# THE PREVALENCE AND RISK FACTORS OF OVERWEIGHT AND OBESITY AMONG CHILDREN SEEN AS OUTPATIENT AT PAEDIATRIC EMERGENCY UNIT AND ACCIDENT AND EMERGENCY DEPARTMENT IN KENYATTA NATIONAL HOSPITAL

**(A Cross Sectional Study)**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT FOR THE AWARD OF THE DEGREE OF MASTER OF MEDICINE IN PAEDIATRICS AND CHILD HEALTH,**

**UNIVERSITY OF NAIROBI**

**DECLARATION**

This research is to be undertaken in part fulfillment of the Masters in Paediatrics and Child Health from the University of Nairobi and will be my original work and has not been undertaken and presented for a degree in any other University.

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## DECLARATION

I, Kennedy Muriungi Gituma, declare that this thesis is my original work and has not been submitted elsewhere for examination, an award of a degree or application.

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## DEDICATION

This work is dedicated to God almighty, my husband and my daughter.

## LIST OF ABBREVIATIONS

A&E-Accident and Emergency

APA-American Academy of Paediatrics

BMI- Body mass index.

CDC- Centers for Disease Control and Prevention

IDD- Intellectual/Developmental Disabilities

KDHS-Kenya Demographic and Health Survey

KNH- Kenyatta National Hospital

MOH- Ministry of Health

NHANES- National Health and Nutrition Examination Survey

PE- Physical education

PEU-Paediatric emergency unit

UNICEF- United Nations Children's Fund

U.S.A- United States of America

WHO- World Health Organization

## OPERATIONAL DEFINITIONS

Body mass index (BMI)- Weight in kilograms and height in meters will be measured using a professional weight and height scale. The result of weight divided by height in square meters will be termed as body mass index.

Overweight-Body mass index calculated will be plotted in the gender specific body mass index charts. A body mass index of between the eighty fifth percentile and the ninety fourth percentile for children and teens of the same age and sex will be described as overweight.

Obesity-Body mass index calculated will be plotted in the gender specific body mass index charts. A body mass index at or above the ninety fifth percentile for children and teens of the same age and sex will be described as obesity.

Child-Any human being under the age of eighteen years.

Critically Ill child- any child presenting with the following clinical findings: apnoea, upper airway obstruction, hypoxaemia, central cyanosis, severe respiratory distress, total inability to feed, shock, severe dehydration, active bleeding requiring transfusion, unconsciousness or seizures(1).

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## ABSTRACT

**Introduction:** Childhood overweight and obesity are important causes of morbidities in both developing and developed country settings. Urban sprawl in many developing nations has led to an increase in the rates of childhood obesity and overweight. An increase in sedentary lifestyle and consumption of high calorie foods and drinks are among the major reasons contributing to this change(2)(3)(4). During the Covid 19 pandemic the rate of obesity among children increased compared to pre-pandemic period(5). Childhood obesity has a negative impact on overall health and is associated with comorbidities that increase hospital visits.

**Study Objective**: To assess the prevalence and risk factors of overweight and obesity among children seen as outpatient in Kenyatta National Hospital (K.N.H).

**Methodology:** A cross-sectional study among children seen as outpatient at paediatric emergency unit and accident and emergency in K.N.H was conducted. Informed consent was acquired from guardians of all the participants and assent was acquired where possible. We recruited 385 study participants using consecutive sampling. Weight and height were measured and body mass index calculated. A questionnaire was administered and nutritional status assessment done using the CDC gender specific BMI charts. Data was analyzed using R software version 4.0.2. Categorical variables were analyzed descriptively. Continuous variables were analyzed using median and interquartile ranges. Binary logistic regression was used in evaluating the risk factors associated with obesity and overweight. Odds ratios were adjusted in order to get the net effect of each risk.

**Results:** The prevalence of obesity was 14% (CI 95%: 11%-18%) and that of overweight was at 8%(CI95%:5%-11%). School going age, household monthly income and transport to school had significant association with obesity and overweight.

**Conclusion:** The prevalence of obesity and overweight was high among children seen at the emergency departments in Kenyatta National Hospital.

# CHAPTER ONE: INTRODUCTION

## 1.1 Background

The definition of obesity and overweight is based on cutoff points determined from distributions of anthropometric measurements such as weight and body mass index. There is lack of an accepted criteria that defines childhood obesity or overweight on the basis of whole-body fatness and its relationship to health complications(6).

The body mass index (BMI) is a parameter that is utilized to define if a child has obesity or is overweight. A body mass index equal to or more than eighty fifth percentile but less than ninety fifth percentile for children aged two to eighteen years of same sex is described as overweight while a body mass index at or above the ninety fifth percentile for children aged two to eighteen years of same sex is described as obesity(6).

Obesity and overweight have been found to be increasing in developing and developed countries and thus they were declared a global epidemic by the world health organization in 1997. Countries in North and sub-Saharan Africa including Kenya have been affected by this pandemic(7). The aim of this study is to determine the prevalence and risk factors of obesity and overweight among children seen as outpatient at the paediatric emergency unit and accident and emergency department in Kenyatta National Hospital.

The origin of obesity stems from the late 19th century to early 20th century. Prior to this period malnutrition, communicable diseases and poverty were rampant in the developed nations(8). Low industrial productivity was due to these health problems. The dawn of the 20th century came with dietary supplementation through the addition of fat and sugar to the usual diet. This led to improved growth and reduction in malnutrition with an increase in industrial productivity but also resulted in the rise of obesity and overweight. For years obesity was a rare condition but later it became so common in the twentieth century as reported by the world health organization(7).In 1990 the worldwide prevalence of childhood obesity and overweight was 4.2% and this increased to 6.7% in the year 2010.

## 1.11 Preference of CDC growth charts over WHO growth charts

CDC growth charts (including body mass index charts) were developed in the year 2000 and six years later WHO growth charts were developed. In 2006, American Academy of Paediatrics, CDC and the National Institute of Health convened a panel of experts to evaluate the scientific evidence

behind the two growth charts and deliberate on the possible utilization of the new World Health Organization growth charts by clinicians. The major differences lied in the reference population that was studied with WHO using an ideal study population. The WHO Multicentre Growth Reference Study was conducted between the year 1997-2003 in six locations: Accra, Ghana; Pelotas, Brazil; Delhi, India; Oslo, Norway; Muscat, Oman and Davis, California. The inclusion criteria into the longitudinal study were neighborhoods whose people had good socioeconomic status determined by low infant mortality rate, lower rates of undernutrition, wasting and stunting. Other requirements for enrollment into the study included communities with lactation consultants, communities willing to practice exclusive breastfeeding for four months, introduction of complementary feeds by six months and continued breastfeeding for a minimum of twelve months. Exclusion criteria included mothers who were smoking during pregnancy and lactation, multiple birth, preterm infants born less than 37weeks and those born more than 42weeks, low socioeconomic status, significant morbidity in the infant or mother and mothers who were reluctant to follow the feeding criteria. Data utilized in generation of the CDC growth charts was acquired from a sequence of National Health Examination Surveys carried out for thirty-one years (1963-1994) among civilians and non-institutionalized population in U.S.A. The study was a continuous cross-sectional survey of health and nutritional status among people who came from different ethnicity and socioeconomic status. The expert panel concluded that WHO growth charts should be used for growth assessment for children less than two years while the growth charts developed by CDC should be used for assessment of growth for those aged two to nineteen years(9).

### 1.2 Prevalence of obesity and overweight in children globally

The United Nations Children's Fund (UNICEF) in 2013 noted a steep rise in the numbers of children under 5 years of age who were overweight(10). There was a rise in the number of children who were overweight globally from 32 million to 42 million between the year 2000 and 2013. This was according to estimates by the World Bank and the World Health Organization(10). WHO reported that by the year 2020 thirty-nine million children under the age of 5 were obese or overweight and by 2016 over three hundred and forty million children and adolescents were obese or overweight?

### 1.2.1 Prevalence of childhood obesity and overweight in developed countries

Childhood obesity has an upward trend in many developed countries. The prevalence of obesity and overweight as seen in the United States of America is 11% and 25% respectively. Since1971 the prevalence of obesity and overweight has had an upward trend in developed countries (Table 1). CDC reported the prevalence of obesity was nineteen percent which translated to about fourteen million children and adolescents in the USA aged 2-19 years between the year 2017 and 2018. Obesity rates were highest among adolescents at 21.2% and among school going children(6-11yrs) at 20.3%. Childhood obesity rates in USA was unevenly distributed among the various ethnic groups. Non-Hispanic Black children had the highest prevalence at 24.2% and the least prevalence was among non-Hispanic Asian children at 8.7%. During the Covid 19 pandemic the rate of obesity among children in U.S.A aged two to nineteen years increased to 22.4% in the year 2020(5).

There is substantial evidence that excessive energy content in soft drinks, larger sizes of meal portions and a persistent reduction of physical activity are some of the major key factors contributing to the high rates of obesity worldwide. Therefore, over-consumption of calories coexisting with reduced physical activity led to the evolution of childhood obesity and overweight (11).

**Narrative for Table 1: Changes in the prevalence of obesity and overweight in selected developed countries.**

Table 1 shows that the prevalence of childhood obesity differs among selected countries in Europe. Scandinavian countries have a considerably lower prevalence compared to Mediterranean countries. However, the proportion of children with obesity is rising in both groups.

***Table 1: Changes in the prevalence of obesity and overweight in selected developed countries according to Mahshid Dehghan et al***

| Country/Year | Age(years) | Study (author) | Change in obesity |
|---|---|---|---|
| **USA** | | | |
| 1973–1994 | 5–24 | Bogalusa [67] | Mean level increased 0.2 kg/yr, twofold increase in prevalence of obesity |
| 1971–1974 | 6–19 | NHANES I [68] | relatively stable |
| 1976–1980 | 6–19 | NHANES II [68] | relatively stable |
| 1988–1994SS | 6–19 | NHANES III [68] | Doubled to 11% |
| 1999–2000 | 6–19 | NHANES IV [68] | Increased by 4% |
| **Japan** | | | |
| 1974–1993 | 6–14 | Kotani [69] | Doubled (5% to 10%) |
| **UK** | | | |
| 1984–98 | 7–11 | Lobstein [70] | Changed from 8% to 20% |
| **Spain** | | | |
| 1985/6 to 1995/6 | 6–7 | Moreno [71] | Changed from 23% to 35% |
| **France** | | | |
| 1992–1996 | 5–12 | Rolland-Cachera [72] | Changed from 10% to 14% |
| **Greece** | | | |
| 1984–2000 | 6–12 | Krassas [73] | Increased by 7% |

From the above review of epidemiology trends in developed countries, we appreciate that childhood obesity is currently an epidemic disease in developed countries between 1970 towards the late 1990s and this is evident in many large nations within Europe and North America. We also see that obese or overweight children have a 2-fold higher risk of becoming overweight in adulthood(12).

### 1.2.2 Prevalence of obesity and overweight in developing countries

Obesity and overweight are now issues being faced in the developing countries especially within in the urban areas. It is estimated that around eight million children are overweight in developed countries whereas thirty five million overweight children can be found in developing countries(7). According to WHO more than 115 million people living in developing countries suffer from

obesity related comorbidities. WHO predicts that by 2030 obesity related comorbidities will be the top most cause of death in developing countries(7).

Under nutrition and obesity concurrently exist in many developing nations. According to Martorell et al in 2000, obesity doesn't appear to be a huge concern among preschool-age children in developing parts of the world like Asia and sub-Saharan Africa. The contrary was found in developing nations in the Caribbean, North Africa, Latin America and Middle East where the prevalence of obesity in pre-school children was almost similar to that seen in the USA(13).In Africa, the approximate prevalence of childhood obesity and overweight in the year 2010 was 8.5% and this was anticipated to reach 12.7% in Africa and 8.7% in East Africa in the year 2020(14). So far there are no reported changes to this trend.

The prevalence of childhood obesity and overweight among under 5-year-old children in Africa was found to be 5% in 2017. In absolute figures the prevalence rose from 6.6million in 2000 up to 9.7 million in 2017. This was approximately a 50 % rise(15). A study done in 2006, South Africa, assessing the prevalence of obesity and overweight amongst children aged six to thirteen years attending primary school (randomly selected from 5 South Africa provinces and of different socioeconomic category), found that girls were more likely to have a higher body mass index for age than boys. The prevalence in boys of overweight and obesity was 14% and 3.2 % respectively while that for girls was 17.9% and 4.9% respectively. These trends were found to match values in developed countries (16).

The rate of obesity in Western Africa is approximately 10%. Rates of obesity amongst women are found to be three times higher than those found in men. In the urban setup in Western Africa, there has been a two times increase in the rates of obesity in the past fifteen years(7).

Girls have 26% more body fat than boys, which may explain the relative insulin resistance in the female population. Girls are less insulin sensitive than boys as early as five years of age. A study showed that up to eighty percent of children who develop type 2 diabetes are female. Thus, sex-linked genes may contribute to insulin resistance with later development of obesity and other conditions which are part of metabolic syndrome. This may happen in an environment characterized by abundance of energy dense foods and sedentary lifestyle behavior(17) (18).

From the above review the trend in prevalence of obesity and overweight is not only increasing in the developed nations but also in urban settings of developing nations. In East Africa the estimated prevalence in 2020 is 8.7% which is equivalent to a 55% rise in the last 30yrs.The study done in South Africa reported a higher prevalence of obesity and overweight in girls in comparison to boys. Similar trends were described in some developed European nations but contrary trends were described in developing and developed nations in North and South America.

### 1.3 Pathophysiology of childhood obesity

The brain communicates with adipocyte tissue and gastrointestinal tract to control feeding and energy balance via neuroendocrine feedback loops. The satiety center and feeding center are located in the ventromedial and lateral hypothalamus respectively. Energy balance requires an ability of the brain to detect the status of energy stores and match energy intake with expenditure. Several theories such as the "glucostatic" hypothesis and "adipostatic" model have been used to explain the short-term and long-term regulation of feeding and energy expenditure(19).

Obesity results from an imbalance of caloric intake and energy expenditure. A child's level of adiposity arises from a composite interplay among genetically determined body habitus, nutritional intake, physical activity and energy expenditure. Obesity arises from slight imbalances of energy intake and expenditure. Studies have shown that normal weight and obese children may have similar energy intake but factors such as a higher social economic status, sedentary lifestyle, obese parents, level of physical activity and increased parental level of education are major players in development of obesity(20).

### 1.4 Clinical Evaluation

The purpose of evaluating an obese child is to identify the etiology and pick out comorbidities present in the child. This is achieved by taking an adequate history and physical examination of the child and using tools such as BMI charts and feed frequency questionnaires to determine nutritional status and associated risk factors.

### 1.4.1 The importance of Clinical History

Dietary history includes content, frequency and location of meals, snacks and energy dense foods like sodas. Time spent in physical education at school, organized sports and unstructured play at home can be used to assess level of physical activity. The duration of screen time (time spent on video games, smart phones, television and tablets) can also be used to assess the level of physical activity. In the review of the body system a history of wheezing or snoring may point towards obesity related complications like asthma and obstructive sleep apnea. A history of medications used by the child is important. Medications like glucocorticoids, antipsychotics and antiepileptics may cause weight gain. A delay of milestones is important to find out because genetic causes of obesity may be associated with this. History of obesity and obesity-related comorbidities in the family is a predictor that the obese child will likely grow up to be an obese adult. A thorough psychosocial history including getting information about eating habit disorders, peer relationships and depression is crucial in evaluation of these children (21).

### 1.4.2 Physical examination

This includes measuring height, weight and calculating the BMI of the child. Assessment for characteristics of endocrine abnormalities and dysmorphic features is crucial. Tall obese children are likely to have an exogenous cause while short obese children are likely to have genetic or endocrine dysfunction (21).

### 1.4.3 Comorbidities

Multiple comorbidities are associated with childhood obesity. Examples include fractures, asthma, obstructive sleep apnea, steatohepatitis, dyslipidemia, essential hypertension and diabetes mellitus. Obesity can actually affect almost all organ systems in the body. The severity of the comorbidities worsens as the body mass index increases(21). Some of these comorbidities are conditions that drive children and adolescents to visit the emergency department(22).

## CHAPTER TWO: LITERATURE REVIEW

While conducting the literature review of this study, I searched the published literature using PubMed and Google Scholar using the terms 'childhood', 'obesity', 'prevalence', 'risk factors', 'developed countries', 'Africa', 'Kenya', 'pediatric emergency unit' and 'emergency department'. Papers included in this literature review were published not more than 30years ago. These papers have information regarding prevalence and risk factors associated with overweight and obesity not limited to pediatric emergency unit or hospital setup.

### 2.1 Situation of childhood obesity and overweight in Kenya

The Kenya national health survey conducted in 2014 demonstrated that the trend in prevalence of overweight in under 5yr old children had slightly declined from 6% in 1998 to 4% in 2014(23). A Kenyan study done in 2014 by Muthuri et al whose parent study was an International Study of Childhood Obesity, Lifestyle and Environment (ISCOLE) reported a higher prevalence. The study recruited 563 participants of which 46.5% were boys and 53.5% were girls from both private and public schools in Nairobi. Of these, 6.4% were obese, 14.4% were overweight and 3.7% were underweight. Obese or overweight children were likely to belong to a higher socioeconomic status and come from household where parents had attained a higher level of education. Children living in urban setups were likely to spend more time doing sedentary activities and less time participating in moderate to vigorous activity. Children in these areas were therefore more likely to be obese or overweight (1).

In a study done by Ibrahim Saida et al among nursery school children aged 3-6yrs in Embakasi, the prevalence of overweight children was 13.7%, obese 6.1%, underweight 7.4%. The study also showed that 58% of obese children came from private schools and 42% from public schools. This study found a significant association between a household monthly income and obesity. No association was found between a parent's level of education and obesity status.

From the two Kenyan studies discussed above we appreciate several similarities in their findings despite being conducted on children of different age groups. The prevalence of obesity and overweight is almost similar in both studies and risk factors such as high socioeconomic status and urbanization have both been linked to the increase in prevalence of obesity and overweight. However, Muthuri et al reported that a higher level of parent's education increased the risk of

obesity or overweight but Ibrahim et al did not find noteworthy relationship between a parent's level of education and obesity or overweight.

### 2.2 Childhood obesity and overweight in a hospital setup

A study done in 2008 in an emergency department of a tertiary academic hospital in Chicago aimed at studying emergency unit visits for children aged two to seventeen years and finding the prevalence of obesity, overweight and normal children in this population and describing the diagnosis at discharge and billing levels of service offered among the different age groups. The prevalence of obesity and overweight was 46%. In the study there was no statistically significant differences between diagnosis at discharge and grade of service offered among obese, overweight and normal children (24).

A prospective observational study done in 2013 among patients aged 6-18yrs in the emergency department of a children's hospital in Rome, Italy, the prevalence of obesity and overweight was 13.5% and 20%% respectively. The study also looked at the relationship between BMI and children's presentation at emergency department and found that obesity and overweight was more common among school going children than adolescents. The children were also more likely to get fractures than school age children of normal weight. The study demonstrated the importance of supporting efforts aimed at reducing obesity in children. The emergency department therefore provides an opportune setting for timely identification and referral of school going children with obesity and obesity related comorbidities (14).

In 2004 a study was done in a tertiary pediatric hospital in Australia, assessing obesity and under-nutrition. The findings of the study were that the proportion of inpatient and outpatient participant who were underweight was similar. However, the prevalence of obesity and overweight in inpatients (22%) was close to the prevalence found in the National Nutrition Survey of Australia (1995) but was found to be much higher in outpatients (32%). The duration of admission increased significantly with age in overweight or obese patients but remained constant for the normal weight and underweight children. (11).

From the above review it is clear that the emergency department attends to high-risk pediatric population and can therefore serve as a center for screening and early referral of obese or overweight children and thus help in combating childhood obesity. The above 3 studies done in a

hospital setup looked at the prevalence of obesity and overweight but failed to look at risk factors associated with obesity or overweight in these children.

### 2.3 Risk factors for childhood obesity

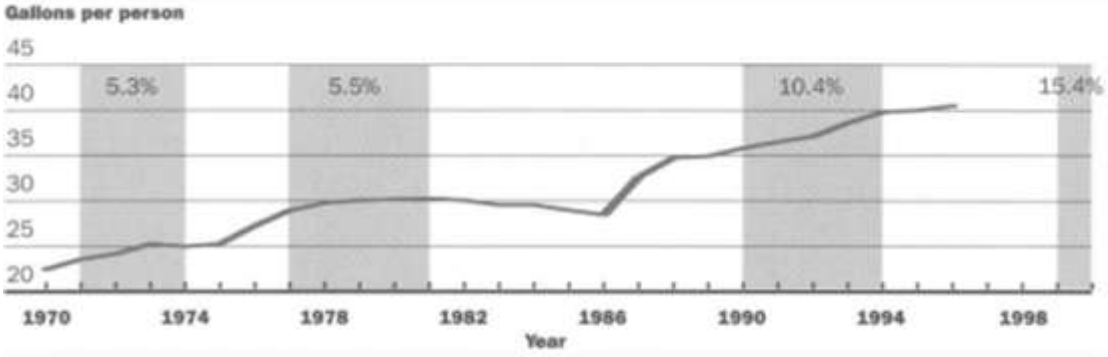
#### 2.3.1 Changes in food market

No evidence of a direct cause of overweight and obesity has ever been reported but researchers have found associations between specific energy intake and overweight or obesity. The role of soft drinks had the strongest evidence as a cause of childhood obesity and overweight. Fast foods have also been shown to have a causal role but evidence to support the causal role of snack foods is suboptimal. What has been reported is that weight gain results when more food is consumed without an accompanying increase in energy expenditure.(25).

In the past several decades an analysis of the food supply market in U.S.A found a marked increase in overall consumption of carbonated soft drinks. The National Health and Nutrition Examination Survey reported an increase in the total expenditure of soft drinks in USA from 1970s-1990s.The time period when increased soda consumption was observed matched with the time period when obesity in childhood was on the rise (Figure 1). Researchers therefore came to a conclusion that consumption of sodas could have contributed to this rising trend of pediatric obesity. The pitfall is that this trend is for overall consumption of sodas by both children and adults(25).

A multinational cross-sectional study done in Nairobi among 9-11yearold children assessed the association between dietary behaviors and weight status of these school going children. The findings of the study showed that body mass index was negatively associated with consumption of fast foods (p value 0.036), potato crisps (p value 0.003) and cakes/pastries (p value 0.023). This study also found no significant association between body mass index and sweetened drinks. In fact the study reported less healthy eating habits were observed in children with lower body mass index(3).

**Figure 5. Annual Regular (Non-Diet) Soft Drink Consumption**




Sources: NHANES data; regular soft drink consumption data for the United States overall are from Judy Putnam and Shirley Gerrior, "Trends in the U.S. Food Supply, 1970–97," in *America's Eating Habits: Changes and Consequences*, edited by Elizabeth Frazao, USDA Agriculture Information Bulletin no. 750 (Washington: USDA, 1999), pp. 133–59 (www.ers.usda.gov/publications/aib750/ [September 26, 2005]).

Notes: Shaded areas represent years over which BMI measures are available. The percentage of children overweight in those data is shown.

Figure 1: Annual regular (non-diet) soft drink consumption by National Health and Nutrition Examination Survey

**2.3.1.1 Factors that contributed to an increase in soft drinks consumption**

In the year 1995 to 1999 the amount of money spent in advertisement of soft drinks in U.S.A increased by 50% from 541 million dollars to 799 million dollars(25).

Researchers have reported evidence that advertising affects food choices even among 2year old children. In many households children are allowed to watch adult programs on television sets and are thus exposed to similar advertisements as their parents(25).

Another factor attributed to this is the rise in the number of times people eat outside their homes. French et al reported that more soft drinks are consumed in restaurants than at home(25).The amount of calories from food eaten away from home increased from eighteen percent in 1977 to thirty four percent in 1995.Thistrend resulted in a great change in the food market(25).

**2.3.1.2 Larger portion sizes**

Manufacturing of larger portion sizes of fast foods (convenience foods) began as early as 1970s. Snacking has been established as a source of increased energy intake in adults. Researchers have observed that school going children will also consume more when given big portions of food but this does not apply to toddlers and infants. (25). Even though the multinational cross-sectional study done in Nairobi by Wachira LJ et al found that unhealthy diets were consumed more commonly by children with lower body mass index, they proposed the likelihood that the portion

sizes of unhealthy foods was larger among obese and overweight children even when eaten less frequently(3).

#### 2.3.1.3 Decline in consumption of dairy products

According to a survey done by the USA department of agriculture, the consumption of beverage milk decreased from 1970 and 1997 while that for carbonated drinks increased in the same time period(12).Evidence has shown that there is a 70% decline in the risk of overweight when one increases dairy intake by about 2servings per day. Literature review has shown that intake of calcium was associated with a 21% reduction in risk of getting insulin resistance among overweight youths. This in turn reduces their risk of getting diabetes(12).A longitudinal study done in children showed that more dairy servings per day and increased intake of calcium contributed to low adiposity level in childhood(12).

### 2.3.2 Changes in the Built Environment

As a consequence of urban sprawl automobile is becoming a popular means of transport. The daily vehicle miles per household has also increased since 1990(25). This rise is partially attributed to inability of children to ride their bicycles, walk to school or other activities. Reasons for this include too much traffic, unsafe routes and school being too far from home(25).

A systematic review done in Sub Saharan Africa reported significant higher rates of overweight and obesity among children and adolescent living in urban areas compared to those in rural areas(26).

A multinational cross-sectional study done in Nairobi among private and public school children aged 9-11 years reported that out of 563 participants, children who used active transport(22.4%) met the recommended physical activity guidelines compared to 5.5% who used motorized transport(2).

### 2.3.3 Changes in School and Child Care

The evolution of the mode of transport to school was accompanied by a change in the school environment.

#### 2.3.3.1 Foods and beverages

The changes in the food market also resulted in increased availability and consumption of soft drinks in school. The use of vending machines in schools in industrialized countries was a major contributor to this between 1978-1998 and resulted in a 48% increase of soft drink consumption in schools. By the year 2000, 67% of middle school and high school children had access to vending machines. A study done by Wachira LJ et al on association between dietary behaviors and weight status of 9-11year old children recruited from private and public schools in Nairobi found that out of 563 participants, 72.9% of the respondents ate meals away from home and 55.2% of these took lunch provided by their respective schools. The study did not report on the types of food groups constituting these lunch meals but it did report a high prevalence of obesity and overweight among school going children in Nairobi(3).

#### 2.3.3.2 Physical activity

Physical activity (PE) lessons have been gradually phased out of schools to give more hours to academics. Daily PE attendance reduced from 42% in 1991 to about 29% by 2003 in the USA. A potential cause of this is an increase in the amount of homework assigned particularly to the youngest students. Sandra Hofferth et al, reported that the amount of time allocated to studies by children aged six to eight years rose to 146 percent(25).

A potential contributing factor is the rise in the number of children left in day care centers after school resulting in a decline in unorganized play. These facilities are commonly being used among employed mothers of preschool age and school going children. According to National Health and Nutrition Examination Survey, the trends in maternal employment from 1970-1998 superimposed against trends in rates of childhood obesity shows a positive correlation (Figure 2). The multinational cross-sectional study done by Muthuri et al reported that ninety four percent of the participants went to schools with written policies on physical activity. This study did not expound on the types of physical activity the participants undertook(2).

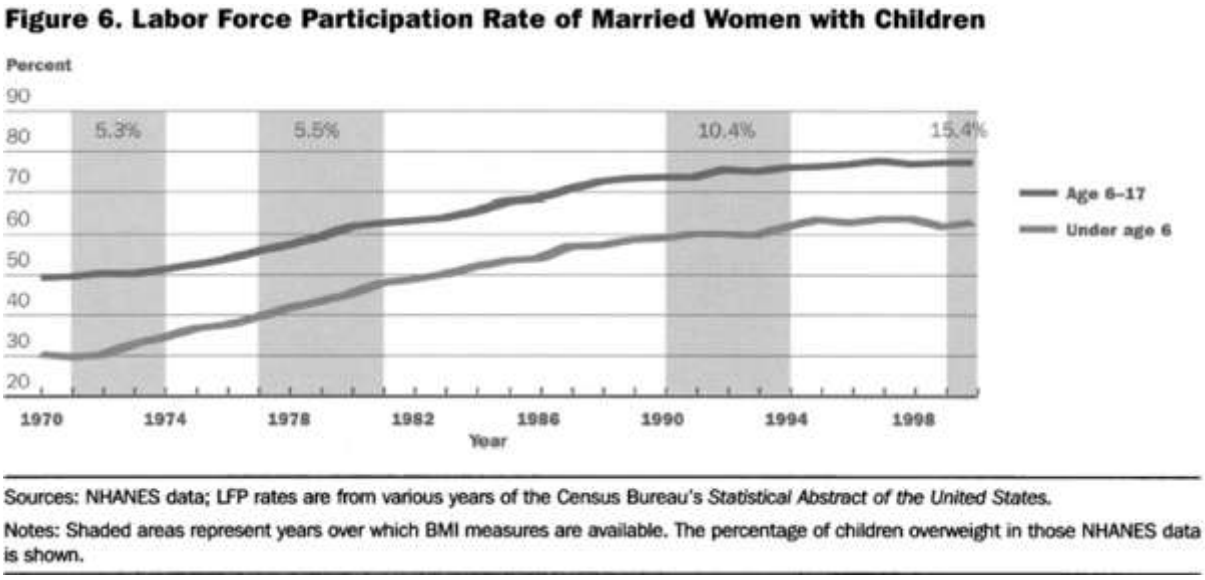



Figure 2: Labor force participation rate of married women with children by National Health and Nutrition Examination Survey

### 2.3.4 Changes in the Role of Parents

Muthuri et al reported a positive association between the parental level of education and obesity/overweight. The higher the maternal or paternal level of education the higher the chance of the child being obese or overweight(2). However, a study done by Ibrahim Said et al among nursery school children aged 3-6years in Embakasi found no significant association between maternal level of education and a child's body mass index but found significant association between household monthly income and obesity.

#### 2.3.4.1 Nutrition

Many households tend to rely on restaurant meals or buy pre-cooked meals because of convenience. This is largely due to the large number of children with both parents in employment. Evidence shows that this reduces the amount of time spent cooking nutritious meals(25).

A study that looked at the impact of maternal employment on obesity in childhood found out that a 10hr increment in mean hours worked each week over a child's lifetime is associated with a one percent risk of obesity(25).

### 2.3.4.2 Physical activity

The amount of supervised active play has significantly reduced due to more intense working hours subjected to mothers. Also noted was that having both parents full time employment also discourages children from walking to school. These parents would prefer driving their children to school on their way to work. Therefore, maternal employment affects both a child's nutritional status and physical activity(25).

### 2.3.4.3 Screen time

School-age children with both parents employed have increased screen time because of spending their afternoon hours unsupervised. The number and placement of televisions in homes has also increased. The USA in 1970 reported that 35 % of homes had more than one placement of television but by 1999 ,88% of homes had more than one television(25). This trend coincided with the rising trend of childhood obesity in the USA during the 1970s-1990(Figure 3). Wachira LJ et al also looked at association between screen based sedentary behavior and body mass index in the same multinational cross-sectional study. The study found that 67.9% of the participants did not exceed the recommended two hours limit during school days but 74.2% exceeded the recommended guidelines over the weekend. The type of school and gender of the participant were significantly associated with screen time but no significant association was found between screen time and body mass index(4).

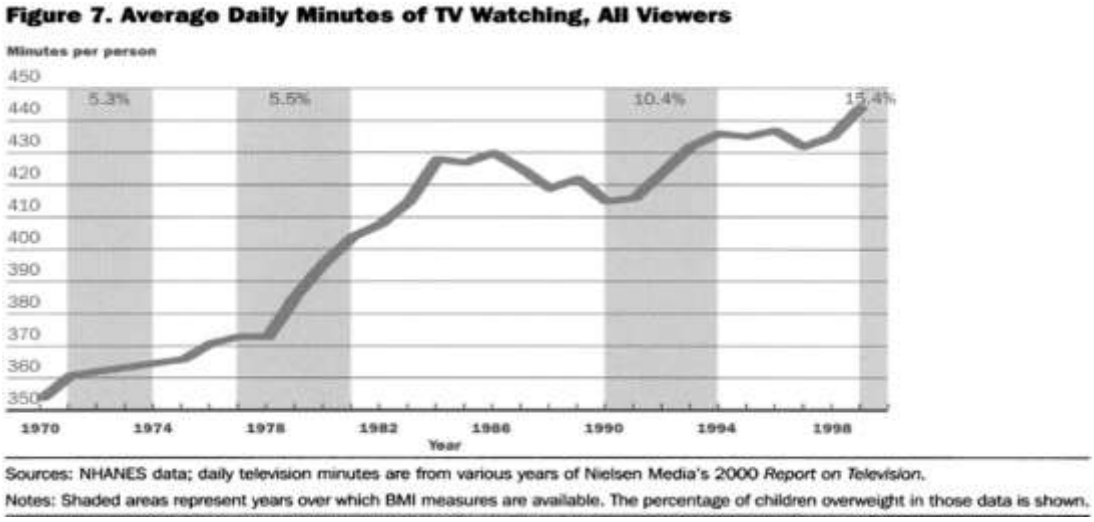



Figure 3: Average daily minutes of TV watching, all viewers by National Health and Nutrition Examination Survey

### 2.3.5 Sleep deprivation

Longitudinal studies have demonstrated that shorter duration of sleep predict the later emergence of obesity and overweight. Sleep deprivation impairs one's problem-solving abilities, attention and impulse control thus may cause undermined dietary choices. Lack of sleep may affect human humoral systems that affect metabolism of glucose, release of serotonin and neuropeptides that affect eating behavior. Leptin hormone decreases food intake and promotes energy expenditure and scientists have shown decreased levels in sleep deprived individuals. A cross-sectional study reported that adolescents who were obese experienced shorter duration of sleep than did no obese adolescents. The study also demonstrated that daytime physical activity reduced by three percent for every one hour increase in sleep disturbance(6).A systematic review done by Regina Felso et al which objectively assessed sleep duration reported a negative association between sleep duration and body mass index(27)(28).

### 2.3.6 Genetics

Parent's genetics can influence the development of overweight and obesity in childhood but genetics alone cannot explain why the childhood prevalence of obesity has been rising in the recent years. Parent's genetic traits may increase the susceptibility to overweight in their child in the presence of energy imbalance. Environmental factors that influence intake or energy expenditure can be the trigger of weight gain in the susceptible children(25).

The above review clearly points out that overweight and obesity is mostly caused by modifiable factors and most of which can be prevented by lifestyle adjustments.

## 2.4 Conclusion

Both international and local data demonstrates that the trend in the prevalence of obesity and overweight is on the rise and most of its causes are preventable. It is also clear that most international and local data on prevalence of obesity and overweight focused mainly on national nutrition surveys or studies done on children in schools. Despite the selection bias that will arise from choosing a tertiary hospital as a study site, the international studies that were done in a hospital setup revealed a high prevalence of obesity and overweight especially in the emergency department, proving that obesity and overweight causes certain morbidities that disproportionately drive children to visit an emergency department. Therefore, assessing risk factors associated with

obesity and overweight will help reduce the cost of recurrent emergency department visits or hospitalization that may be incurred with families of overweight and obese children.

This study aims to find out if obesity and overweight is a problem among patients seen as outpatient at the pediatric emergency unit and accident and emergency department in Kenyatta National Hospital. It will also provide data that may be necessary in formulating national strategies targeted at preventing the modifiable risk factors.

***Table 2: Summary of the Risk Factors associated with childhood obesity and their strengths of association***

| **Study** | **Setting** | **Risk factor** | **Type of association** | **Strength of association** |
|---|---|---|---|---|
| Muthuri SK et al, multi-national,cross-sectional study | Primary schools in Nairobi, 2012, | School environment factors | Positive | p-value < 0.0001 |
| Muthuri SK et al multi-national,cross-sectional study | Primary schools in Nairobi, 2012, | Transport to school | Positive | p-value 0.0019 |
| Ibrahim Saida et al, cross-sectional study | Nursery schools Nairobi,2015 | Physical activity | Positive | p-value 0.032 |
| Wachiral LJ et al, multi-national,cross-sectional study | Primary schools in Nairobi,2012 | Consumption of cakes, potato crisps, fast-foods and milk products | Negative | Cakes(pvalue 0.023), potatocrisps(pvalue 0.003),fast-foods (pvalue0.036),milk products(p values0.017) |
| Muthuri SK et al, multi-national,cross-sectional study | Primary schools in Nairobi,2012 | Parental level of education | Positive | p value<0.0001 |
| Ibrahim Saida et al, cross-sectional study | Nursery schools in Nairobi,2015 | Maternal level of education | No association | p value>0.005 |

| | | | | | |
|---|---|---|---|---|---|
| Wachira LJ et al, Multi-national,cross-sectional study | Primary schools in Nairobi,2012 | Screen time | No association | p value 0.112 | **2.5** |
| Kelly R et al, cross-sectional study | 2 school districts in Minnesota and Iowa,2005 | Sleep duration | Negative association | Boys(pvalue 0.002), girls(p value 0.008) | |
| ReginaFelso et al, systematic review | 33 studies from America, Europe and Asia and 1 multicenter study | Sleep duration | Negative association | | |

**Conceptual Framework**

### 2.5.1 Narrative

Multiple factors interplay in the development of obesity and overweight in children (energy balance). Energy intake is determined by the amount and nutritional value of food consumed while energy expenditure is determined by the level of physical activity which is influenced by amount of organized and unstructured play, means of transport from school and amount of screen time. Sleep duration can affect both the amount of energy intake and energy expenditure. In this study five risk factors will be assessed from those discussed in the literature review. Consumption of fast-foods, snacks and sugary drinks will be assessed because of the negative association found in the local study which conflicts with what was found in the national nutritional survey in USA and also with what is known from vast literature sources. Parental level of education will be assessed because of conflicting findings between the two studies done in Nairobi. The type of physical activity undertaken by the recruited participants will be assessed in this study because the study done by Muthuri et al assessing the association between obesity and physical activity level in Kenyan schools failed to assess this aspect. The type of transport to school was associated with meeting the physical activity guidelines and thus this study will purpose to find out if the distance from home to school affected the choice of mode of transport. Screen time duration will also be assessed because the Kenyan study done by Wachira LJ et al found no association between screen

time and body mass index. Finally sleep duration was not assessed in our local studies thus will be included in this study's variables.

### 2.5.2 Summary of the Conceptual Framework

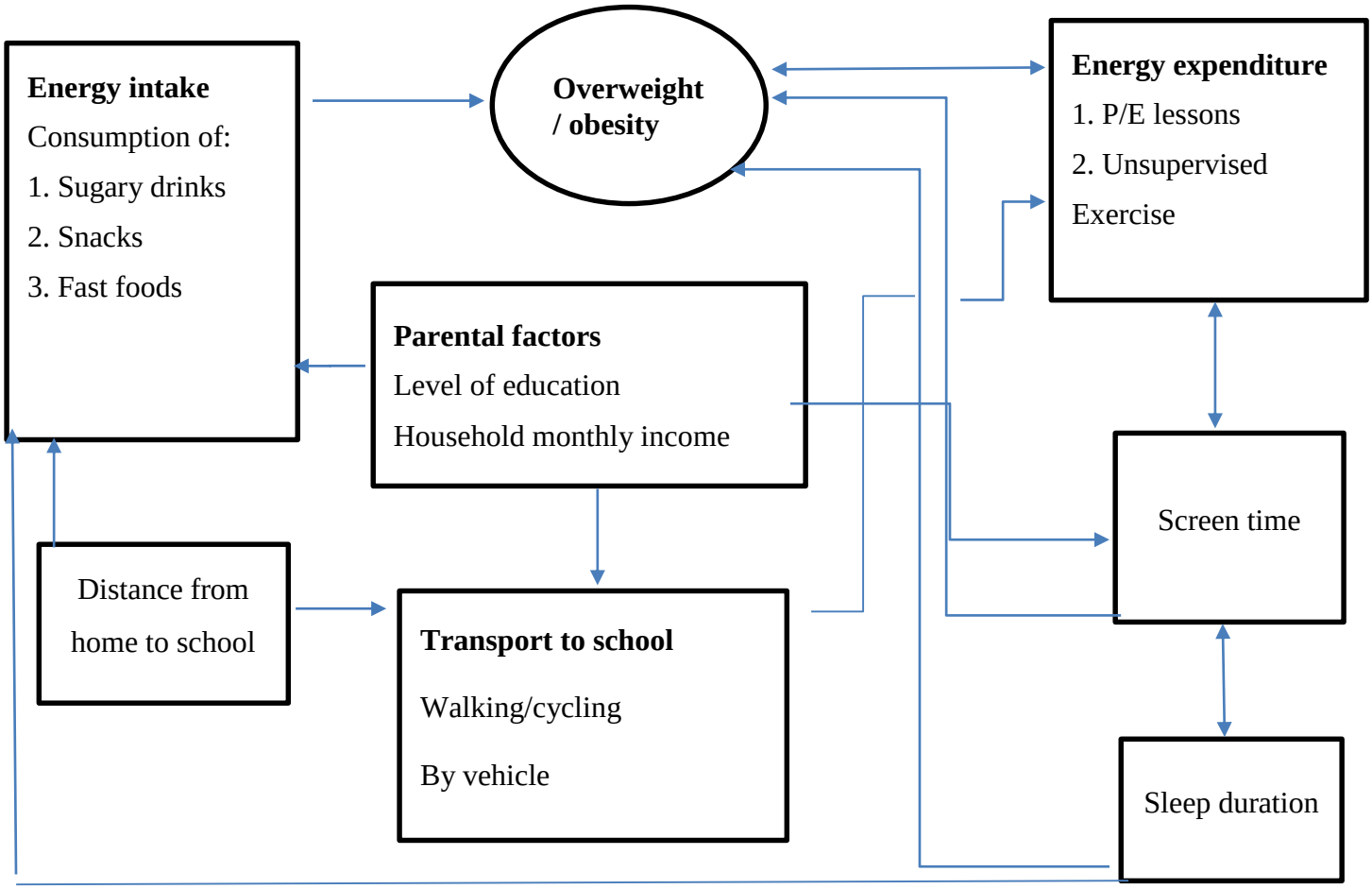



Figure 4: Conceptual framework for the risk factors for obesity and overweight

## 2.6 Justification for the Study

Few studies have been done locally or in Africa assessing prevalence of overweight or obesity within a hospital setup. Most studies done in the country and within Africa focused on children in schools. Obese children are likely to suffer from morbidities that make them visit the emergency department. It is therefore important to find out if obesity is affecting our children in Kenyatta National Hospital.

Currently, body mass index is not among the routine anthropometric measurements done during triage of children at the emergency departments in KNH. Conducting this study in an emergency department will elucidate the missed opportunity in identifying childhood obesity during the Covid 19 pandemic. This will further facilitate early screening and timely specialist referral of obese and overweight children to allow management of these children and thus prevent complications associated with obesity.

International and local studies done so far have revealed that the risk factors associated with obesity and overweight are modifiable, such as increased consumption of sugary drinks and reduced level of physical activity. These are influenced by factors such as amount of unstructured and organized play, screen time and type of school transport.

Conducting this study will help in availing data that the pediatric scientific community and MOH can use to make informed decisions towards prevention and management of childhood obesity and overweight.

## 2.7 Research Question

What is the prevalence and risk factors associated with overweight and obesity among children seen as outpatient at pediatric emergency unit and accident and emergency department in Kenyatta National Hospital?

## 2.8 Objectives

### 2.8.1 Primary Objective

To determine the prevalence of overweight and obesity among children seen as outpatient at paediatric emergency unit and accident and emergency department in Kenyatta National Hospital.

### 2.8.2Secondary Objective

To determine risk factors associated with overweight and obesity among children seen as outpatient at paediatric emergency unit and accident and emergency department in Kenyatta National Hospital. The following risk factors will be explored: age, sex, frequency of soft drinks, frequency of snacks and fast foods, playing field availability, screen hours, sleep hours, mode of transport to school and family monthly income.

# CHAPTER THREE: METHODOLOGY

## 3.1 Study Design

This was a cross-sectional study aimed at finding out the prevalence and risk factors of obesity and overweight among outpatient children aged two to twelve years seen at the paediatric emergency unit and accident and emergency department in Kenyatta National Hospital.

## 3.2 Study Site and Setting

This study was conducted at the paediatric emergency unit and accident and emergency department in Kenyatta National Hospital between the months of September 2021 to January 2022. According to the Health information department of Kenyatta National Hospital, the total number of children seen in pediatric emergency unit averages about 37,170 annually. The total number of children seen in 2020 dropped to 20765 annually and this was attributed to the covid 19 travel restrictions and curfews. As from January to July 2021 17,390 children were seen in the pediatric emergency unit. This shows the number of children being seen is now on the rise.

At the accident and emergency department in KNH, the total number of children seen between 2-12yrs averages 3740 annually. The total number seen in 2020 declined to 2521 due to the covid 19 travel restrictions and curfew. From January- July 2021 the number of children seen aged 2-12yrs was 1510.

Various conditions drive children to seek outpatient services at KNH. The various morbidities of children seen at pediatric emergency unit and accident and emergency in KNH are outlined in appendix VIII. Comorbidities seen in children with obesity such as fractures, asthma, hypertension and diabetes mellitus are among conditions that children presented with in both pediatric emergency unit and accident and emergency in the period between January 2018-July of 2021 in KNH.

Information about the residence of the children seen in the two outpatient departments between 2018 to July 2021 was not available.

The total number of patients seen as outpatients decreased from 84 % (32,036) of the total in 2019 to 75 % (15,591) of the total in 2020. In January to March of 2021 the total number of children seen at pediatric emergency unit was 9,008 and 76% (6867) of these children were seen as outpatient. The number of children admitted who were less than 2years represented 56%,57% and

59% in the years 2019,2020 and January to march of 2021 respectively. This shows that a greater percentage of the children attended to at pediatric emergency unit are seen as outpatient and most of the children admitted are less than 2years. Further information about the statistics of both study sites can be found in appendix VIII.

### 3.3 Study Population

The population of this study included all outpatient children (patients who will not be admitted) aged between 2-12yrs, seen between the months of September 2021 to January 2022 at paediatric emergency unit and accident and emergency department in Kenyatta National Hospital. According to the health information department of Kenyatta national hospital an average of 3200 children are reviewed at the KNH pediatric emergency unit and accident and emergency department in a month (refer to appendix VIII). The KNH being a teaching and referral hospital, characteristically has a heterogeneous population of patients not only from Nairobi but from across other counties; additionally, these patients are from across both low, middle and high socio-economic status, a majority of which are from the middle level status.

### 3.4 Inclusion criteria

All children aged between 2-12yrs (with children aged >6 years having given assent), seen as outpatient whose guardians consented to participate in the study from September 2021 to January 2022 at pediatric emergency unit and accident and emergency department in Kenyatta National Hospital.

### 3.5 Exclusion criteria

Any child requiring admission because these are critically ill children. A critically ill child was defined using the WHO pediatric emergency, triage, assessment and treatment guidelines(1).

### 3.6 Sample size Determination

The literature review done did not find any study in a similar setting looking at the prevalence of obesity and overweight. Therefore, 50% prevalence will be used to determine the sample size.

The sample size will be calculated using the formula for a descriptive study.

$$n = \frac{Z^2 p (1-p)}{d^2}$$

Where Z = Z statistic for a level of confidence

P = expected prevalence of overweight and obesity.

n = sample size

d = precision

In proportion of one; if 5%, d = 0.05

For the level of confidence of 95%, Z value is 1.96

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

n=384

### 3.7 Sampling Procedure

Sample selection was nonrandomized consecutive sampling of eligible patients until the desired sample size was achieved.

### 3.8 Data Variables

***Table 3: Study Variables***

| | |
|---|---|
| Socio Demographic Characteristics | Child: Age, Weight, Height, BMI,<br>Parent/Guardian: level of education, monthly household income |
| Exposure Variables (risk factors)<br><br>Cofounders<br><br>Effect modifiers | Consumption of sugary drinks -This includes sodas and other carbonated soft drinks, juices, energy drinks, sweetened tea, coffee and chocolate milk<br>Consumption of fast foods-this includes meals that can be easily prepared and served away from home such as chips, hotdogs, burgers, samosa, sausages, ice-cream<br>Consumption of snacks- this is a small amount of food eaten between main meals such as cakes, bread, fruits, vegetables and ice-cream<br>Use of vehicle/active transport- Mode of travel to school. Active transport includes travel by bicycle, foot or public transport.<br>Distance from home to school- The length in kilometers to be covered between home and school.<br>Playing field at home- availability of a piece of land designated for playing sports.<br>Screen time per day- amount of time spent using a device such as videogames, television set, smartphones, tablets and computers for recreational purposes. According to American academy of pediatrics screen time should be restricted to less than two hours a day.<br>Duration of sleep at night- Number of hours of sleep in a night. According to the National sleep foundation the recommended sleep time is ten hours of sleep per night.<br>PE lessons- physical exercise and games undertaken in schools.<br>Residence- the house or apartment where one lives.<br>Street vendors- an individual selling perishable or nonperishable items on the street from a van or a stall, displaying them on the pavement. |
| Outcome Variables (prevalence) | Overweight- a body mass index equal to or more than eighty fifth percentile but less than ninety fifth percentile for same sex using CDC body mass index charts.<br>Obese- a body mass index at or above the ninety fifth percentile for same sex using CDC body mass index charts. |

### 3.10 Data Collection

Participants were enrolled into the study as per the inclusion and exclusion criteria. Data collection was done at the Pediatric emergency unit and Accident and Emergency department in Kenyatta National Hospital. The principal investigator observed Covid 19 protocols on personal protection during data collection. Consent was taken from the guardian of the participant and assent was taken from children aged six years and above.

Data collection was conducted by the principal investigator. The principal investigator used one professional weight and height scale to get weight and height measurements. All participants were required to remove their shoes and hats. All measurements were double checked for accuracy. A parent or guardian was in the same room as the participant during data collection. Body mass index was calculated using the formula weight in kilograms divided by height in square meters, the formula and result was double checked and then plotted on CDC gender specific body mass index chart. A structured close ended questionnaire was administered which included anthropometric data, demographic data and data on specific risk factors.

### 3.11 Data management and analysis

After data collection, responses were coded and entered in to excel by use of excel data entry forms. The data was then imported in to R version 4.0.2 in preparation for analysis. In R the responses were recorded, data cleaned.

Categorical variables such as sex, place of residence and income per month were analyzed descriptively using frequencies and proportions. The descriptive data was the presented using tables and bar graphs. Continuous variables such as age of the children was analyzed using median and interquartile range. Prevalence of obesity and overweight was presented as a proportion with 95% confidence intervals. The prevalence was also presented on a bar graph in percentage form.

For inferential analysis crude odds ratios were computed for categorical variables such as for association between the age categories and obesity/overweight. The p-values were computed using Pearson’s chi square or fisher’s exact test to check the significance of association.

Binary logistic regression was used in evaluating the effect of the risk factors associated with obesity and overweight. This analysis adjusts the odds ratios in relation to the other risk factors in order to get the net effect of each risk. The effect of the predictors was assessed using p-values and

odds ratios at 95% confidence level. P-values greater than 0.05 and odds ratios of one were considered to be statistically insignificant.

### 3.12 Quality Assurance

The researcher adhered to the study protocol with the methodology rigorously adhered to. Cleaning and duplication were done before data analysis and the procedures documented.

### 3.13 Ethical Considerations

The study proposal was submitted to the KNH/UON ERC for approval before the commencement of the study. Pre-consent counselling was done. Written informed consent was acquired from parents/guardians and for children from six years of age assent was acquired as well prior to enrolment into the study. Patients who consent to inclusion into the study were guaranteed the utmost observance of confidentiality and were allowed to drop out at any time during the study period. Those who declined to give informed consent or assent were not denied treatment. The study participants did not incur any extra financial costs. Patient's data was de-identified to maintain confidentiality. The principal investigator and the statistician were the only ones with access to the collected data. The completed data capture tools were stored in locked cabinets and databases were password protected. The principal investigator did not benefit in monetary terms from this study. The results will be published to allow other medical practitioners to benefit from the study.

**RESULTS**

**The following study flow was followed during the study.**

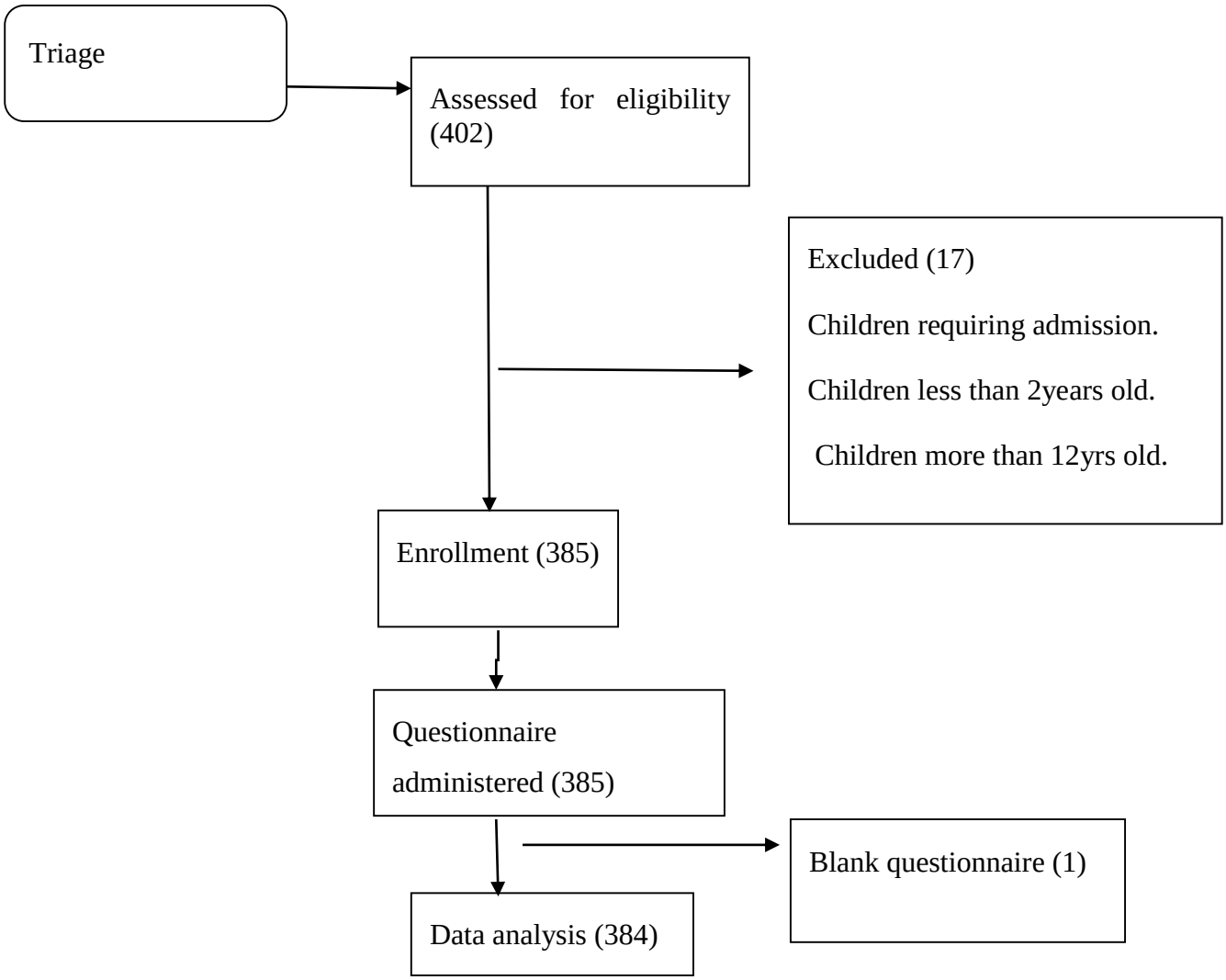



Figure 5: Study Flow Diagram

*Table 4: Demographic and clinical characteristics of the participants (n=384)*

| **Variable** | **Paediatric emergency unit N = 371** | **Accidents and emergency N = 13** |
|---|---|---|
| **Children characteristics** | **Frequency (%) Median (IQR)** | **Frequency (%)** |
| Age | 5.5 (3.8, 8.6) | 4.3 (3.5,7.0) |
| Weight 9-78 Kgs | 20 (15.0, 28.0) | 17.5 (15.0, 22.0) |
| Sex: Male | 210 (56.6%) | 5 (38.5%) |
| Female | 161 (43.4%) | 8 (61.5%) |
| Level of study: None | 74 (19.9%) | 5 (38.5%) |
| Preschool | 130 (35%) | 4 (30.8%) |
| Lower primary | 105 (28.3%) | 3 (23.1%) |
| Upper primary | 62 (16.7%) | 1 (7.7%) |
| Type of school: Private | 250 (68.7%) | 7 (53.8%) |
| Public | 116 ()31.3% | 6 (46.2%) |
| School going Yes | 299 (80.6%) | 8 (61.5%) |
| Children: No | 72 (19.4%) | 5 (38.4%) |
| Residence: Outside Nairobi | 150 (40.4%) | 6 (46.2%) |
| Nairobi | 221 (59.6%) | 7 (53.8%) |
| **Guardian/Family characteristics** | | |
| Education level: None | 2 (0.5%) | |
| Primary | 49 (13.2%) | 3 (23.1%) |
| Secondary | 140 (37.7%) | 3 (23.1%) |
| College | 137 (36.9%) | 3 (23.1%) |
| University | 43 (11.6%) | 4 (23.1%) |
| Monthly Income | | |
| in Kenya shillings < 10000 | 105 (28.3%) | 3 (23.1%) |
| 100000-50000 | 188 (50.7%) | 7 (35.8%) |
| 50001-100000 | 57 (15.4%) | 2 (15.4%) |
| >100001 | 21 (5.7) | 1 (7.7%) |

Most of the children seen in PEU and A& E were enrolled into school. The preschoolers were the majority for those in paediatric emergency unit. Majority of the children seen in both emergency departments had been enrolled into private schools (Table 4).

**Age distribution of the children**

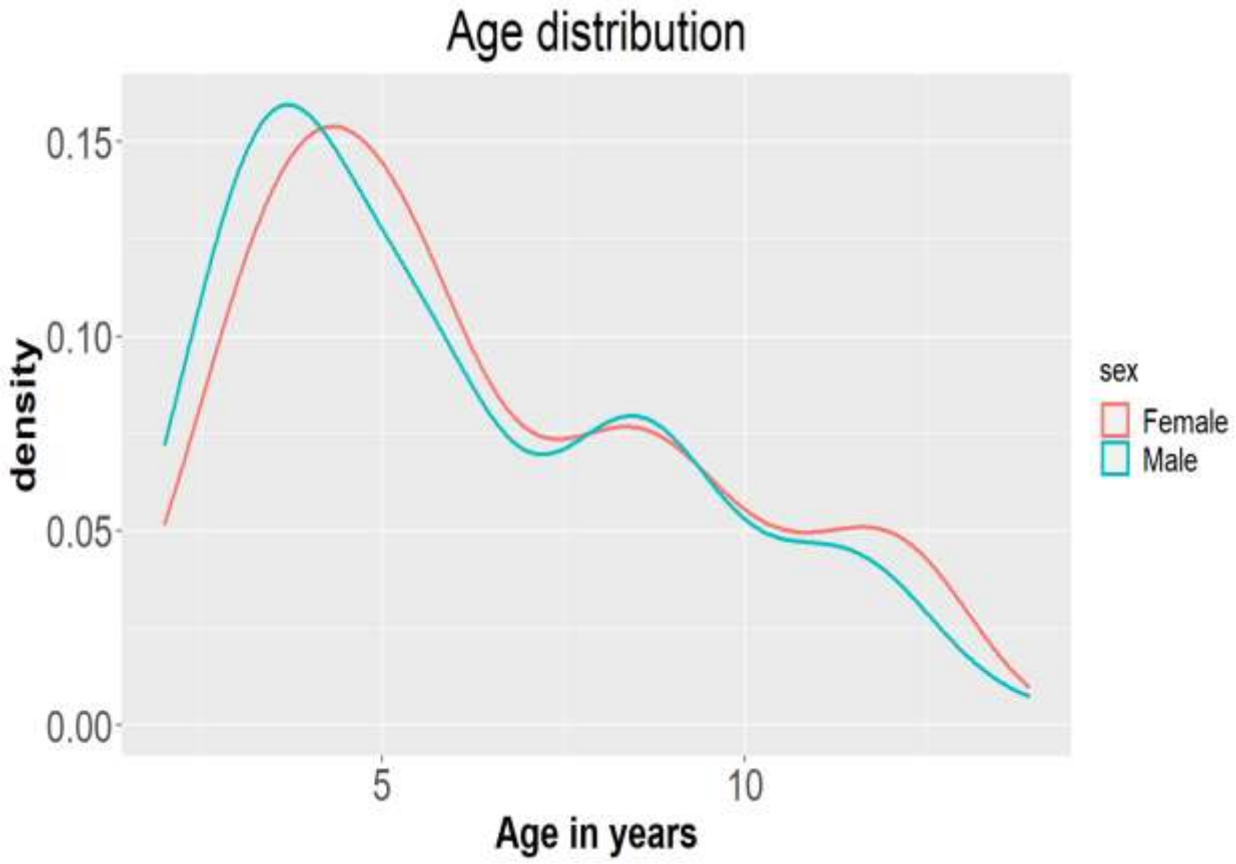



Figure 6: Density plot of age distribution of the children

The age of the participating children was positively skewed for both males and females. The median age was 5.5 years with an interquartile range of 4.8 years. The mean age was 6.2 years.

**Distribution of Weight**

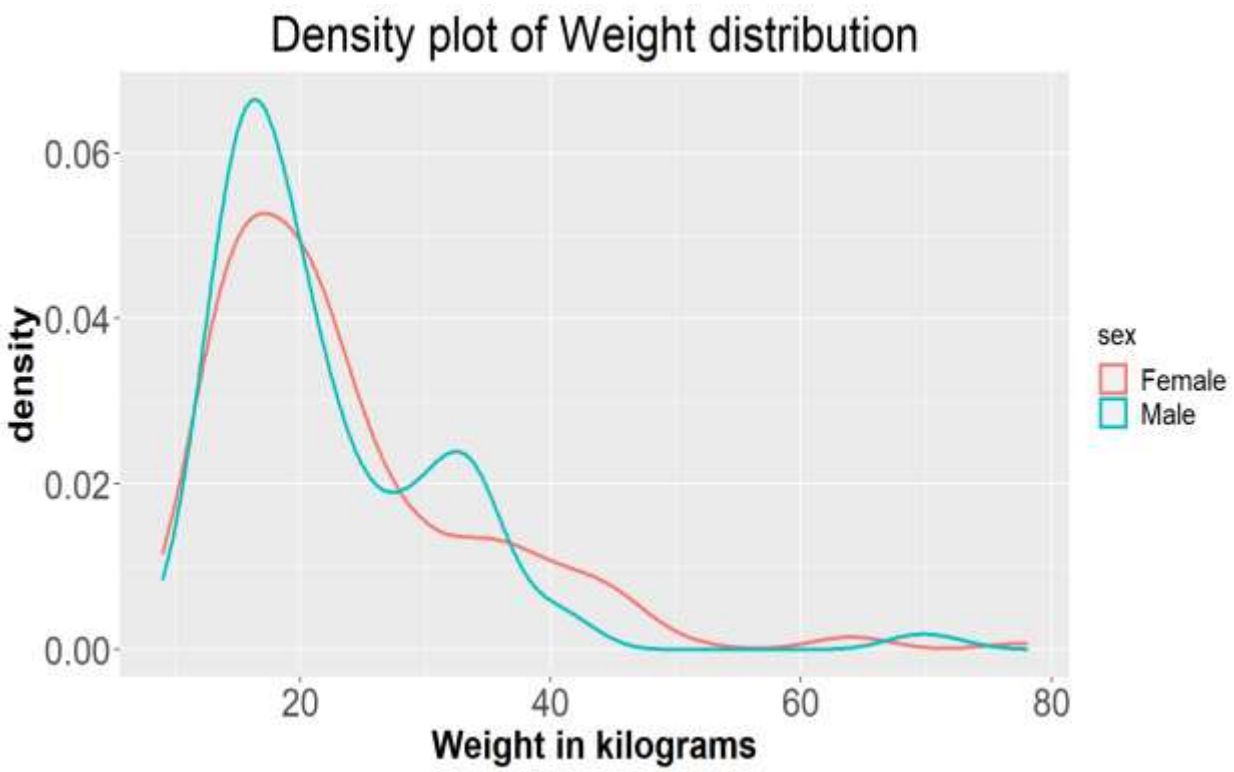



Figure 7: Density plot showing weight distribution for the participating children

The weight of the children was positively skewed. The median weight was 20.0 kilograms with an interquartile range 13.0 kilograms. The mean weight was 22.8 kilograms.

**Primary objective: To determine the prevalence of obesity and overweight with 95% confidence interval**

In terms of nutritional status, children were classified in to 4 categories using body mass index percentiles. The BMI percentiles were calculated using weight (kilograms) and height (meters) and the sex of the child was taken in to account. This study found a combined prevalence of obesity and overweight to be 22% (CI95%: 18%, 26%).

Healthy children were 70%(CI95%:65,75%) while the rest were found to be underweight.

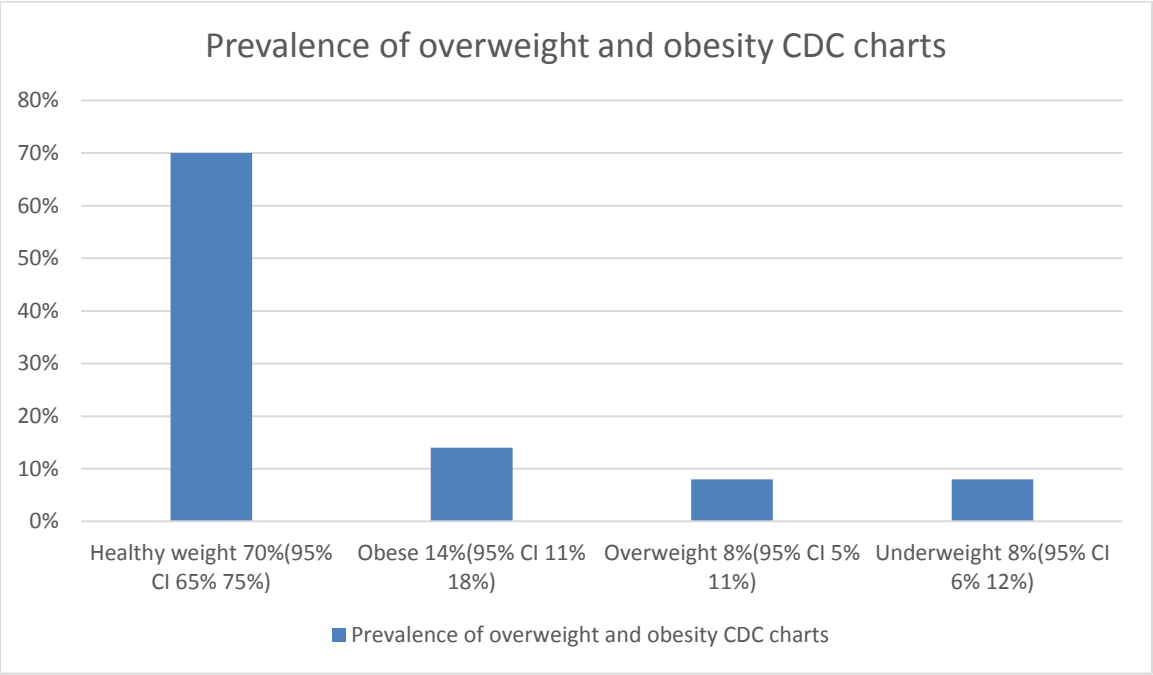



Figure 8: Bar graph showing prevalence of obesity and overweight using CDC body mass index charts

**Secondary objective: Risk factors associated with obesity and overweight**

***Table 5: Bivariable analysis of risk factors associated with obesity and overweight***

| Variable | Categories | Outcome | | | |
|---|---|---|---|---|---|
| | | +Healthy (ref) N = 301 | + (Overweight + Obese) N = 83 | Crude OR (95%CI) | P-Value |
| Age in years | <6 years (ref) | 183 (60.8%) | 39 (47.0%) | | |
| | 6-12years | 118 (39.2%) | 44 (53%) | 1.75 (1.07, 2.85) | 0.02 |
| Sex | Female (ref) | 136 (45.2%) | 32 (38.6%) | | |
| | Male | 165 (54.8%) | 51 (61.4%%) | 1.31 (0.79, 2.16) | 0.28 |
| Frequency of soft drinks | Daily (ref) | 226 (75.0%) | 57 (68.7%) | | |
| | Rarely | 21 (7.0%) | 4 (4.8%) | 0.76 (0.25, 2.29) | 0.80 |
| | Weekly | 46 (15.3%) | 21(25.3%) | 1.81 (1.01,3.27) | 0.05 |
| | Monthly | 8 (2.7%) | 1 (1.2%) | 0.50 (0.06, 4.04) | 0.70 |
| Frequency of snacks: | Daily (ref) | 157 (52.1%) | 31 (37.3%) | | |
| | Rarely | 27 (9.0%) | 7 (8.4%) | 1.31 (0.53, 3.28) | 0.62 |
| | Weekly | 96 (31.9%) | 42 (50.6%) | 2.22 (1.31, 3.76) | 0.003 |
| | Monthly | 21 (7.0) | 3 (3.6%) | 0.72 (0.20, 2.58) | 0.77 |
| Playing field available | No (ref) | 55 (18.3%) | 10 (12.0%) | | |
| | Yes | 264 (81.7%) | 73 (88%) | 1.63 (0.79, 3.36) | 0.18 |
| Screen hours | >2 hours (ref) | 84 (27.9%) | 27 (32.5%) | | |
| | 0 – 2 hours | 217 (72.1%) | 56 (67.5%) | 0.80 (0.48, 1.35) | 0.41 |
| Sleep hours: | >10 hours (ref) | 79 (26.2%) | 22 (26.5%) | | |
| | 0 – 10 hours | 222 (73.8%) | 61 (73.5%) | 0.99 (0.57, 1.71) | 0.96 |
| Mode of transport to school: | Vehicle (ref) | 110 (36.5%) | 22 (26.5%) | | |
| | Walking | 191 (63.5%) | 61 (73.5%) | 1.60 (0.93, 2.74) | 0.09 |
| Family monthly income in Kenya shillings | <10,000 (ref) | 97 (32.2%) | 12 (14.5%) | | |
| | 10,001-50,000 | 142 (47.2%) | 51 (61.4%) | 2.90 (1.47, 5.73) | 0.002 |
| | 50,001-100,000 | 44 (14.6%) | 16 (19.3%) | 2.94 (1.28, 6.73) | 0.02 |
| | >100,000 | 18 (6.0%) | 4 (4.8%) | 1.80 (0.52, 6.20) | 0.47 |

Four factors were established to be significantly associated with the nutritional status of the children. These factors were age, consumption of soft drinks, consumption of snacks and family

income, p-values <0.05 at 5% significance level. Children aged 6 years and above were 75% (OR 1.75) more likely to be obese or overweight compared to those less than six years. Those children who took soft drinks weekly were 81% more likely to be obese or overweight compared to those who took soft drinks daily.

Weekly consumption of snacks increased the odds of being obese or overweight by 2.22 times the odds of those who consumed snacks daily while monthly consumption of snacks reduced the odds of being obese or overweigh by 28% compared to daily consumption. The odds of being obese or overweight for children who came from families that earned monthly incomes of 10,000-50,000 and 50,001-100,000 were 2.90 and 2.94 times higher respectively the odds of children whose families earned less than 10,000. Children who came from families that earned more than Kenya shillings 100,000 were 84% more likely to be obese or overweight compared to those whose families earned less than 10,000 Kenya shillings (table 5).

**Multivariable analysis**

The factors presented under multivariable analysis were selected through Akaike's Information Criteria (AIC) where 4 variables were selected to explain the outcome. A binary logistic regression model was utilized to assess the factors associated with obesity and overweight.

***Table 6: Multivariable analysis of risk factors associated with obesity and overweight***

| **Variable** | **Categories** | **Outcome** | | | |
|---|---|---|---|---|---|
| | | **+Healthy (ref) N = 301** | **+ (Overweight + Obese) N = 83** | **Adjusted OR (95%CI)** | **P-Value** |
| Age in years | <6 years (ref) | 183 (60.8%) | 39 (47.0%) | | |
| | 6-12years | 118 (39.2%) | 44 (53%) | 1.71 (1.02, 2.88) | 0.04 |
| Frequency of snacks: | Daily (ref) | 157 (52.1%) | 31 (37.3%) | | |
| | Rarely | 27 (9.0%) | 7 (8.4%) | 1.34 (0.48, 3.32) | 0.55 |
| | Weekly | 96 (31.9%) | 42 (50.6%) | 2.34 (1.34, 4.11) | 0.003 |
| | Monthly | 21 (7.0) | 3 (3.6%) | 0.79 (0.17, 2.55) | 0.72 |
| Mode of transport to school: | Vehicle (ref) | 110 (36.5%) | 22 (26.5%) | | |
| | Walking | 191 (63.5%) | 61 (73.5%) | 1.81 (1.01, 3.34) | 0.05 |
| Family monthly income in Kenya shillings | <10,000 (ref) | 97 (32.2%) | 12 (14.5%) | | |
| | 10,001-50,000 | 142 (47.2%) | 51 (61.4%) | 3.68 (1.87, 7.77) | 0.001 |
| | 50,001-100,000 | 44 (14.6%) | 16 (19.3%) | 4.04 (1.66, 10.10) | 0.002 |
| | >100,000 | 18 (6.0%) | 4 (4.8%) | 1.75 (0.44, 6.00) | 0.39 |

Age and mode of transport were significantly associated with obesity and overweight after adjusting for other factors, p-values 0.04 and 0.05 respectively at 5% significance level. Weekly consumption of snacks, family incomes of between 10,001-50,000 and 50,001-100,000 were also significantly associated with obesity and or overweight.

Children aged six years and above were 71% (OR 1.71) more likely to be obese or overweight compared to those under 6 years after adjusting for the other factors. Weekly consumption of snacks increased the odds for obesity and or overweight by 2.34 times (OR 2.34) the odds of those who consumed daily. Children who consumed snacks monthly were 21% less likely to be obese or overweight compared to those who consumed daily (OR 0.79).

Children who came from families with a monthly income of between KSHs. 10,000 and 50,000 were 3.68 times more likely to be obese and or overweight compared to those with households that earned less than 10,000. Family income of KSHs. 50,001-100,000 increased the odds of obesity or overweight by 4.04. Incomes of more than Kenya shilling 100,00 increased the odds of obesity 75% after adjusting for other factors (table 6).

## DISCUSSION

The aim of this study was to find out the prevalence and risk factors of overweight and obesity among children seen as outpatient in the emergency departments at Kenyatta National Hospital.

### Summary of the results

In this study we found the prevalence of obesity and overweight to be at 14% and 8% respectively using CDC body mass index charts and the prevalence of obese and overweight to be at 16% and 11% respectively using WHO body mass index charts. The prevalence of obese and overweight children as a composite outcome using CDC and WHO BMI charts was at 22% and 27% respectively. The confidence intervals did not show a difference in prevalence.

The regional data from Kenya demographic health survey of 2014 found the prevalence of overweight among children under 5 years was 4%. These trends compare with those seen in a longitudinal survey (2018-2020) done in USA among a cohort of children and adolescents aged 2-19years. The survey found the prevalence of obesity was 22.4% (CI: 95%: 22.3–22.6) in august 2020 and was 19.3% (CI:95%:19.1–19.4) one year ago in august of 2019(5). These findings highlight the need for strategies to prevent and manage overweight and obesity during and after the Covid 19 pandemic.

Age of the child above 6 years, weekly consumption of soft drinks, weekly consumption of snacks and family income of between Kenya shillings 10,000-50,000 and 50,001-100,000 were significantly associated with obesity and overweight. We did not find statistical significance in soft drinks, snacks and fast-foods that were consumed monthly or rarely. On multivariable analysis, age of the children, weekly consumption of snacks and fast-foods and family income of Kenya shillings 10,000-50,000 and Kenya shillings. 50,001-100,000 were significantly associated with odds of obesity and or overweight. Level of income above Kenya shillings 100,000 was not found to be significantly associated with obesity and overweight.

Children who came from families with a monthly income of Kenya shillings 10,000-50,000 and 50,001-100,000 had their odds of being obesity and overweight increased 2.90 and 2.94 times respectively while after adjustment for other factors, the odds for obesity and overweight were increased by 3.68 and 4.04 times for children who came from families that had a monthly income of Kenya shillings 10,000-50,000 and 50,001-100,000 respectively.

The multivariable logistic regression analysis found that school going children (6-12years) were 71% more likely to be obese or overweight than preschool children (under 6years). The results of this study analysis were similar to those observed in a prospective observational study conducted on patients aged 6–18 years admitted to the emergency department at a Children's Hospital in Rome, Italy. The results of the study showed that school going children were over twenty three times more likely to be obese (OR: 23.22; CI: 95%:15.60–34.56; $p < 0.001$) and over five times more likely to be overweight (OR: 5.17; CI: 95%: 3.96–6.74; $p < 0.001$) than adolescents compared to children with healthy weight(22).

The multivariable analysis of this study also found that children who walked to school were 81% more likely to be overweight or obese compared to those who went to school by vehicle. This finding contradicted what was found by Muthuri et al whose univariable analysis reported that 14.7%(0.0019) of overweight and obese children walked or biked to school and 25.8% of them used a vehicle for transport to school (2). However, this study's finding can be explained by the findings of a study done by Wachira et al who reported that in neighborhoods where children walk home from school French fries and simple pastries are sold cheaply to them by street vendors and therefore those using vehicles are less exposed to these snacks sold by the roadside and thus less likely to be obese or overweight. This was found to be an effect modifier(3).

This study analysis also showed that weekly consumption of snacks (this is a small amount of food eaten between main meals such as cakes, bread, fruits, vegetables and ice-cream) or fast foods (this includes meals that can be easily prepared and served away from home such as chips, hotdogs, burgers, samosa, sausages, ice-cream) increased the odds for obesity and overweight by 2.34times compared to daily consumption. This result contradicted what is known in existing literature. A possible explanation for this is response bias from parents/guardians whose children were obese or overweight.

The study also found a statistically significant association between household monthly income and obesity and overweight. The odds for obesity and overweight were increased 3.68times and 4.04times for children who came from families that had a monthly income of Kenya shillings 10,000-50,000 and 50,001-100,000 respectively. These findings compared to what was observed by a study done by Muthuri et al whereby a total annual household income of < Kshs466,728(monthly income of <Ksh 38,894) was significantly associated with obesity and

overweight ($p<0.0001$) and the proportions of obesity and overweight increased with increasing household income(2).

From the bivariable analysis some factors were not significantly associated with the outcome but were found to have an effect. The findings that more boys than girls were found to be obese and overweight was similar to what Aballa et al found while looking at the prevalence of obesity among school aged children in Nairobi(29).

Our findings show that it is necessary to routinely screen all children we serve in our hospitals for obesity and overweight. The findings also imply that policies promoting healthy diet and lifestyle should focus more on the at-risk population (school going children, middle- and high-income families).

**Study Limitations**

These results are generalizable to the age group that was included and people seen in a tertiary care facility. Its findings may not be extended to the general population. To corroborate and generalize the results, a population-based study is required. This study was conducted in an urban set up which may have influenced findings in variables such as household income, type of transport to school and type of school as well as the outcome. Being a cross-sectional study, recall bias was a limitation. Data collected did not include the clinical diagnosis of children who were interviewed. However, this study proved that emergency departments can serve as a central point in screening for children with obesity and overweight.

## CONCLUSION

The prevalence of obesity and overweight was high among children seen at the emergency departments in K.N.H. The results indicate that school age children presenting to the emergency department are at a higher risk of obesity and overweight than preschoolers. The results also showed that monthly household income was significantly associated with obesity. The study found a negative association between transport to school by vehicle with the outcome obesity and overweight.

## RECOMMENDATIONS

Body mass index to be included as part of the routine anthropometric measurements during triage of children at emergency departments in KNH. Training of health workers on how to compute and document body mass index. Further research is needed to establish the association between mode of transport to school with obesity and overweight.

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## APPENDICIES

### 4.1 Appendix I – CONSENT FORM (ENGLISH VERSION)

### 4.11 Part I: Information sheet

TITLE OF STUDY

The prevalence and risk factors of overweight and obesity among children seen as outpatient at paediatric emergency unit and accident and emergency department in Kenyatta National Hospital.

Introduction

My name is Dr. Doreen Njeri Nganga, a pediatric postgraduate student at the University of Nairobi. I am conducting a study to assess prevalence and risk factors of overweight and obesity at Kenyatta National Hospital. This will be determined by taking weight, height and data collection through filling a questionnaire.

Purpose of the research

The information that is obtained from this study will be used to assess how common is overweight and obesity in Kenyatta National Hospital. This study is also a requirement for any doctor who aspires to graduate from our college as a pediatrician.

Voluntary Participation/Right to Decline or Withdraw

An invitation for your child to participate in this study is hereby extended to you. You will have the opportunity to ask questions before you decide on his/her enrollment into the study. You may seek clarification regarding any bit of the study from me should any part be unclear. The decision for your child to participate in this research is entirely voluntary after you have comprehensively understood the details herein. By refusing to participate in the study, your child will not be denied any medical care. Furthermore, you may stop them from participating at any time with no consequences whatsoever.

Procedures

Your child will be triaged before enrollment into the study if he or she meets the eligibility criteria. The principal investigator will use a standard professional weight and height scale to get weight and height measurements and the child will be required to take off his shoes. A formula will be used to calculate the body mass index. Thereafter, a questionnaire will be administered to help in data collection which will include information on the measurements taken, demographic and specific risk factors. All the procedures will be done while the parent/guardian is present in the room.

Confidentiality

If you agree to allow your child take part in the study, you will be asked to provide personal information and other details related to her condition. All the information collected will be kept confidential, and no one but the researchers will access it. His/her name will not appear in any document. The information about the participant will be identified by a number, and only the researchers can relate the identification number to the said participant. The information will not be shared with anyone else unless authorized by the Kenyatta National Hospital/University of Nairobi – Ethics and Research Committee (KNH/UoN-ERC).

Risks

Your child's involvement in this research will be through an interview and thus, it will not expose you to any risks if you consent to participate.

Cost and Compensation

There will be no extra cost incurred by you from participation in this study, and there is also no compensation.

Sharing of information

Following authorization by the Kenyatta National Hospital Ethics and Research Committee, which is a committee whose work is to make sure research participants are protected from harm and the relevant medical information yielded from this study may be shared with fellow doctors through scientific seminars, workshops, and publications. Personal information will not be disclosed whatsoever.

Whom to contact

This proposal has been reviewed and subsequently approved by KNH-UoN ERC, for one year; the responsibility of this committee is to make sure research participants are protected from harm. It has been submitted to them through the Chairman of the Department of Paediatrics and Child Health at the School of Medicine, University of Nairobi, with the approval of university supervisors. The contact information of these people is given below if you wish to contact any of them for whatever reason;

**1.Principal researcher:**

Dr. Doreen Njeri Nganga,

Paediatric Resident, Department of Paediatrics and Child Health, School of Medicine, University of Nairobi.

P.O. Box 55077-00200.

Mobile No. 0728848789

Email: njeridoreen@gmail.com

**2.KNH-UoN ERC:**

The Secretary, KNH/UoN-ERC

P.O. Box 20723 KNH,

Nairobi 00202

Tel 726300-9 Email: uonknh_erc@uonbi.ac.ke

**3.University of Nairobi research supervisors**

1. Prof. Jowi Christine Yuko, Department of Paediatrics and Child Health, School of Medicine, University of Nairobi, P.O. Box 19676 KNH, Nairobi 00202, Tel: 0202726300.

2. Dr Aluvaala Martin Jalemba, Department of Paediatrics, School of Medicine, University of Nairobi, P.O. Box 19676 KNH, Nairobi 00202, Tel: 0202726300.

4.12 Part ii: Consent certificate by the patient

I hereby give my written and informed consent to allow my child to participate in this study on overweight and obesity as seen at Kenyatta National Hospital.

I have been adequately explained to about the study by Dr. Doreen Njeri Nganga. I do this with the full understanding of the purpose of the study and procedures which have been explained to me.

I understand that my child's rights will be respected and confidentiality maintained at all times.

I also understand that the consent is voluntary, and I am at liberty to withdraw my child from the study without his/her care being affected.

Guardian's signature……Guardian's Name……

Signature/left thumbprint

Date……Day/Month/Year

Statement by the witness if the guardian is not literate

I have witnessed the accurate reading of the consent form to the participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

Name of witness……

Signature of witness……..

Date……

4.13 Part iii: Statement by the researcher

I have accurately read out the information sheet to the participant and the best of my ability and made sure of the following;

- That the participant consent has been given voluntarily and free of duress.
- That all information given will be treated with confidentiality.
- That refusal to take part in or withdrawal from the study will not in any way compromise the quality of care and treatment given to the patient.
- That the results of this study might be published to enhance the knowledge of the subject of research.
- That I have answered all the questions asked by the participant to the best of my ability and knowledge.
- That a copy of this Informed Consent Form has been provided to the participant.

Name of the researcher taking consent ……

Signature of the researcher taking the consent ……

Date ……Day/Month/Year

## 4.2 Appendix II – CONSENT FORM (SWAHILI VERSION)

4.21 Sehemu ya I: Maelezo ya Habari

KICHWA CHA MAFUNZO

Sababu za kuenea na hatari za unene na unene uliopitiliza miongoni mwa watoto huonekana kama wagonjwa wa nje katika kitengo cha dharura cha watoto na idara ya ajali na dharura katika Hospitali ya Kitaifa ya Kenyatta.

Utangulizi

Jina langu ni Dkt Doreen Njeri Nganga, mwanafunzi wa digrii ya watoto katika Chuo Kikuu cha Nairobi. Ninafanya utafiti kutathmini kuenea na sababu za hatari ya unene kupita kiasi na unene kupita kiasi katika Hospitali ya Kitaifa ya Kenyatta. Hii itaamuliwa kwa kuchukua uzito, urefu na ukusanyaji wa data kupitia kujaza dodoso.

Kusudi la utafiti

Habari ambayo imepatikana kutoka kwa utafiti huu itatumika kutathmini jinsi kawaida ni uzani mzito na unene kupita kiasi katika Hospitali ya Kitaifa ya Kenyatta. Utafiti huu pia ni hitaji kwa daktari yeyote anayetamani kuhitimu kutoka chuo kikuu kama daktari wa watoto.

Kushiriki kwa hiari / Haki ya Kupungua au Kuondolewa

Mwaliko kwa mtoto wako kushiriki katika utafiti huu unapewa wewe. Utakuwa na nafasi ya kuuliza maswali kabla ya kuamua juu ya uandikishaji wake katika utafiti. Unaweza kutafuta ufafanuzi juu ya utafiti wowote kutoka kwangu ikiwa sehemu yoyote haijulikani wazi. Uamuzi wa mtoto wako kushiriki katika utafiti huu ni wa hiari kabisa baada ya kuelewa kabisa maelezo hapa. Kwa kukataa kushiriki katika utafiti, mtoto wako hatanyimwa huduma yoyote ya matibabu. Kwa kuongezea, unaweza kuwazuia kushiriki wakati wowote bila matokeo yoyote.

Taratibu

Mtoto wako atasakwa na muuguzi na kuhudumiwa na daktari kabla ya kujiandikisha kwenye utafiti ikiwa atatimiza vigezo vya kustahiki. Mchunguzi mkuu atatumia kiwango cha kawaida cha uzito na urefu wa taaluma kupata vipimo vya uzito na urefu na mtoto atahitajika kuvua viatu

vyake. Fomula itatumika kuhesabu faharisi ya molekuli ya mwili. Baadaye, dodoso litasimamiwa kusaidia katika ukusanyaji wa data ambayo itajumuisha habari juu ya vipimo vilivyochukuliwa, idadi ya watu na sababu maalum za hatari. Taratibu zote zitafanywa wakati mzazi / mlezi yupo kwenye chumba.

Usiri

Ikiwa unakubali kumruhusu mtoto wako kushiriki katika utafiti huo, utaulizwa utoe maelezo ya kibinafsi na maelezo mengine yanayohusiana na hali yake. Habari yote iliyokusanywa itahifadhiwa kwa siri, na hakuna mtu isipokuwa watafiti wataipata. Jina lake halitaonekana kwenye hati yoyote. Habari juu ya mshiriki itatambuliwa kwa idadi, na watafiti tu ndio wanaweza kuhusisha nambari ya kitambulisho kwa mshiriki aliyetajwa. Habari hiyo haitashirikiwa na mtu mwingine yeyote isipokuwa idhiniwe na Hospitali ya Kitaifa ya Kenyatta / Chuo Kikuu cha Nairobi - Kamati ya Maadili na Utafiti (KNH / UoN-ERC).

Hatari

Kuhusika kwa mtoto wako katika utafiti huu kutakuwa kupitia mahojiano na kwa hivyo, hakutakuweka kwenye hatari yoyote ikiwa utakubali kushiriki.

Gharama na Malipo

Hakutakuwa na gharama ya ziada uliyoipata kutokana na kushiriki katika utafiti huu, na pia hakuna fidia.

Ugawanaji wa Habari

Kufuatia idhini ya Kamati ya Maadili na Utafiti ya Hospitali ya Kitaifa ya Kenyatta, ambayo ni kamati ambayo kazi yake ni kuhakikisha washiriki wa utafiti wanalindwa kutokana na madhara na habari inayofaa ya matibabu inayotolewa kutoka kwa utafiti huu inaweza kushirikiwa na madaktari wenza kupitia semina za kisayansi, warsha, na machapisho. Maelezo ya kibinafsi hayatafunuliwa chochote.

Nani wa kuwasiliana

Pendekezo hili limepitiwa na baadaye kupitishwa na KNH-ERC, kwa mwaka mmoja; jukumu la kamati hii ni kuhakikisha washiriki wa utafiti wanalindwa kutokana na madhara. Imewasilishwa kwao kupitia kwa Mwenyekiti wa Idara ya Watoto na Afya ya Mtoto katika Shule ya Tiba, Chuo Kikuu cha Nairobi, kwa idhini ya wasimamizi wa vyuo vikuu. Habari ya mawasiliano ya watu hawa imepewa hapa chini ikiwa unataka kuwasiliana na yeyote kati yao kwa sababu yoyote;

Katibu, KNH / UoN-ERC

P.O. Sanduku 20723 KNH,

Nairobi 00202

Simu 726300-9

Barua pepe: uonknh_erc@uonbi.ac.ke

Mtafiti mkuu:

Dkt Doreen Njeri Nganga, Mkazi wa watoto, Idara ya Watoto na Afya ya Watoto, Shule ya Tiba, Chuo Kikuu cha Nairobi. P.O. Box 19676 KNH, Nairobi 00202. Simu Namba 0728848789.

Wasimamizi wa utafiti wa Chuo Kikuu cha Nairobi

1. Prof Jowi Christine Yuko, Idara ya Watoto na Afya ya Watoto, Shule ya Tiba, Chuo Kikuu cha Nairobi, P.O. Sanduku la 19676 KNH, Nairobi 00202, Simu: 0202726300.

2. Dr Aluvaala Martin Jalemba, Idara ya Watoto, Shule ya Tiba, Chuo Kikuu cha Nairobi, P.O. Sanduku la 19676 KNH, Nairobi 00202, Simu: 0202726300.

4.22 Sehemu ya ii: Hati ya kibali kwa mgonjwa

Hivi sasa ninatoa idhini yangu ya maandishi na ya habari kumruhusu mtoto wangu kushiriki katika utafiti huu juu ya unene kupita kiasi na unene kupita kiasi kama inavyoonekana katika Hospitali ya Kitaifa ya Kenyatta.

Nimeelezwa vya kutosha kuhusu utafiti huo na Dkt Doreen Njeri Nganga. Nafanya hivi kwa uelewa kamili wa kusudi la utafiti na taratibu ambazo nimefafanuliwa. Ninaelewa kuwa haki za mtoto wangu zitaheshimiwa na usiri utunzaji wakati wote.

Ninaelewa pia kwamba idhini ni ya hiari, na niko huru kumtoa mtoto wangu kutoka kwa masomo bila huduma yake kuathiriwa.

Saini ya Guardian…….Jina la Guardian

Saini / kidole gumba cha kushoto

Tarehe …… Siku / Mwezi / Mwaka

Kauli ya shahidi ikiwa mlezi hajui kusoma na kuandika

Nimeshuhudia usomaji sahihi wa fomu ya idhini kwa mshiriki, na mtu huyo amepata nafasi ya kuuliza maswali. Ninathibitisha kuwa mtu huyo ametoa idhini kwa uhuru.

Jina la shahidi ……

Saini ya shahidi …… ..

Tarehe……

4.23 Sehemu ya iii: Taarifa ya mtafiti

Nimesoma kwa usahihi karatasi ya habari kwa mshiriki na kwa uwezo wangu wote na kuhakikisha yafuatayo;

• Kwamba idhini ya mshiriki imepewa kwa hiari na bila malipo.

• Kwamba habari zote zinazotolewa zitatunzwa kwa usiri.

• Kukataa kushiriki au kujitoa kutoka kwa utafiti hakutaweza kwa njia yoyote kuhatarisha ubora wa huduma na matibabu anayopewa mgonjwa.

• Ili matokeo ya utafiti huu yatangazwe ili kuongeza maarifa ya mada ya utafiti.

• Kwamba nimejibu maswali yote yaliyoulizwa na mshiriki kwa kadri ya uwezo wangu na maarifa yangu.

• Kwamba nakala ya Fomu hii ya Kibali Iliyofahamishwa imetolewa kwa mshiriki.

Jina la mtafiti anayekubali ……

Saini ya mtafiti kuchukua idhini ……

Tarehe …… Siku / Mwezi / Mwaka

## 4.3 Appendix I11 ASSENT FORM FOR CHILDREN AGED 6 YEARS AND ABOVE (ENGLISH VERSION)

**Name of study**: The prevalence and risk factors of overweight and obesity among outpatient children seen at Pediatric Emergency Unit and Accident and Emergency Department in Kenyatta National Hospital.

**I understand that I have been asked to participate in a study about:** Assessing how common is overweight and obesity in Kenyatta National Hospital. The study will also try to identify what are some of the risk factors associated with overweight and obesity.

**I will be asked to**: take off my shoes and step onto the weight and height scale so that my measurements can be taken, which will take about **ten** minutes. I understand that I do not have to participate. If I do participate, I can quit at any time. I also understand that I do not have to answer any questions I don't want to answer or do anything I don't want to do. My parent or guardian will be with me throughout the whole process.

**This study is being done by**: **Dr. Doreen Njeri Nganga** at **Kenyatta National Hospital**. His/her phone number is: **0728848789** and his/her e-mail address is **njeridoreen@gmail.com .**

If I have any questions or concerns about the study, I can call and ask him/her about them. When I sign my name, this means that I agree to participate in the study and that all of my questions have been answered. I have also been given a copy of this form.

Name_____ Date_____
Signature_____

## 4.4 Appendix IV- ASSENT FORM FOR CHILDREN AGED 6 YEARS AND ABOVE (SWAHILI VERSION)

**Jina la utafiti:** Sababu za kuenea na hatari za unene kupita kiasi na unene kupita kiasi kati ya watoto wanaolazwa nje wanaonekana katika Kitengo cha Dharura cha watoto na Idara ya Ajali na Dharura katika Hospitali ya Kitaifa ya Kenyatta.

**Ninaelewa kuwa nimeulizwa kushiriki katika utafiti kuhusu**: Kutathmini umaarufu wa unene kupita kiasi na unene kupita kiasi katika Hospitali ya Kitaifa ya Kenyatta. Utafiti huo pia utajaribu kutambua ni vipi sababu zingine za hatari zinazohusiana na uzito kupita kiasi na unene kupita kiasi.

**Nitaulizwa:** kuvua viatu vyangu na kuingia kwenye uzani na urefu wa vipimo ili vipimo vyangu vichukuliwe, ambavyo vitachukua **dakika kumi**. Ninaelewa kuwa sio lazima kushiriki. Ikiwa ninashiriki, ninaweza kuacha wakati wowote. Ninaelewa pia kwamba sio lazima nijibu maswali yoyote ambayo sitaki kujibu au kufanya chochote ambacho sitaki kufanya. Mzazi wangu au mlezi wangu atakuwa pamoja nami katika mchakato wote.

**Utafiti huu unafanywa na**: **Dkt Doreen Njeri Nganga** katika **Hospitali ya Kitaifa ya Kenyatta**. Nambari yake ya simu ni: **0728848789** na anwani yake ya barua pepe ni: **njeridoreen@gmail.com**.

Ikiwa nina maswali yoyote au wasiwasi juu ya utafiti huo, ninaweza kumpigia simu na kumuuliza juu yao. Wakati ninasaini jina langu, hii inamaanisha kwamba ninakubali kushiriki kwenye utafiti na kwamba maswali yangu yote yamejibiwa. Nimepewa pia nakala ya fomu hii.

Jina_____ Tarehe_____

Saini_____

## 4.5 Appendix V-OVERWEIGHT AND OBESITY QUESTIONNAIRE

STUDY NUMBER ____

DATE OF THE INTERVIEW dd-mm-yyyy __-__-____

### A. SOCIAL DEMOGRAPHIC FACTORS

1. What is the age of the child in years?
2. Date of birth
3. level of study
4. Type of school.
   a) private
   b) public
5. Residence
6. What is the highest level of education of the parent/guardian

O Primary

O Secondary

O College

O University

O Never attended school

7. What is the parent/guardian's occupation?

   O Unemployed

   O Self-employed (specify_____)

   O Employed (specify_____)

   O Student

   O other(specify_____)

8. What is the family's monthly income (the gross countable income received or projected to be received during the month or the monthly equivalent)?

O Less than Ksh10,000

O Ksh10,000-50,000

O Ksh50,001-100,000

O More than Ksh101,000

**B. ANTHROPOMETRIC DATA**

1.WEIGHT (Kg)____

2.HEIGHT (cm)_____

3.BODY MASS INDEX (BMI) _____

4. GENDER_____

**C. RISK ASSESSMENT**

**1. Food consumed characteristics**

a) Does the child take **sugary drinks** (soda, juice, energy drinks, sweetened tea, coffee or chocolate milk)? YES____ NO____

If yes, how often does he/she take sugary drinks?

O Daily

O Weekly

O Monthly

O Rarely

b) How often does the child have **snacks** (this is a small amount of food eaten between main meals such as cakes, bread, fruits, vegetables and ice-cream) or **fast-foods** (this includes meals that can

be easily prepared and served away from home such as chips, hotdogs, burgers, samosa, sausages, ice-cream)?

O Daily

O Weekly

O Monthly

O Rarely

**2. Home environment characteristics**

a) Is there a playing field at home? YES____ NO____

b) How much screen time per day is the child exposed to? (Television, videogames, smart phone, tablet or computers for recreational purposes)

O Zero to 2 hours

O More than 2 hours

c) How many hours does the child sleep at night?

O Zero to ten hours

O More than 10hours

**3. School environment characteristics**

a) Does the child go to school? YES____ NO____

If yes, how does the child get to school?

O Walking or cycling

O Vehicle

b) What is the distance from home to school?

O Zero to 1 kilometer

O More than 1 kilometer

c) Does the child have PE lessons as part of his/her curriculum in school?

YES____ NO____

If yes, how many hours of PE does he/she have in a week?

O Zero to one hour

O More than one hour

## 4.6 Appendix VI- DATA ANALYSIS DUMMY TABLES

**The risk factors associated with obesity and overweight**

**Table 1**

**Type of school transport**

| Variable | Frequency (n) | Percentage (%) |
|---|---|---|
| Vehicle | | |
| Walking/cycling | | |

**Table 2**

**Screen time duration**

| Variable | Frequency (n) | Percentage (%) |
|---|---|---|
| 0-2 hours | | |
| >2 hours | | |

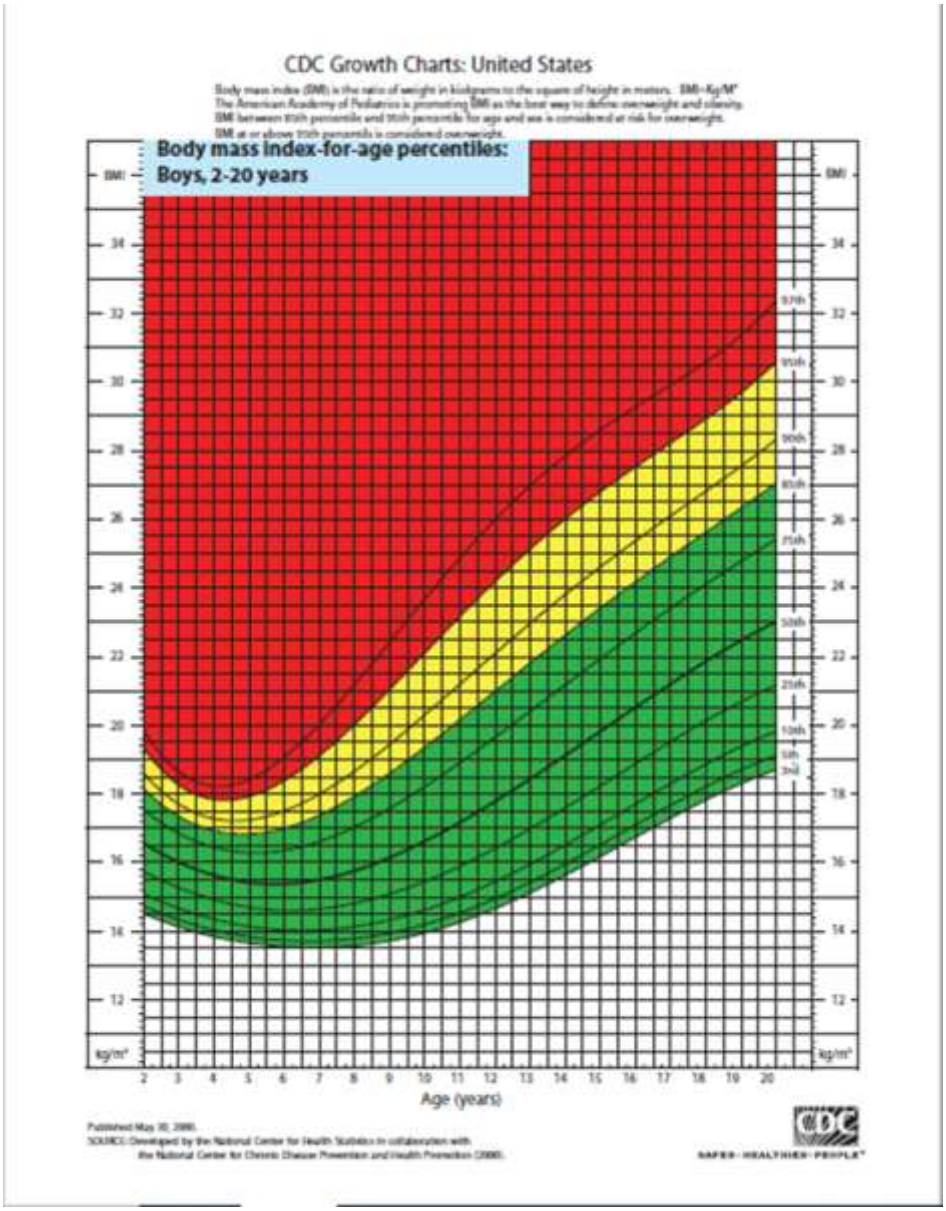
**Table 3**

**Results of univariate model for factors associated with childhood obesity or overweight**

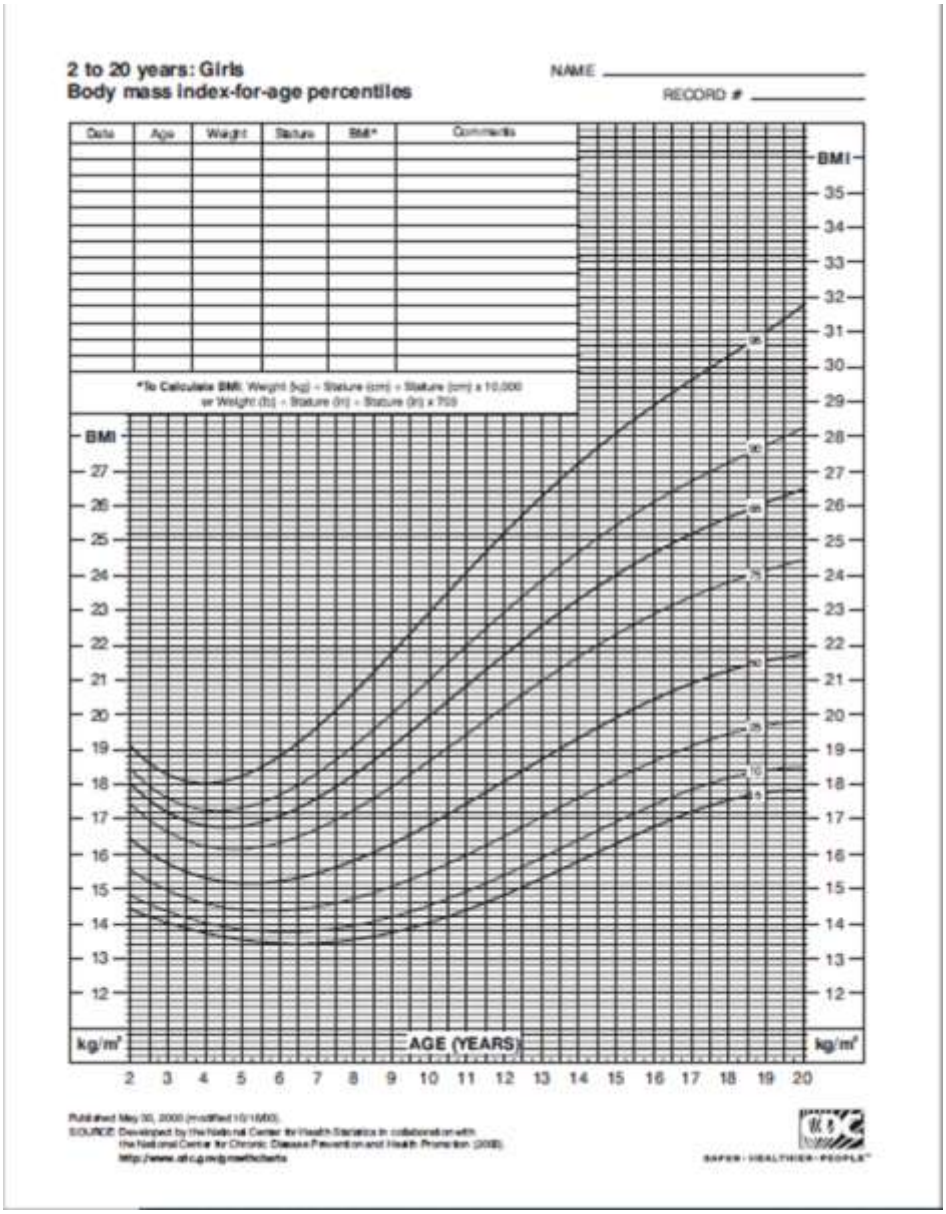
| **Variable** | **Category** | **Odds ratio (95%CI)** | **P-value** |
|---|---|---|---|
| | | **Obese or overweight** | |
| Parental level of education | None | | |
| | Primary | | |
| | Secondary | | |
| | College | | |
| | university | | |

## 4.7Appendix VII-CDC GROWTH CHARTS

### 4.7.1 CDC Growth Chart-Boys



### 4.7.2 CDC Growth Chart-Girls



## 4.8 Appendix V111- A&E AND PEU STASTISTICS

Paeds Attending A&E - Up-to 12yrs -(2018 - July 2021)

| Year | Pead Male | Pead Female | Total |
|---|---|---|---|
| 2018 | 2210 | 1567 | 3777 |
| 2019 | 2159 | 1539 | 3698 |
| 2020 | 1502 | 1019 | 2521 |
| 2021 Jan - July | 893 | 617 | 1510 |
| Total | 6764 | 4742 | 11506 |

## Cases of Under 5yrs Morbidity at Acc. & Emergency Department - Year 2018 - July 2021

**Year 2018**

| Disease | No. of cases |
|---|---|
| All Other Diseases | 352 |
| Burns | 307 |
| Other injuries | 213 |
| Other ENT Disorders | 113 |
| Diseases of Digestives system | 91 |
| Head injury | 85 |
| Other Central Nervous System Conditions | 65 |
| Diseases of the Genito-urinary system | 61 |
| Fractures | 37 |
| Congenital Anomalies | 19 |
| Neo-natal Sepsis | 17 |
| Neoplasms | 9 |
| Other Eye conditions | 7 |
| Sexual Assault | 6 |
| Dog Bites | 6 |
| Hydrocephalus | 6 |
| Diseases of the skin | 5 |
| Road Traffic Injuries | 5 |
| Other Convulsive Disorders | 5 |
| Eye Infections | 4 |
| Upper Respiratory Tract Infections | 3 |
| Asthma | 3 |
| Other Meningitis | 3 |
| Diseases of the blood and blood forming organ | 3 |
| Diseases of Circulatory system | 3 |
| Violence related injuries | 2 |
| Diarrhea with Severe Dehydration | 2 |
| Diarrhoea | 1 |
| Mumps | 1 |
| Tonsolitis | 1 |
| Mental Disorders | 1 |
| Other Bites | 1 |
| Rickets | 1 |

**Year 2019**

| Disease | No. of cases |
|---|---|
| Burns | 342 |
| All Other Diseases | 227 |
| Other ENT Disorders | 217 |
| Other injuries | 148 |
| Head injury | 130 |
| Diseases of Digestives system | 73 |
| Other Central Nervous System Conditions | 65 |
| Fractures | 57 |
| Diseases of the Genito-urinary system | 48 |
| Congenital Anomalies | 12 |
| Road Traffic Injuries | 12 |
| Other Eye conditions | 11 |
| Ear Infections/ Conditions | 5 |
| Diseases of Circulatory system | 5 |
| Aneamia | 4 |
| Other Bites | 4 |
| Diseases of the skin | 3 |
| Sexual Assault | 3 |
| Eye Infections | 2 |
| Cardiovascular conditions | 2 |
| Other Meningitis | 2 |
| Juvenile Rheumatism | 2 |
| Neo-natal Sepsis | 2 |
| Jaundice | 2 |
| Diarrhoea | 1 |
| Confirmed Malaria (only Positive cases) | 1 |
| Pneumonia | 1 |
| Other Dis. Of Respiratory System | 1 |
| Dental Disorders | 1 |
| Chromosomal abnormalities (e.g. Down's, Edwards syndromes, etc) | 1 |
| Dog Bites | 1 |
| Epilepsy | 1 |
| Other Convulsive Disorders | 1 |

| | |
|---|---|
| Cardiovascular conditions | 1 |
| Gunshot | 1 |
| Neonatal Tetanus | 1 |
| Speech Disorders | 1 |
| Endocrine diseases | 1 |
| Jaundice | 1 |

| | |
|---|---|
| Violence related injuries | 1 |
| Gunshot | 1 |

Year 2020

| Disease | No. of cases |
|---|---|
| Burns | 289 |
| Head Injury | 143 |
| Other ENT Disorders | 129 |
| Other Injuries | 122 |
| Fractures | 110 |
| All Other Diseases | 99 |
| Other Central Nervous System Conditions | 17 |
| Diseases of Digestives system | 15 |
| Congenital Anomalies | 11 |
| Other Eye conditions | 10 |
| Diseases of the Genito-urinary system | 10 |
| Road Traffic Injuries | 9 |
| Other Dis. Of Respiratory System | 5 |
| Rickets | 5 |
| Sexual Assault | 4 |
| Diseases of the skin | 3 |
| Cerebral Palsy | 3 |
| Neonatal Tetanus | 3 |
| Diseases of Circulatory system | 3 |
| Ear Infections/ Conditions | 2 |
| Upper Respiratory Tract Infections | 2 |
| Chromosomal abnormalities (e.g. Downs, Edwards syndromes, etc) | 2 |
| Newly Diagnosed HIV | 2 |
| Other Meningitis | 2 |
| Hernia | 2 |
| Aneamia | 1 |
| Eye Infections | 1 |
| Dental Disorders | 1 |
| Snake Bites | 1 |
| Dog Bites | 1 |
| Other Bites | 1 |
| Cardiovascular conditions | 1 |
| Autism | 1 |
| Juvenile Rheumatism | 1 |
| Speech Disorders | 1 |

Year 2021 - Jan - July

| Disease | No. of cases |
|---|---|
| Burns | 149 |
| Head Injury | 82 |
| Other ENT Disorders | 61 |
| Fractures | 61 |
| All Other Diseases | 58 |
| Other Injuries | 51 |
| Foreign Body | 25 |
| Other Central Nervous System Conditions | 13 |
| Road Traffic Injuries | 7 |
| Ear Infections/ Conditions | 6 |
| Diseases of the skin | 6 |
| Congenital Anomalies | 4 |
| Diseases of Digestives system | 4 |
| Dental Disorders | 3 |
| Eye Infections | 2 |
| Other Eye conditions | 2 |
| Dog Bites | 2 |
| Other Meningitis | 2 |
| Hydrocephalus | 2 |
| Sexual Assault | 1 |
| Autism | 1 |
| Diseases of the blood and blood forming organ | 1 |
| Endocrine diseases | 1 |
| Neoplasms | 1 |
| Lower Respiratory Tract Infection | 1 |
| Polytrauma | 1 |

PEU Attendance

2018

| Under 5 yrs Male New | Under 5 yrs Female New | Over 5 yrs Male New | Over 5 yrs Female New | Under 5 yrs Male Old | Under 5 yrs Female Old | Over 5 yrs Male Old | Over 5 yrs Female Old | Total |
|---|---|---|---|---|---|---|---|---|
| 9603 | 7243 | 2125 | 1593 | 6828 | 4942 | 2163 | 1734 | 36231 |

2019

| Under 5 yrs Male New | Under 5 yrs Female New | Over 5 yrs Male New | Over 5 yrs Female New | Under 5 yrs Male Old | Under 5 yrs Female Old | Over 5 yrs Male Old | Over 5 yrs Female Old | Total |
|---|---|---|---|---|---|---|---|---|
| 9975 | 7380 | 2245 | 1615 | 7445 | 5478 | 2286 | 1678 | 38102 |

2020

| Under 5 yrs Male New | Under 5 yrs Female New | Over 5 yrs Male New | Over 5 yrs Female New | Under 5 yrs Male Old | Under 5 yrs Female Old | Over 5 yrs Male Old | Over 5 yrs Female Old | Total |
|---|---|---|---|---|---|---|---|---|
| 5960 | 4212 | 1166 | 772 | 4007 | 2622 | 1191 | 835 | 20765 |

2021- Jan- July 2021

| Under 5 yrs Male New | Under 5 yrs Female New | Over 5 yrs Male New | Over 5 yrs Female New | Under 5 yrs Male Old | Under 5 yrs Female Old | Over 5 yrs Male Old | Over 5 yrs Female Old | Total |
|---|---|---|---|---|---|---|---|---|
| 4721 | 3405 | 980 | 663 | 3372 | 2303 | 1121 | 825 | 17390 |

Source: Statistics Unit
Health Information Dept
KNH
27/08/2021

PEU Morbidity

2018

| | Disease | Under 5yrs | Over5yrs | Total |
|---|---|---|---|---|
| 1 | Upper Respiratory Tract Infections | 6438 | 0 | 6438 |
| 2 | Diseases of Digestives system | 1976 | 0 | 1976 |
| 3 | Other diseases of the Respiratory System | 1722 | 0 | 1722 |
| 4 | Pneumonia | 1299 | 0 | 1299 |
| 5 | Diseases of the skin | 1204 | 0 | 1204 |
| 6 | Tonsilitis | 991 | 0 | 991 |
| 7 | Neo-natal Sepsis | 942 | 0 | 942 |
| 8 | All Other Diseases | 937 | 0 | 937 |
| 9 | Other Convulsive Disorders | 813 | 0 | 813 |
| 10 | Diarrhoea | 644 | 0 | 644 |
| 11 | Other ENT Disorders | 626 | 0 | 626 |
| 12 | Rickets | 598 | 0 | 598 |
| 13 | Jaundice | 467 | 0 | 467 |
| 14 | Fevers | 299 | 0 | 299 |
| 15 | Diseases of Circulatory system | 291 | 0 | 291 |
| 16 | Urinary Tract Infection | 289 | 0 | 289 |
| 17 | Ear Infections/ Conditions | 288 | 0 | 288 |
| 18 | Other Meningitis | 287 | 0 | 287 |
| 19 | Asthma | 277 | 0 | 277 |
| 20 | Eye Infections | 238 | 0 | 238 |
| 21 | Anaemia | 235 | 0 | 235 |
| 22 | Malnutrition | 234 | 0 | 234 |
| 23 | Congenital Anomalies | 172 | 0 | 172 |
| 24 | Diseases of the blood and blood forming organ | 130 | 0 | 130 |
| 25 | Suspected Malaria | 108 | 0 | 108 |
| 26 | Cerebral Palsy | 107 | 0 | 107 |
| 27 | Other Eye conditions | 101 | 0 | 101 |
| 28 | Other Central Nervous System Conditions | 100 | 0 | 100 |
| 29 | Intestinal worms | 87 | 0 | 87 |
| 30 | Endocrine diseases | 85 | 0 | 85 |
| 31 | Chromosomal abnormalities (e.g. Downs, Edwards syndromes, etc) | 65 | 0 | 65 |
| 32 | Diseases of the Genito-urinary system | 63 | 0 | 63 |
| 33 | Confirmed Malaria (only Positive cases) | 36 | 0 | 36 |
| 34 | Dental Disorders | 24 | 0 | 24 |
| 35 | Cardiovascular conditions | 24 | 0 | 24 |
| 36 | Speech Disorders | 19 | 0 | 19 |

| | | | | |
|---|---|---|---|---|
| 37 | Poisoning | 19 | 0 | 19 |
| 38 | Chicken Pox | 17 | 0 | 17 |
| 39 | Dysentery (Bloody diarrhoea) | 17 | 0 | 17 |
| 40 | Epilepsy | 16 | 0 | 16 |
| 41 | Tuberculosis | 14 | 0 | 14 |
| 42 | Autism | 13 | 0 | 13 |
| 43 | Hepatitis | 12 | 0 | 12 |
| 44 | Mumps | 9 | 0 | 9 |
| 45 | Head injury | 7 | 0 | 7 |
| 46 | Other Tuberculosis | 6 | 0 | 6 |
| 47 | Mental Disorders | 6 | 0 | 6 |
| 48 | Diabetes | 5 | 0 | 5 |
| 49 | Juvenile Rheumatism | 5 | 0 | 5 |
| 50 | Other Bites | 4 | 0 | 4 |
| 51 | Measles | 4 | 0 | 4 |
| 52 | Fractures | 3 | 0 | 3 |
| 53 | Road Traffic Injuries | 3 | 0 | 3 |
| 54 | Other injuries | 3 | 0 | 3 |
| 55 | Meningococcal Meningitis | 3 | 0 | 3 |
| 56 | Burns | 3 | 0 | 3 |
| 57 | Typhoid fever | 2 | 0 | 2 |
| 58 | Brucellosis | 2 | 0 | 2 |
| 59 | Poliomyelitis (AFP) | 1 | 0 | 1 |
| 60 | Jiggers Infestation | 1 | 0 | 1 |
| 61 | Newly Diagnosed HIV | 1 | 0 | 1 |
| 62 | Cholera | 1 | 0 | 1 |
| 63 | Upper Respiratory Tract Infections | 0 | 1532 | 1532 |
| 64 | Diseases of Digestive system | 0 | 613 | 613 |
| 65 | All Other Diseases | 0 | 513 | 513 |
| 66 | Other Dis. of Respiratory System | 0 | 513 | 513 |
| 67 | Other ENT Disorders | 0 | 418 | 418 |
| 68 | Diseases of the skin | 0 | 391 | 391 |
| 69 | Urinary Tract Infection | 0 | 284 | 284 |
| 70 | Diarrhoea | 0 | 173 | 173 |
| 71 | Asthma | 0 | 163 | 163 |
| 72 | Pneumonia | 0 | 136 | 136 |
| 73 | Diseases of the blood and blood forming organ | 0 | 119 | 119 |
| 74 | Central Nervous System Conditions | 0 | 104 | 104 |
| 75 | Arthritis, Rheumatism, Joint pains, etc. | 0 | 97 | 97 |
| 76 | Eye Infections | 0 | 82 | 82 |

| | | | | |
|---|---|---|---|---|
| 77 | Anaemia | 0 | 82 | 82 |
| 78 | Intestinal worms | 0 | 77 | 77 |
| 79 | Ear Infections/ Conditions | 0 | 69 | 69 |
| 80 | Diseases of Circulatory system | 0 | 67 | 67 |
| 81 | Fevers | 0 | 60 | 60 |
| 82 | Other Eye conditions | 0 | 59 | 59 |
| 83 | Suspected Malaria | 0 | 49 | 49 |
| 84 | Other Meningitis | 0 | 47 | 47 |
| 85 | Diseases of Endocrine system | 0 | 41 | 41 |
| 86 | Muscular skeletal conditions | 0 | 37 | 37 |
| 87 | Neoplasms | 0 | 31 | 31 |
| 88 | Diseases of the Genito-urinary system | 0 | 29 | 29 |
| 89 | Malnutrition | 0 | 26 | 26 |
| 90 | Confirmed Malaria (only Positive cases) | 0 | 23 | 23 |
| 91 | Cerebral Palsy | 0 | 21 | 21 |
| 92 | Dental Disorders | 0 | 17 | 17 |
| 93 | Mental Disorders | 0 | 17 | 17 |
| 94 | Hepatitis | 0 | 16 | 16 |
| 95 | Epilepsy | 0 | 15 | 15 |
| 96 | Tuberculosis | 0 | 14 | 14 |
| 97 | Pelvic Inflammatory Disease | 0 | 11 | 11 |
| 98 | Cardiovascular conditions | 0 | 11 | 11 |
| 99 | Chicken Pox | 0 | 11 | 11 |
| 100 | Hypertension | 0 | 11 | 11 |
| 101 | Diabetes | 0 | 9 | 9 |
| 102 | Gunshot | 0 | 8 | 8 |
| 103 | Autism | 0 | 7 | 7 |
| 104 | Poisoning | 0 | 7 | 7 |
| 105 | Other injuries | 0 | 6 | 6 |
| 106 | Malaria in pregnancy | 0 | 5 | 5 |
| 107 | Dysentery (Bloody diarrhoea) | 0 | 4 | 4 |
| 108 | Speech Disorders | 0 | 4 | 4 |
| 109 | Mumps | 0 | 4 | 4 |
| 110 | Dysfunctional Uterine Bleeding | 0 | 3 | 3 |
| 111 | Other tuberculosis | 0 | 3 | 3 |
| 112 | Conditions of the Breast (not cancers) | 0 | 2 | 2 |
| 113 | Abortion | 0 | 2 | 2 |
| 114 | Dog Bites | 0 | 2 | 2 |
| 115 | Typhoid fever | 0 | 2 | 2 |
| 116 | Sexually Transmitted Infections | 0 | 1 | 1 |
| 117 | Jiggers Infestation | 0 | 1 | 1 |

| | | | | |
|---|---|---|---|---|
| 118 | Road Traffic Injuries | 0 | 1 | 1 |
| 119 | Burns | 0 | 1 | 1 |
| 120 | Fractures | 0 | 1 | 1 |

2019

| | Disease | Under 5yrs | Over5yrs | Total |
|---|---|---|---|---|
| 1 | Upper Respiratory Tract Infections | 5374 | 0 | 5374 |
| 2 | Other diseases of the Respiratory System | 2129 | 0 | 2129 |
| 3 | Diseases of Digestives system | 1958 | 0 | 1958 |
| 4 | Pneumonia | 1464 | 0 | 1464 |
| 5 | Diseases of the skin | 1427 | 0 | 1427 |
| 6 | Neo-natal Sepsis | 1264 | 0 | 1264 |
| 7 | Tonsilitis | 1048 | 0 | 1048 |
| 8 | All Other Diseases | 1028 | 0 | 1028 |
| 9 | Other Convulsive Disorders | 810 | 0 | 810 |
| 10 | Other ENT Disorders | 707 | 0 | 707 |
| 11 | Jaundice | 688 | 0 | 688 |
| 12 | Rickets | 685 | 0 | 685 |
| 13 | Diarrhoea | 648 | 0 | 648 |
| 14 | Other Meningitis | 414 | 0 | 414 |
| 15 | Anaemia | 368 | 0 | 368 |
| 16 | Diseases of Circulatory system | 353 | 0 | 353 |
| 17 | Malnutrition | 307 | 0 | 307 |
| 18 | Fevers | 306 | 0 | 306 |
| 19 | Urinary Tract Infection | 269 | 0 | 269 |
| 20 | Asthma | 244 | 0 | 244 |
| 21 | Eye Infections | 209 | 0 | 209 |
| 22 | Congenital Anomalies | 209 | 0 | 209 |
| 23 | Ear Infections/ Conditions | 205 | 0 | 205 |
| 24 | Other Eye conditions | 150 | 0 | 150 |
| 25 | Diseases of the blood and blood forming organ | 147 | 0 | 147 |
| 26 | Endocrine diseases | 124 | 0 | 124 |
| 27 | Other Central Nervous System Conditions | 113 | 0 | 113 |
| 28 | Suspected Malaria | 111 | 0 | 111 |
| 29 | Cerebral Palsy | 104 | 0 | 104 |
| 30 | Intestinal worms | 90 | 0 | 90 |
| 31 | Chromosomal abnormalities (e.g. Downs, Edwards syndromes, etc) | 80 | 0 | 80 |

| | | | | |
|---|---|---|---|---|
| 32 | Diseases of the Genito-urinary system | 79 | 0 | 79 |
| 33 | Confirmed Malaria (only Positive cases) | 72 | 0 | 72 |
| 34 | Dental Disorders | 37 | 0 | 37 |
| 35 | Poisoning | 32 | 0 | 32 |
| 36 | Chicken Pox | 26 | 0 | 26 |
| 37 | Dysentery (Bloody diarrhoea) | 18 | 0 | 18 |
| 38 | Hepatitis | 15 | 0 | 15 |
| 39 | Autism | 14 | 0 | 14 |
| 40 | Speech Disorders | 14 | 0 | 14 |
| 41 | Tuberculosis | 14 | 0 | 14 |
| 42 | Other injuries | 11 | 0 | 11 |
| 43 | Epilepsy | 9 | 0 | 9 |
| 44 | Mumps | 9 | 0 | 9 |
| 45 | Mental Disorders | 7 | 0 | 7 |
| 46 | Cardiovascular conditions | 4 | 0 | 4 |
| 47 | Head injury | 3 | 0 | 3 |
| 48 | Juvenile Rheumatism | 3 | 0 | 3 |
| 49 | Cholera | 3 | 0 | 3 |
| 50 | Road Traffic Injuries | 3 | 0 | 3 |
| 51 | Typhoid fever | 2 | 0 | 2 |
| 52 | Measles | 2 | 0 | 2 |
| 53 | Other Tuberculosis | 2 | 0 | 2 |
| 54 | Other Bites | 1 | 0 | 1 |
| 55 | Snake Bites | 1 | 0 | 1 |
| 56 | Poliomyelitis (AFP) | 1 | 0 | 1 |
| 57 | Fractures | 1 | 0 | 1 |
| 58 | Diabetes | 1 | 0 | 1 |
| 59 | Sexual Assault | 1 | 0 | 1 |
| 60 | Burns | 1 | 0 | 1 |
| 61 | Newly Diagnosed HIV | 1 | 0 | 1 |
| 62 | Upper Respiratory Tract Infections | 0 | 1290 | 1290 |
| 63 | Diseases of Digestive system | 0 | 691 | 691 |
| 64 | Other Dis. of Respiratory System | 0 | 561 | 561 |
| 65 | All Other Diseases | 0 | 456 | 456 |
| 66 | Other ENT Disorders | 0 | 424 | 424 |
| 67 | Diseases of the skin | 0 | 368 | 368 |
| 68 | Urinary Tract Infection | 0 | 269 | 269 |
| 69 | Diarrhoea | 0 | 152 | 152 |
| 70 | Pneumonia | 0 | 127 | 127 |
| 71 | Anaemia | 0 | 120 | 120 |
| 72 | Asthma | 0 | 117 | 117 |

| | | | | |
|---|---|---|---|---|
| 73 | Diseases of the blood and blood forming organ | 0 | 112 | 112 |
| 74 | Central Nervous System Conditions | 0 | 102 | 102 |
| 75 | Arthritis, Rheumatism, Joint pains, etc. | 0 | 99 | 99 |
| 76 | Ear Infections/ Conditions | 0 | 83 | 83 |
| 77 | Eye Infections | 0 | 76 | 76 |
| 78 | Diseases of Circulatory system | 0 | 75 | 75 |
| 79 | Fevers | 0 | 65 | 65 |
| 80 | Intestinal worms | 0 | 63 | 63 |
| 81 | Other Eye conditions | 0 | 53 | 53 |
| 82 | Suspected Malaria | 0 | 52 | 52 |
| 83 | Muscular skeletal conditions | 0 | 48 | 48 |
| 84 | Diseases of Endocrine system | 0 | 46 | 46 |
| 85 | Other Meningitis | 0 | 40 | 40 |
| 86 | Cerebral Palsy | 0 | 35 | 35 |
| 87 | Confirmed Malaria (only Positive cases) | 0 | 34 | 34 |
| 88 | Diseases of the Genito-urinary system | 0 | 30 | 30 |
| 89 | Hepatitis | 0 | 30 | 30 |
| 90 | Gunshot | 0 | 27 | 27 |
| 91 | Neoplasms | 0 | 27 | 27 |
| 92 | Epilepsy | 0 | 20 | 20 |
| 93 | Chicken Pox | 0 | 19 | 19 |
| 94 | Dental Disorders | 0 | 19 | 19 |
| 95 | Mental Disorders | 0 | 17 | 17 |
| 96 | Poisoning | 0 | 16 | 16 |
| 97 | Malnutrition | 0 | 15 | 15 |
| 98 | Mumps | 0 | 11 | 11 |
| 99 | Diabetes | 0 | 9 | 9 |
| 100 | Other injuries | 0 | 7 | 7 |
| 101 | Dysentery (Bloody diarrhoea) | 0 | 7 | 7 |
| 102 | Tuberculosis | 0 | 6 | 6 |
| 103 | Pelvic Inflammatory Disease | 0 | 6 | 6 |
| 104 | Cardiovascular conditions | 0 | 6 | 6 |
| 105 | Conditions of the Breast (not cancers) | 0 | 6 | 6 |
| 106 | Autism | 0 | 4 | 4 |
| 107 | Newly Diagnosed HIV | 0 | 3 | 3 |
| 108 | Malaria in pregnancy | 0 | 3 | 3 |
| 109 | Head injury | 0 | 2 | 2 |
| 110 | Typhoid fever | 0 | 2 | 2 |
| 111 | Speech Disorders | 0 | 2 | 2 |
| 112 | Dog Bites | 0 | 2 | 2 |

| | | | | |
|---|---|---|---|---|
| 113 | Other tuberculosis | 0 | 2 | 2 |
| 114 | Measles | 0 | 2 | 2 |
| 115 | Tetanus | 0 | 1 | 1 |
| 116 | Burns | 0 | 1 | 1 |
| 117 | Hypertension | 0 | 1 | 1 |
| 118 | Other Bites | 0 | 1 | 1 |
| 119 | | 23420 | 5862 | 29282 |
| 120 | 2020 | | | |
| 121 | **Disease** | **Under 5yrs** | **Over5yrs** | **Total** |
| 1 | Upper Respiratory Tract Infections | 2449 | 0 | 2449 |
| 2 | Other diseases of the Respiratory System | 1539 | 0 | 1539 |
| 3 | Diseases of Digestives system | 1332 | 0 | 1332 |
| 4 | Neo-natal Sepsis | 999 | 0 | 999 |
| 5 | Pneumonia | 946 | 0 | 946 |
| 6 | Diseases of the skin | 804 | 0 | 804 |
| 7 | All Other Diseases | 700 | 0 | 700 |
| 8 | Other Convulsive Disorders | 682 | 0 | 682 |
| 9 | Jaundice | 584 | 0 | 584 |
| 10 | Tonsilitis | 475 | 0 | 475 |
| 11 | Rickets | 437 | 0 | 437 |
| 12 | Diarrhoea | 342 | 0 | 342 |
| 13 | Other Meningitis | 275 | 0 | 275 |
| 14 | Diseases of Circulatory system | 240 | 0 | 240 |
| 15 | Anaemia | 237 | 0 | 237 |
| 16 | Congenital Anomalies | 234 | 0 | 234 |
| 17 | Other ENT Disorders | 226 | 0 | 226 |
| 18 | Malnutrition | 197 | 0 | 197 |
| 19 | Fevers | 185 | 0 | 185 |
| 20 | Diseases of the blood and blood forming organ | 183 | 0 | 183 |
| 21 | Urinary Tract Infection | 162 | 0 | 162 |
| 22 | Asthma | 160 | 0 | 160 |
| 23 | Other Central Nervous System Conditions | 107 | 0 | 107 |
| 24 | Ear Infections/ Conditions | 103 | 0 | 103 |
| 25 | Endocrine diseases | 100 | 0 | 100 |
| 26 | Cerebral Palsy | 80 | 0 | 80 |
| 27 | Chromosomal abnormalities (e.g. Downs, Edwards syndromes, etc) | 65 | 0 | 65 |
| 28 | Other Eye conditions | 64 | 0 | 64 |
| 29 | Eye Infections | 58 | 0 | 58 |

| | | | | |
|---|---|---|---|---|
| 30 | Suspected Malaria | 52 | 0 | 52 |
| 31 | Diseases of the Genito-urinary system | 46 | 0 | 46 |
| 32 | Intestinal worms | 37 | 0 | 37 |
| 33 | Confirmed Malaria (only Positive cases) | 32 | 0 | 32 |
| 34 | Cardiovascular conditions | 24 | 0 | 24 |
| 35 | Dental Disorders | 22 | 0 | 22 |
| 36 | Other injuries | 15 | 0 | 15 |
| 37 | Poisoning | 12 | 0 | 12 |
| 38 | Tuberculosis | 9 | 0 | 9 |
| 39 | Chicken Pox | 9 | 0 | 9 |
| 40 | Speech Disorders | 9 | 0 | 9 |
| 41 | Dysentery (Bloody diarrhoea) | 8 | 0 | 8 |
| 42 | Hepatitis | 7 | 0 | 7 |
| 43 | Autism | 6 | 0 | 6 |
| 44 | Mental Disorders | 5 | 0 | 5 |
| 45 | Mumps | 4 | 0 | 4 |
| 46 | Snake Bites | 3 | 0 | 3 |
| 47 | Bilharzia | 3 | 0 | 3 |
| 48 | Typhoid fever | 3 | 0 | 3 |
| 49 | Other tuberculosis | 2 | 0 | 2 |
| 50 | Head injury | 2 | 0 | 2 |
| 51 | Neoplasms | 2 | 0 | 2 |
| 52 | Epilepsy | 2 | 0 | 2 |
| 53 | Dog Bites | 2 | 0 | 2 |
| 54 | Road Traffic Injuries | 2 | 0 | 2 |
| 55 | Cholera | 2 | 0 | 2 |
| 56 | Kalazar (Leishmaniaisis) | 1 | 0 | 1 |
| 57 | Meningococcal Meningitis | 1 | 0 | 1 |
| 58 | Brucellosis | 1 | 0 | 1 |
| 59 | Diabetes | 1 | 0 | 1 |
| 60 | Burns | 1 | 0 | 1 |
| 61 | Fractures | 1 | 0 | 1 |
| 62 | Neonatal Tetanus | 1 | 0 | 1 |
| 63 | Upper Respiratory Tract Infections | 0 | 587 | 587 |
| 64 | Diseases of Digestive system | 0 | 378 | 378 |
| 65 | Other Dis. of Respiratory System | 0 | 324 | 324 |
| 66 | All Other Diseases | 0 | 205 | 205 |
| 67 | Diseases of the skin | 0 | 178 | 178 |
| 68 | Other ENT Disorders | 0 | 170 | 170 |
| 69 | Urinary Tract Infection | 0 | 134 | 134 |

| | | | | |
|---|---|---|---|---|
| 70 | Diseases of the blood and blood forming organ | 0 | 109 | 109 |
| 71 | Asthma | 0 | 100 | 100 |
| 72 | Pneumonia | 0 | 77 | 77 |
| 73 | Anaemia | 0 | 76 | 76 |
| 74 | Diarrhoea | 0 | 59 | 59 |
| 75 | Diseases of Circulatory system | 0 | 54 | 54 |
| 76 | Central Nervous System Conditions | 0 | 50 | 50 |
| 77 | Diseases of Endocrine system | 0 | 48 | 48 |
| 78 | Arthritis, Rheumatism, Joint pains, etc. | 0 | 46 | 46 |
| 79 | Other Meningitis | 0 | 30 | 30 |
| 80 | Intestinal worms | 0 | 30 | 30 |
| 81 | Fevers | 0 | 29 | 29 |
| 82 | Ear Infections/ Conditions | 0 | 28 | 28 |
| 83 | Other Eye conditions | 0 | 25 | 25 |
| 84 | Suspected Malaria | 0 | 25 | 25 |
| 85 | Eye Infections | 0 | 20 | 20 |
| 86 | Diseases of the Genito-urinary system | 0 | 18 | 18 |
| 87 | Muscular skeletal conditions | 0 | 16 | 16 |
| 88 | Confirmed Malaria (only Positive cases) | 0 | 16 | 16 |
| 89 | Chicken Pox | 0 | 14 | 14 |
| 90 | Dental Disorders | 0 | 13 | 13 |
| 91 | Mental Disorders | 0 | 11 | 11 |
| 92 | Cerebral Palsy | 0 | 10 | 10 |
| 93 | Cardiovascular conditions | 0 | 8 | 8 |
| 94 | Poisoning | 0 | 8 | 8 |
| 95 | Neoplasms | 0 | 8 | 8 |
| 96 | Other injuries | 0 | 7 | 7 |
| 97 | Diabetes | 0 | 7 | 7 |
| 98 | Hypertension | 0 | 7 | 7 |
| 99 | Pelvic Inflammatory Disease | 0 | 7 | 7 |
| 100 | Hepatitis | 0 | 6 | 6 |
| 101 | Epilepsy | 0 | 5 | 5 |
| 102 | Autism | 0 | 5 | 5 |
| 103 | Other tuberculosis | 0 | 5 | 5 |
| 104 | Dis. of Puerperium & Childbirth | 0 | 5 | 5 |
| 105 | Tuberculosis | 0 | 4 | 4 |
| 106 | Gunshot | 0 | 3 | 3 |
| 107 | Dysentery (Bloody diarrhoea) | 0 | 3 | 3 |
| 108 | Conditions of the Breast (not cancers) | 0 | 3 | 3 |
| 109 | Malnutrition | 0 | 2 | 2 |

| | | | | |
|---|---|---|---|---|
| 110 | Kalazar (Leishmaniaisis) | 0 | 1 | 1 |
| 111 | Malaria in pregnancy | 0 | 1 | 1 |
| 112 | Mumps | 0 | 1 | 1 |
| 113 | Bilharzia | 0 | 1 | 1 |
| 114 | Tetanus | 0 | 1 | 1 |
| 115 | Newly Diagnosed HIV | 0 | 1 | 1 |
| | | 14292 | 2980 | 17272 |

**2021 Jan-July**

| | Disease | Under 5yrs | Over5yrs | Total |
|---|---|---|---|---|
| 1 | Upper Respiratory Tract Infections | 2429 | 0 | 2429 |
| 2 | Other diseases of the Respiratory System | 1396 | 0 | 1396 |
| 3 | Diseases of Digestives system | 945 | 0 | 945 |
| 4 | Pneumonia | 940 | 0 | 940 |
| 5 | Neo-natal Sepsis | 807 | 0 | 807 |
| 6 | All Other Diseases | 567 | 0 | 567 |
| 7 | Diseases of the skin | 516 | 0 | 516 |
| 8 | Other Convulsive Disorders | 497 | 0 | 497 |
| 9 | Tonsilitis | 445 | 0 | 445 |
| 10 | Jaundice | 430 | 0 | 430 |
| 11 | Rickets | 398 | 0 | 398 |
| 12 | Other ENT Disorders | 232 | 0 | 232 |
| 13 | Diarrhoea | 202 | 0 | 202 |
| 14 | Other Meningitis | 180 | 0 | 180 |
| 15 | Anaemia | 178 | 0 | 178 |
| 16 | Diseases of Circulatory system | 176 | 0 | 176 |
| 17 | Congenital Anomalies | 169 | 0 | 169 |
| 18 | Fevers | 161 | 0 | 161 |
| 19 | Diseases of the blood and blood forming organ | 143 | 0 | 143 |
| 20 | Asthma | 142 | 0 | 142 |
| 21 | Malnutrition | 137 | 0 | 137 |
| 22 | Other Central Nervous System Conditions | 117 | 0 | 117 |
| 23 | Urinary Tract Infection | 106 | 0 | 106 |
| 24 | Severe Pneumonia | 84 | 0 | 84 |
| 25 | Endocrine diseases | 65 | 0 | 65 |
| 26 | Eye Infections | 53 | 0 | 53 |
| 27 | Gastroenteritis | 53 | 0 | 53 |
| 28 | Suspected Malaria | 52 | 0 | 52 |
| 29 | Hernia | 49 | 0 | 49 |

| | | | | |
|---|---|---|---|---|
| 30 | Diseases of the Genito-urinary system | 49 | 0 | 49 |
| 31 | Cerebral Palsy | 44 | 0 | 44 |
| 32 | Ear Infections/ Conditions | 38 | 0 | 38 |
| 33 | Chromosomal abnormalities (e.g. Downs, Edwards syndromes, etc) | 37 | 0 | 37 |
| 34 | Other Eye conditions | 34 | 0 | 34 |
| 35 | Intestinal worms | 25 | 0 | 25 |
| 36 | Confirmed Malaria (only Positive cases) | 21 | 0 | 21 |
| 37 | Autism | 20 | 0 | 20 |
| 38 | Hydrocephalus | 18 | 0 | 18 |
| 39 | Dental Disorders | 17 | 0 | 17 |
| 40 | Lower Respiratory Tract Infection | 15 | 0 | 15 |
| 41 | Diarrhea with Severe Dehydration | 13 | 0 | 13 |
| 42 | Mental Disorders | 11 | 0 | 11 |
| 43 | Dysentery (Bloody diarrhoea) | 11 | 0 | 11 |
| 44 | Diabetes | 10 | 0 | 10 |
| 45 | Other injuries | 8 | 0 | 8 |
| 46 | Chicken Pox | 8 | 0 | 8 |
| 47 | Poisoning | 8 | 0 | 8 |
| 48 | Speech Disorders | 7 | 0 | 7 |
| 49 | Neoplasms | 5 | 0 | 5 |
| 50 | tuberculosiss | 5 | 0 | 5 |
| 51 | Cardiovascular conditions | 5 | 0 | 5 |
| 52 | Hepatitis | 5 | 0 | 5 |
| 53 | Tuberculosis | 4 | 0 | 4 |
| 54 | Newly Diagnosed HIV | 2 | 0 | 2 |
| 55 | Head injury | 2 | 0 | 2 |
| 56 | Road Traffic Injuries | 2 | 0 | 2 |
| 57 | Fractures | 2 | 0 | 2 |
| 58 | Juvenile Rheumatism | 1 | 0 | 1 |
| 59 | Snake Bites | 1 | 0 | 1 |
| 60 | Foreign Body | 1 | 0 | 1 |
| 61 | Sexual Assault | 1 | 0 | 1 |
| 62 | Measles | 1 | 0 | 1 |
| 63 | Upper Respiratory Tract Infections | 0 | 658 | 658 |
| 64 | Other Dis. of Respiratory System | 0 | 372 | 372 |
| 65 | Diseases of Digestive system | 0 | 322 | 322 |
| 66 | All Other Diseases | 0 | 202 | 202 |
| 67 | Other ENT Disorders | 0 | 156 | 156 |
| 68 | Diseases of the skin | 0 | 150 | 150 |
| 69 | Urinary Tract Infection | 0 | 93 | 93 |

| | | | | |
|---|---|---|---|---|
| 70 | Asthma | 0 | 70 | 70 |
| 71 | Diseases of the blood and blood forming organ | 0 | 60 | 60 |
| 72 | Anaemia | 0 | 59 | 59 |
| 73 | Central Nervous System Conditions | 0 | 55 | 55 |
| 74 | Pneumonia | 0 | 53 | 53 |
| 75 | Diseases of Circulatory system | 0 | 36 | 36 |
| 76 | Convulsions | 0 | 35 | 35 |
| 77 | Diarrhoea | 0 | 27 | 27 |
| 78 | Fevers | 0 | 25 | 25 |
| 79 | Suspected Malaria | 0 | 22 | 22 |
| 80 | Other Meningitis | 0 | 21 | 21 |
| 81 | Diseases of Endocrine system | 0 | 17 | 17 |
| 82 | Intestinal worms | 0 | 14 | 14 |
| 83 | Confirmed Malaria (only Positive cases) | 0 | 14 | 14 |
| 84 | Tonsilitis | 0 | 13 | 13 |
| 85 | Muscular skeletal conditions | 0 | 13 | 13 |
| 86 | Eye Infections | 0 | 13 | 13 |
| 87 | Arthritis, Rheumatism, Joint pains, etc. | 0 | 12 | 12 |
| 88 | Diseases of the Genito-urinary system | 0 | 12 | 12 |
| 89 | Ear Infections/ Conditions | 0 | 11 | 11 |
| 90 | Other Eye conditions | 0 | 11 | 11 |
| 91 | Neoplasms | 0 | 9 | 9 |
| 92 | Mental Disorders | 0 | 8 | 8 |
| 93 | Cerebral Palsy | 0 | 7 | 7 |
| 94 | Autism | 0 | 6 | 6 |
| 95 | Cardiovascular conditions | 0 | 6 | 6 |
| 96 | Dental Disorders | 0 | 6 | 6 |
| 97 | Diabetes | 0 | 5 | 5 |
| 98 | Hydrocephalus | 0 | 4 | 4 |
| 99 | Lower Respiratory Tract Infection | 0 | 4 | 4 |
| 100 | Hernia | 0 | 3 | 3 |
| 101 | Chicken Pox | 0 | 3 | 3 |
| 102 | Typhoid fever | 0 | 3 | 3 |
| 103 | Malnutrition | 0 | 3 | 3 |
| 104 | Other Tuberculosis | 0 | 3 | 3 |
| 105 | Epilepsy | 0 | 3 | 3 |
| 106 | Other injuries | 0 | 3 | 3 |
| 107 | Tuberculosis | 0 | 2 | 2 |
| 108 | Hepatitis | 0 | 2 | 2 |
| 109 | COVID 19 | 0 | 2 | 2 |

| | | | | |
|---|---|---|---|---|
| 110 | Speech Disorders | 0 | 2 | 2 |
| 111 | Dysfunctional Uterine Bleeding | 0 | 1 | 1 |
| 112 | P.V. Bleeding | 0 | 1 | 1 |
| 113 | Poisoning | 0 | 1 | 1 |
| 114 | Malaria in pregnancy | 0 | 1 | 1 |
| 115 | Dis. of Puerperium & Childbirth | 0 | 1 | 1 |
| 116 | Pelvic Inflammatory Disease | 0 | 1 | 1 |
| 117 | Dysentery (Bloody diarrhoea) | 0 | 1 | 1 |
| 118 | Wound/Ulcer | 0 | 1 | 1 |
| 119 | Conditions of the Breast (not cancers) | 0 | 1 | 1 |
| | | 12100 | 2639 | 14739 |

Source: Statistics Unit
Health Information department KNH
27/08/2021

**PEU Admissions - YEAR 2019 - MARCH 2021**

**1. Attendance**

| Year | New | | Old | | **total** | **No. of patient not admitted** |
|---|---|---|---|---|---|---|
| | Male | Female | New | Old | | |
| 2019 | 12224 | 9007 | 9729 | 7140 | **38100** | **32036** |
| 2020 | 7120 | 4978 | 5200 | 3446 | **20744** | **15591** |
| Jan - March 2021 | 2990 | 2173 | 2274 | 1571 | **9008** | **6867** |
| **Total** | **22334** | **16158** | **17203** | **12157** | **67852** | **54494** |

**2. Admissions**

| Year | New | | Old | | **total** |
|---|---|---|---|---|---|
| | Male | Female | New | Old | |
| 2019 | 2693 | 2055 | 817 | 499 | **6064** |
| 2020 | 2338 | 1749 | 625 | 441 | **5153** |
| Jan - March 2021 | 982 | 747 | 253 | 159 | **2141** |
| **Total** | **6013** | **4551** | **1695** | **1099** | **13358** |

**3. Admissions - Age & Gender**

| Year | <1mth | 1-11 mths | 1-4 yrs | 5-12 yrs | Total |
|---|---|---|---|---|---|
| 2019 | 1449 | 1923 | 1515 | 1177 | 6064 |
| 2020 | 1477 | 1478 | 1201 | 997 | 5153 |
| Jan - March 2021 | 521 | 693 | 556 | 371 | 2141 |
| **Total** | **3447** | **4094** | **3272** | **2545** | **13358** |

source: Health
Information Department
KNH 27/08/2021

## 4.9 Appendix IX- SUPPLEMENTARY ANALYSIS

### Supplementary analysis

### Primary objective: Prevalence of overweight and obesity among the children using WHO BMI charts for nutritional assessment

Due to the socioeconomic differences in the reference populations used in generating the CDC and WHO growth curves, a supplementary analysis was done to find out if a measurement error significant enough to cause a difference in prevalence was present.

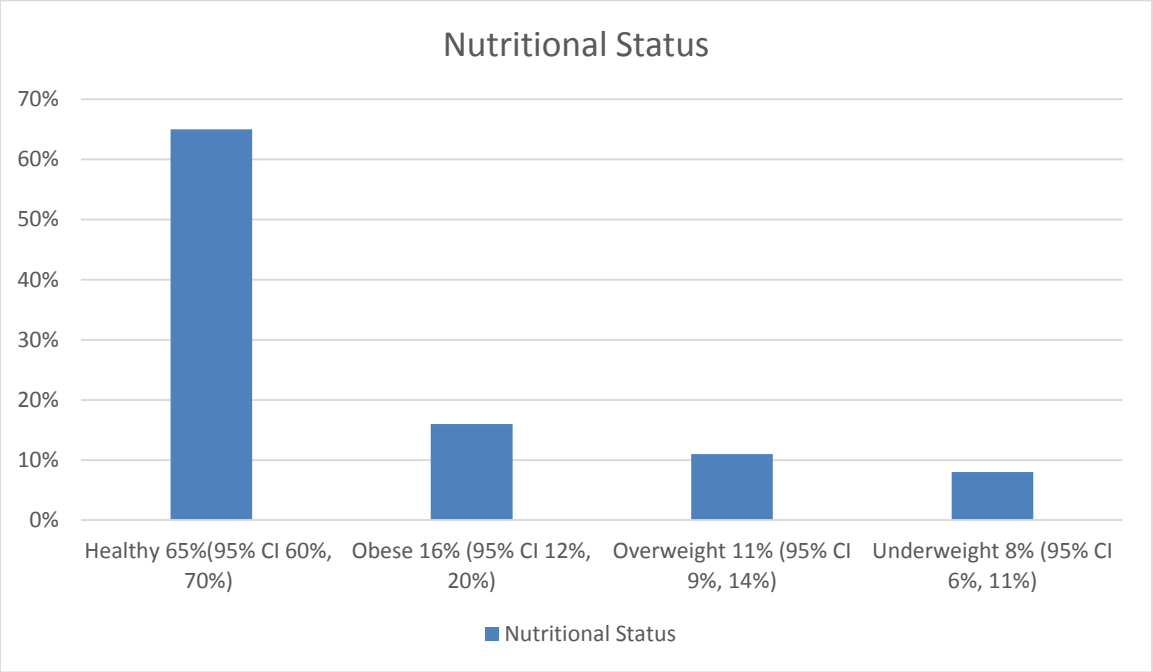



Figure 9: Bar graph showing nutritional status of the children using WHO BMI charts

The prevalence of healthy children was 65% (95% CI 60%, 70%). The combined prevalence of obesity and overweight was found to be 27% (95% CI 22%, 31%) while the rest of the children were under weight. Using the CDC body mass index chart, the study found a combined prevalence of obesity and overweight to be 22% (CI95%: 18%, 26%). The confidence intervals from this analysis showed that the prevalence is not different from that generated using the CDC body mass index charts.

## 4.10 Apendix X- STUDY TIMELINES AND BUDGET TABLES

**Study Timelines**

| | **DURATION (2020 – 2021)** | | | | | | |
|---|---|---|---|---|---|---|---|
| | Oct-Dec 2020 | Feb-2021 | May-Sep 2021 | Sep-Jan 2022 | Jan-Feb 2022 | March 2022 | June 2022 |
| Proposal Development | | | | | | | |
| Proposal Presentation | | | | | | | |
| Ethics Review | | | | | | | |
| Data Collection | | | | | | | |
| Data Analysis | | | | | | | |
| Results Presentation | | | | | | | |
| Publication | | | | | | | |

**Study Budget**

| ITEM | COST(KSHS)-estimated | Justification |
|---|---|---|
| **Ethics Review** | 3,000 | Registration/processing fees |
| **Printing/Stationery** | 11,000 | For data collection tools |
| **Statistician** | 40,000 | For data analysis |
| **Record Retrieval** | 2,000 | Retrieval of records at the KNH |
| **Miscellaneous** | 5,000 | |
| **Total** | **61,000** | |

THE PREVALENCE AND RISK FACTORS OF OVERWEIGHT AND OBESITY AMONG CHILDREN SEEN AS OUTPATIENT AT PAEDIATRIC EMERGENCY UNITAND ACCIDENT AND EMERGENCY DEPARTMENT IN KENYATTA NATIONAL HOSPITAL (A Cross Se

ORIGINALITY REPORT

| 15% | 12% | 11% | 4% |
|---|---|---|---|
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| 5 | W. A. Odhiambo, R. W. Gitau. "Pattern of the postelection violence injuries of patients attended at the accident and emergency department of the Kenyatta National Hospital and the tools of violence employed", Injury Prevention, 2011<br>Publication | 1% |
| 6 | www.ncbi.nlm.nih.gov<br>Internet Source | |

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Ref: KNH-ERC/A/318

14th September, 2021

APPROVED
14 SEP 2021
KNH/UoN-ERC
P. O. BOX 20723 - 00202 NAIROBI

Dr. Doreen Njeri Nganga
Reg. No.H58/33126/ 2019
School of Public Health
College of Health Sciences
University of Nairobi

Dear Dr. Nganga

**RESEARCH PROPOSAL: THE PREVALENCE AND RISK FACTORS OF OVERWEIGHT AND OBESITY AMONG CHILDREN SEEN AS OUTPATIENT AT PAEDIATRIC EMERGENCY UNIT AND ACCIDENT AND EMERGENCY DEPARTMENT IN KENYATTA NATIONAL HOSPITAL(A cross sectional study) (P366/05/2021)**

This is to inform you that the KNH- UoN Ethics & Research Committee (KNH-UoN ERC) has reviewed and **approved** your above research proposal. The approval period is 14th September 2021 – 13th September 2022.

This approval is subject to compliance with the following requirements:

i. Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
ii. All changes (amendments, deviations, violations etc.) are submitted for review and approval by KNH-UoN ERC before implementation.
iii. Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH-UoN ERC within 72 hours of notification.
iv. Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH- UoN ERC within 72 hours.
v. Clearance for export of biological specimens must be obtained from KNH- UoNERC for each batch of shipment.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (Attach a comprehensive progress report to support the renewal).
vii. Submission of an executive summary report within 90 days upon completion of the study.

This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/ or plagiarism.

For more details consult the KNH- UoN ERC website **http://www.erc.uonbi.ac.ke**

Yours sincerely,

**PROF. M.L CHINDIA**
**SECRETARY, KNH- UoN ERC**

c.c. The Principal, College of Health Sciences, UoN
The Senior Director, CS, KNH
The Chair, KNH- UoN ERC
The Assistant Director, Health Information, KNH
The Dean, School of Medicine, UoN
The Chair, Dept. of Paediatrics and Child Health, UoN
Supervisors: Prof. Jowi Christine Yuko, Dept. of Paediatrics and Child Health, UoN
Dr. Aluvaala Martin Jalemba, Dept. of Paediatrics and Child Health, UoN