the principal investigator, Nassaazi Mourice on

Tel: +256 750 623 101

**PARTICIPANT CONSENT PAGE**

I confirm that I have read and understood the participant information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered fully.	
I understand that the participation of any of my pupils is voluntary and that they are free to withdraw at any time, without giving any reason, without their legal rights being affected.	
I agree for their responses to be used in the publication or report released on the study once my permission has been sought and I have agreed.	
I agree on behalf of the pupils, for you to take part in the above study	

Sign

.....

OR

Thumb print



## **APPENDIX B: ASSENT FORM (PUPIL)**

### **Introduction**

Good morning/afternoon. My name is Nassaazi Mourice and I would like to first thank you for agreeing to meet with me. We are conducting a study to analyze the prevalence and correlates of obesity among private day primary school going children aged 9 -12 years in Kampala city. This form provides you with information about the study so that you can decide to participate or not. After you have listened to this information you may ask questions about the study, what you are expected to do and anything else that is not clear to you. We have already told the school administration about this study, and the fact that we are going to interview you, however we would like to also provide you with some information so that you can make an informed choice to participate in this study.

### **Purpose of the study:**

This study is aimed at collecting information that will help us know the prevalence and correlates of obesity among private day primary school going children aged 9 -12 years in Kampala city.

### **If you decide to take part;**

We will conduct an interview and this interview will take about 25 minutes. During this interview, we will ask you about your demographic characteristics, we shall take your height and weight measurements; we shall ask you about your individual characteristics, about some characteristics of your household back home, and about those in the school environment.



## **Confidentiality**

The interview is strictly confidential. Any information you give will not be shared with anyone else and our records and report will not contain your name. All the information collected and recorded will be kept in a locked cabinet and no one else will have access to it. We will keep any quotations that we use in our report or other publications from the interview with you anonymous and ask for your permission prior to using it. You are free to stop the interview at any time or not answer any questions you feel uncomfortable with. There is no right or wrong answer; we are interested in your opinion, so you can talk freely.

## **Risks and benefits**

There are no risks to you for taking part in this study. There are also no direct benefits to you. However, the information you will give will be to the benefit of many persons at different levels, including policy, community, individual, and at academic levels (Academia). This study will highlight the prevalence of obesity among private day primary school going children in Kampala district, a finding which will probably bring the health challenge of childhood obesity to the attention of school heads and proprietors, and possibly will stimulate them to act accordingly, in the direction of lending a hand in preventing the escalation of the epidemic. The same will also apply to the ministry of health, who despite of being already in the know of the existence of the problem may further appreciate its incidence in communities such as private day primary schools.

This study will highlight the institutional correlates of obesity among private primary school going children in Kampala district, the findings may be of benefit to the head teachers and proprietors of the schools that were sampled, and as well as those with a similar ownership status (Private). That will be because the study will highlight the institutional characteristics that have both a positive and negative

correlation with obesity prevalence, and in essence will enable the school heads to intervene appropriately, that is to minimize the effects of the negative correlates, and maximize the effects of the positive correlates

The findings of the study may also be beneficial to the parents of private day primary school going children in Kampala district, and perhaps the country at large, as the findings will highlight the intra-household characteristics (including parental attributes) that have a significant correlation with the incidence of obesity among children. With those findings, parents with obese children will get to know which of your own characteristics or those of your households predisposed their children to obesity so that they get empowered to modify the negative intra-household correlates of obesity. Parents of private primary school going children who are neither obese nor overweight will also be empowered to know which intra-household characteristics increase chances of obesity so that they can avoid them or modify them if already in existent.

**Are there any incentives for participating?**

The pupils will not receive any payment for participating in this study, participating is strictly voluntary.

**Voluntary participation and withdraw.**

Participation in this study is voluntary, your participation is based on solely your discretion, and if you decide to stop participating even in the middle of the interview for any reason, you will not be penalized for that whatsoever. Your position or services you receive will not be affected, due to non-participation.

**Problems or questions**

If you have any questions about this study, please contact the principal investigator, Nassaazi Mourice on  
Tel: +256 750 623 101

**PARTICIPANT ASCENT PAGE**

I confirm that I have read and understood the participant information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered fully.	
I understand that my participation is voluntary and that am free to withdraw at any time, without giving any reason, without my legal rights being affected.	
I agree for your responses to be used in the publication or report released on the study once my permission has been sought and I have agreed.	
I agree to take part in the above study	

Sign

.....

OR

Thumb print



## APPENDIX C: QUESTIONNAIRE

### PART A: Socio demographic characteristics

Number	Question	Response options	Code chosen
1	Gender	1. Female 2. Male	
2	How old are you now?	1. Nine 2. Ten 3. Eleven 4. Twelve	
3	In what class are you?	1. Primary three 2. Primary four 3. Primary Five 4. Primary six 5. Primary seven	

### PART B: Obesity assessment

4 Measurement	Value	BMI
• Height		
• Weight		

**PART C: Intrapersonal characteristics**

Number	Question	Response options	Code chosen
5	Do you engage in any form of physical activity, at school or at home?	1. Yes 2. No	
6	If yes, which form of physical activity do you usually engage in?	1. Foot ball 2. Playing with Swings and seesaws 3. Riding bike 4. Other	
7	Do you like fruits and vegetables?	1. Yes 2. No	
8	How often do you eat them?	1. Always (Daily) 2. Sometimes 3. Rarely	
9	Do you have snacks between main meals when at school?	1. Yes 2. No	
10	How often do you have those snacks?	1. Always (Daily) 2. Sometimes 3. Rarely	

11	Which form of snacks do you usually have?	<ol style="list-style-type: none"> <li>1. Fried treats (e.g Crisps, pancakes, samosas)</li> <li>2. Confectionery (Sweets, chocolate)</li> <li>3. Baked snacks (e.g cakes, bread)</li> <li>4. Other</li> </ol>	
12	How many meals do you have while at school?	<ol style="list-style-type: none"> <li>1. One</li> <li>2. Two</li> <li>3. Three</li> <li>4. More than three</li> </ol>	
13	Do you have enough sleep at night?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	
14	Do you usually eat fast foods like chips, and sausages?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	
15	Do you eat food while reading or shading or drawing shapes?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	

16	What form of transport do you use for going to school, usually?	<ol style="list-style-type: none"> <li>1. Walk to school.</li> <li>2. Driven to school.</li> <li>3. Ridden to school</li> </ol>	
17	Do you engage yourself in any sporting activity?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	
18	If yes, for how long do you engage yourself in sport activities at home or at school?	<ol style="list-style-type: none"> <li>1. Less than 15 minutes</li> <li>2. More than 15 minutes</li> </ol>	
19	Do you play computer game\mobile games?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	
20	If yes, how often do you do so?	<ol style="list-style-type: none"> <li>1. Always</li> <li>2. Sometimes</li> <li>3. Rarely</li> </ol>	
21	For how long do you play computer\mobile games per sitting?	<ol style="list-style-type: none"> <li>1. Less than 5-hours</li> <li>2. More than 5 hours</li> </ol>	

22	For how long do you watch television a day per sitting?	1. Less than 5-hour. 2. More than 5 hours	
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**PART C: Intra-household characteristics**

<b>Number</b>	<b>Question</b>	<b>Response options</b>	<b>Code chosen</b>
23	Do you stay with both your parents?	1. Yes 2. No	
24	If not, which parent do you stay with?	1. Mother only 2. Father only	
25	How would rate the weight status of your father?	1. He is visibly fat. 2. He is not visibly fat	
26	How would rate the weight status of your mother?	1. She is visibly fat. 2. She is not visibly fat	
27	Do your parents put restrictions on television watching for you?	1. Yes 2. No	
28	Do you have video games at home?	1. Yes 2. No	



29	Do your parents encourage you to participate in physical activity at home?	1. Yes 2. No	
30	Do you engage yourself in home chores?	1. Yes 2. No	
31	Is your mother educated?	1. Yes 2. No	
32	Is your father educated?	1. Yes 2. No	
33	Do you have meals with your parents at the same time?	1. Yes 2. No	
34	Who is responsible for your daily food consumption habits at home?	1. Mother only 2. Father only 3. Both mother and father 4. Other household members	

**PART D: Institutional characteristics**

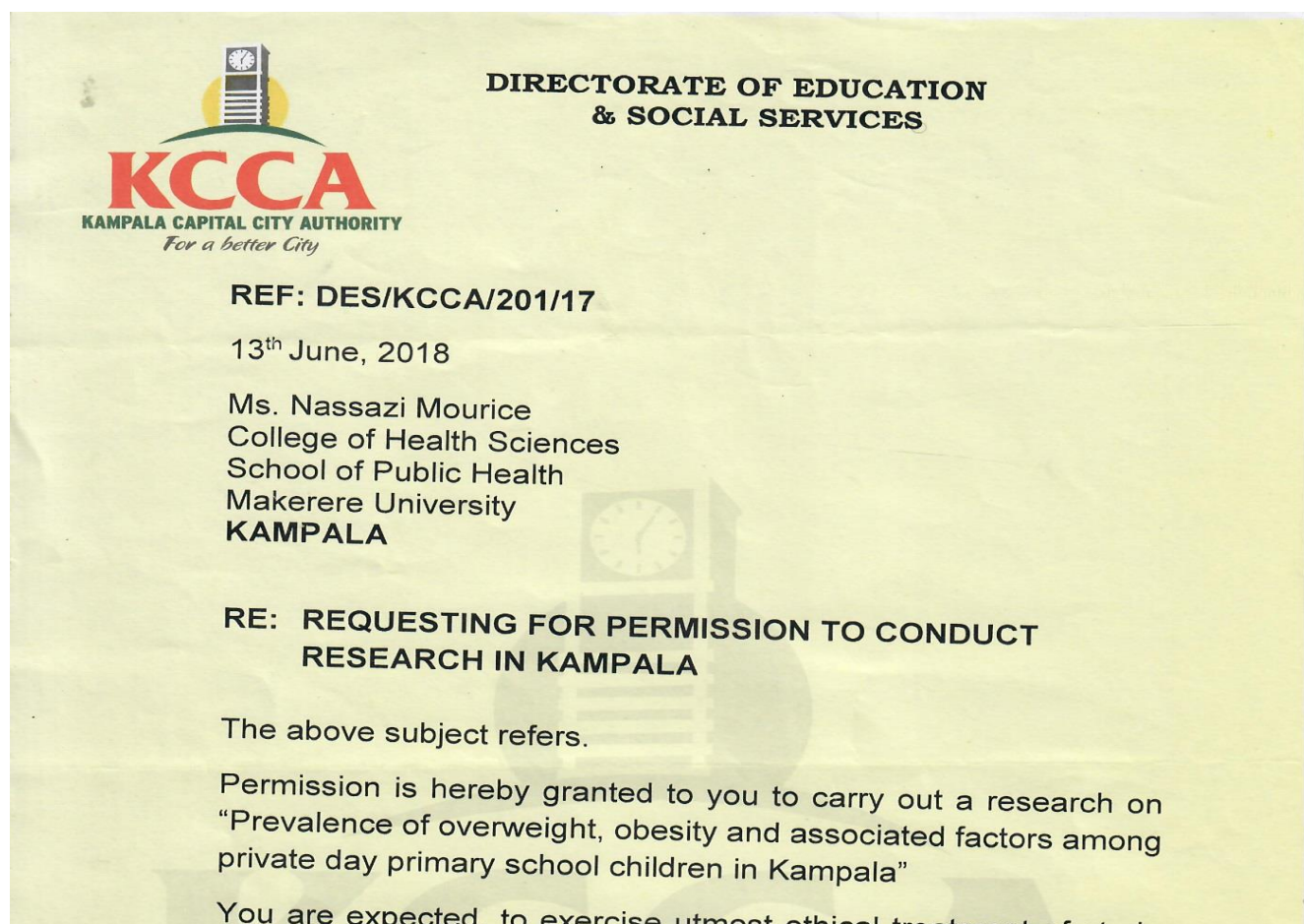
<b>Number</b>	<b>Question</b>	<b>Response options</b>	<b>Code chosen</b>
35	Does the school have infrastructure or equipment for play time?	1. Yes 2. No	

36	Does the school has time allowances particularly for physical activity for you as pupils?	1. Yes 2. No	
37	Does the school provide meals for pupils?	1. Yes 2. No	
38	If yes, which meals does it provide?	1 Breakfast only 2 Breakfast and lunch 3 Lunch only 4 Breakfast, lunch, and snacks	
39	Does the school have a designated play area for pupils?	1. Yes 2. No	
40	How would you rate the size of the play area?	1. It is large enough to accommodate all pupils. 2. It is small, cannot accommodate all pupils	
41	Are you taught about physical education in school?	1. Yes 2. No	

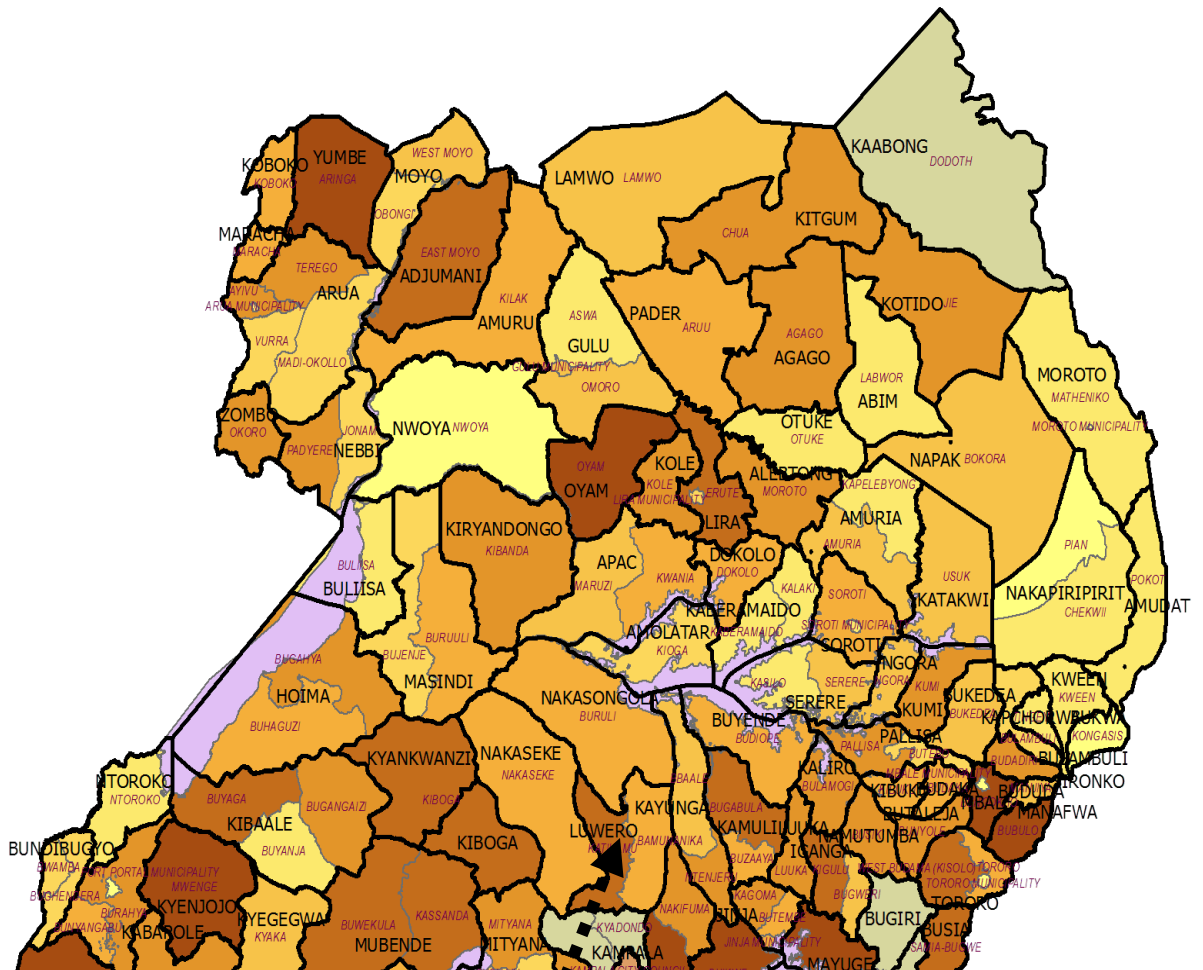
42	Do you think your teachers are interested in physical education and activity for you as pupils?	1. Yes 2. No	
43	Does the school have designated sports time for pupils?	1. Yes 2. No	

**END**

**APPENDIX D: KCCA LETTER OF STUDY APPROVAL**



**APPENDIX E: MAP OF UGANDA SHOWING THE LOCATION OF KAMPALA DISTRICT**





**APPENDIX F: MAP OF KAMPALA SHOWING DIVISIONS (STUDY AREA)**

