# A Survey on Childhood Obesity: An Alarming Epidemic of Bangladesh

By

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## Declaration

It is hereby declared that

1. The thesis submitted is my/our own original work while completing degree at Brac University.
2. The thesis does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The thesis does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. I/We have acknowledged all main sources of help.

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# Approval

The project titled "A Survey on Childhood Obesity: An Alarming Epidemic of the Modern World" submitted by Sajid Sohan (ID: 15146069) of Spring, 2015 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Bachelor of Pharmacy (Honours) on October, 2019.

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## Ethics Statement

This project does not involve any animal trials.

# Abstract

Childhood obesity has become one of the most significant health related issues in this 21st century which has become a major concern of public health in the world. The rising of this burden in children is very alarming & affecting both the victims & total healthcare system. A study of WHO says the number of children affected by overweight & obesity is around 155 million. This phenomenon is now bringing about various metabolic disorders & dysfunctions in the children & the impacts are alarming. It has also been marked as a global epidemic as it causes serious health conditions like T2DM, non-communicable disease, CVDs etc. In this study it has been found that 22.7% people had family history of obesity, 61% had no idea about dietary habit related diseases, 7.7% think not much about the importance of food's nutrition value & 12% people have concerns about their children's exercise. Due to these issues obesity & its consequences are being prominent nowadays.



**Keywords:** Overweight; Obesity; Lifestyle; Epidemic; Diseases; Preventions.

# Dedication

*"Dedicated to my parents"*

## Acknowledgement

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## List of Acronyms

| | |
|---|---|
| WHO | World Health Organization |
| BMI | Body Mass Index |
| CHD | Coronary Heart Disease |
| CVD | Cardiovascular Diseases |
| NAFLD | Non Alcoholic Fatty Liver Disease |
| LMIC | Low & Middle Income Countries |
| CDC | Centers for Disease Control & Prevention |
| SES | Socioeconomic Status |
| T2DM | Type 2 Diabetes Mellitus |
| PCOS | Polycystic Ovary Syndrome |

# Chapter 1

# Introduction

## 1.1 Background of the Study

Obesity is defined as the unusual & uncontrolled gathering of lipid in the adipose tissue until the health is damaged and harmed. The uncontrolled gathering of fat and its spreading throughout the body either around the midsection or abdominally and around the borderline have significant health indication(Ofei, 2005). Obesity is associated with a lot of liability factors which may lead to high blood pressure, hyperlipidaemia, hyperinsulinaemia and early coronary artery disease or atherosclerosis. These factors do not only affect the adults but also the young people and children and can function separately(Cole, Bellizzi, Flegal, & Dietz, 2000). It has become a matter of significance because it leads to complicated situations such as cardiovascular diseases, diabetes and cancers(Engin, 2017). Nowadays the pervasiveness of obesity has become very alarming in the developed country and it has been recognized as an outbreak in most of the countries(Bulbul & Hoque, 2014). Obesity is an understated matter of health importance in many countries throughout the world(Ofei, 2005). The commonness of overweight and this phenomena has risen proportionally during the past few decades around the world(Qasim et al., 2018). Even in some cultures and nations overweight is considered as a matter of pride and social standing while the health care professionals identify it as a curse of maintaining a good health and a disease on its own(Ofei, 2005).

Excess accumulation of fat is also known as adiposity which can be determined by a person's body weight which is independent of his height, which is the body mass index or BMI, measured as weight (kg)/height ($m^2$). According to the World Health Organization (WHO)

an individual who has a weight of 25-29.9 $kgm^{-2}$ is declared as overweight and a weight of over 30 kg/m is declared as obese. Due to different accumulation and distribution of body fat, the correlation between BMI and health may differ in case of unalike population(Hawkesworth, 2012). Obesity has become an alarming outbreak and has been identified as a liability factor for various metabolic disorders. According to a survey of WHO there were nearly 1.6 billion people aged fifteen or more who were overweight and 400 millions of adult people among them were identified as obese and 400 millions of adult people among them were identified as obese(Ramachandran &Snehalatha, 2010). Women are found more prone towards gaining overweight due to reproduction and it has been also found that the average body mass index or BMI is greater in female than male in the entire populations(Hawkesworth, 2012).

*Table 1: The extent of overweight & obesity in adult persons (Park, 2019)*

| Categorization | Body Mass Index/BMI ($kg/m^2$) |
|---|---|
| Fit or healthy weight | 18.5-24.9 |
| Bulky or overweight | 25-29.9 |
| Category 1 obesity | 30-34.9 |
| Category 2 obesity | 35-39.9 |
| Category 3 obesity | 40 or higher |

As the term obesity mean excessive body fat accumulation, the definition of obesity in children and adults does not stand with any general acceptance or alliance. Over 30,000 people die every year because of unnecessary overweight as a result of indigent diet and not maintaining exercises properly. If not maintaining these decently, the present obese

generation will become the future obese adults which are alarming for any country. If calculated in percentage, 21-24% children or teenage are overweight and 16-18% are obese(Hamid, Islam, & Ray, 2014). According to a study of 2005, 10.6% was the percentage of the pervasiveness of young age obesity in developed countries whereas in case of low income country it was 5.2%. As suggested by the collective data from both high and low income countries lack of proper diet and nutrition, improper physical exercises and stationary activities like sitting around for a long time at a stretch, desk bound job, not playing outdoor games, previous history of family obesity and low background knowledge are some of the major factors behind this occurrence(Bhuiyan, Zaman, & Ahmed, 2013).

It has been found in a survey that, by 2030 the prevalence of overweight and obesity will reach to 89% in men 85% in women. It will be a major factor in case of increasing obesity associated diseases such as it will increase cancers by 61%, type 2 diabetes by 21% and coronary heart diseases (CHD) or atherosclerosis by 97%(Engin, 2017). However in utmost cases, life expectancy can be declined by 6-14 years due to obesity. Although obesity is taking extreme form, in the last decade the commonness of this has reduced a little bit in the developed country(Qasim et al., 2018).

## 1.2 General Causes, Etiology & Risk Factors of Obesity

Obesity has been considered as one of the principal health burdens in this 21$^{st}$ century which irrespective of any country, nation, culture etc. affects one's own lifestyle individually, sociologically, physiologically and also psychologically(Manna & Jain, 2015). It has been a widespread phenomenon and its etiology has been remarkable. A study has shown that it may occur due to obsogenic works and focusing on extremely lower fat intake which leads to the consequences of higher intake of sugar and simple carbohydrates in the diet(Meldrum, Morris, &Gambone, 2017). It primarily occurs when the balance between the amount of

energy intake & the burning of it does not maintain. It finally results in overweight. So the amount of energy used up and the major elements of one's diet are the important markers of obesity. A sedentary lifestyle such as doing works that do not include much of body movement, watching TV at a stretch, not taking proper exercises & intake of junk foods, sugar enriched drinks, energy enriched foods and not burning them as needed are very much associated with the weight gain process, found by the review study of World Cancer Research Fund(Hawkesworth, 2012).

An extra amount of fat accumulation in the body does not only affect the life parameters but also declines maintenance of health and increases the risk of death. According to the recent studies, it has been shown that the risk factors related to obesity do not occur due to the extra body weight rather it depends of fat accumulation and distribution in the specific regions of the body. BMI as a marking parameter of obesity notably has some limitations in differentiating in excess fat & lean body mass & it also cannot distinguish the fat distribution throughout the body. However it has been found that mainly fat accumulation around the midsection of the body or central fat distribution around the abdomen mainly leads to the obesity related health hazards and disease. Even fat accumulation in viscera may trigger pro inflammatory or pro oxidant states including oxidative stress(Manna & Jain, 2015).Also metabolic disorders are the obvious effects of obesity leading to complicated situations reducing the general life expectancy(Wang &Lobstein, 2006).

According to a study of WHO 2008, obesity generally is caused by the energy we take and the energy we spend. But there are some other complicated reasons and several factors in case of obesity in children. Numerous liability or risk factors have been recognized which are liable to the development of obesity in adults & children. Among these risk factors, some are nearly impossible to alter or change, such as one's family gene and ethnic background. But

some of the other causative factors are modifiable to some extent such as intake of high sugar and complex carbohydrate enriched food, time spent on daily physical exercise, spending too much time in front of the electronic screens etc. Also higher consumption of junk & fast foods rather than fibrous foods leads to greater BMI of the person, the higher the consumption, higher the chance of being affected by obesity & weight gain(M. Rahman, Reza, Islam, Rahman, & Nath, 2015).

Obesity is no longer seen as solely avoidable by individuals and also the consideration has increased that various forces of environment and society play vital role in the balance of the equation of energy balance. Also due to dietary behavior & demographic factors are correlated to the increasing rate of worldwide obesity(Cole et al., 2000). In this 21$^{st}$ century the urbanization is growing and due to this being dependent on urban life and its obsogenous activities and dependent on urban food supplies which are highly processed creating a greater risk for the urban population to be obese rather than the rural population. It is also a causative factor that so called modification from traditional diet to urban & modern diet in case of nutritional value play a vital role in high obesity rates(Hawkesworth, 2012).

Brain is the center associated with the weight regulation of the body & the etiology of obesity is not multi factorial sometimes. Obesity is becoming widespread & endemic due to the combination of some factors & urban way of life(Wang &Lobstein, 2006). The most important factor is genetics which has been found that a person will be obese or not is 40-70% predetermined by his/her genetics. Extreme early obesity can occur to people due to less common genetic factors affecting the central neuronal pathway which may lead to hyperphagia in very early age. Fetal development can also be affected by some developmental factors resulting in later life obesity(Park, 2019).

Atherosclerosis, a disease where fat deposits in the inner arterial walls most likely occurs at a later stage due to total fattiness in the body or subcutaneous lipid accumulation which is correlated with that in a positive way. Fat gathering in the borderline or peripheral area of the body is not that much of a metabolic significant matter whereas accumulation in the midsection or centrally in the body may lead to insulin decline. Obesity does not only do this type of harm but also it is a life threatening matter which may reduce life expectancy and the impact of excessive obesity can lead to death which affects more young people than the aged people(Engin, 2017). The prevalence of obesity is now raising in not only developed but also in low and middle income countries affecting the people of all age. This phenomena has become a curse in case of healthcare maintenance and expenses(Ofei, 2005).

Also according to a study, two parameters have been identified causing obesity, “inherited” which is present at birth & “acquired” at the later stages of life. For instance, some adult people who are obese might be born with a larger amount of adiposity and in their lifespan they gained more fat successively. This might be termed as “inherited” obesity. But some adults were thin & acquired lots of fats & gained weight proportionally as they become older which can be coined as “acquired” as the obesity and its causative factors were not present during the birth of the individuals(Archer, Lavie, & Hill, 2018).

A study led by researchers recognized a mass of behavior among the aged people & children that may increase the probability of obesity. For instance, fit or normal weight people do not have much of appetite for food compared to overweight or bulky people such as appetitive response, eating without appetite, fortification of food value etc. Some of the more common attributes found in overweight people are eating faster and preload insensitivity(Carnell & Wardle, 2007).

There are some medical & psychological conditions that can lead to overweight & obesity. For example, post neurosurgery hypothalamic damage, less amount of thyroid production or

hypothyroidism and even Cushing's syndrome if any suspicion related to overweight may result in obese state(Wellman & Friedberg, 2002).

Some mental states can also bring about the consequences of overweight. Such as binge eating where people take eating as a measure to overcome any kind of emotional distress, substantial abuse i.e. alcohol intake & depression which leads to poor mood of a person leading to eat without hunger just to cope with the depressed state(Park, 2019).

However, in the advanced and modern era, the newborn "built environment" largely affects the way of our lifestyle leading to weight gain or obese generation where various tools which saves our labor to do any work physically have arrived, where it determines whether taking a walk or driving to destination should be selected thus leading towards an idle way of life(Meldrum et al., 2017).

Even different types of medications play a major role in weight gain leading to abnormal obesity. The following chart shows some of those drugs & alternatives to lose weight.

*Table 2: Drugs leading to weight gain & obesity (Park, 2019)*

| Weight gaining drugs | Alternatives/ Weight neutral drugs |
|---|---|
| 1.Drugs used in diabetes<br>• Insulin<br>• Sulfonylureas<br>• Thiazolidinediones | • Metformin<br>• DPP IV inhibitors<br>• Acarbose |
| 2.Miscellaneous & steroids<br>• Hormonal contraceptives<br>• Antihistamines<br>• Corticosteroids | • Barrier contraceptives<br>• Inflammatory drugs<br>• Decongestants, calcium channel blockers |
| 3.Drugs used in neurological treatments<br>• Antipsychotics: olanzapine, clozapine<br>• Antiepileptic: valporate, carbamazepine<br>• Antidepressant: selective serotonin reuptake inhibitors | • Aripiprazole<br>• Zonisamide<br>• Bupropion |

## 1.3 Consequences of Obesity

Many researches & studies have been conducted on adults, children & teenage about obesity & thus declared a rising burden all over the world. Childhood & youth are considered as the perfect time for someone to gain weight or become a victim of obesity(Wang &Lobstein,

2006). As par the studies of WHO, many dysfunction, illness & early deaths are occurring among people in different parts of the world as the impacts of obesity. It also leads to the change of a person's lifestyle and food habit(Ramachandran &Snehalatha, 2010). It has turned out to be one of the major public health issues in some countries. Obesity has been considered as the 2nd most leading cause of premature deaths & avoidable disease in the United States just after smoking. It also increases the probability of some long term and persistent diseases(Wang & Lobstein, 2006).

One of the most common impacts of obesity is economic impact. A study found that in 2000 obesity & overweight related estimated healthcare cost was 117 billion USD with a directly involved expense of 61 billion USD & indirectly involved 56 billion USD. Here directly involved expenses mean the cost used in diagnosis, treatment, visit of doctors etc whereas indirectly involved cost means the net worth of wages that might have been unpaid due to the lack of physical ability & sickness & also value of future wages that could not have been earned due to early deaths(Wellman & Friedberg, 2002). Many countries' economy has been affected directly & indirectly by obesity which bears significant impact on the countries' GDP(Qasim et al., 2018).

The possibility & risk of numerous diseases such as hyperlipidaemia, high blood pressure, cardiovascular diseases (CVD), type 2 diabetes and some sorts of cancers have been increased proportionally with obesity(Ramachandran &Snehalatha, 2010). It can lead to situations and non-fatal states such as osteoarthritis, gout, respiratory complications, gastro-esophageal reflux diseases not primarily causing death & cancers of prostate, endometrial, breast & colon. It also leads to infertility of male(Ofei, 2005). Not only huge weight gain but also medium weight gain is also correlated with obesity causing diseases. Conditions like hernia, hypoxia, sleep apnea, arthritis also occur due to obesity where it works as a free risk factor(Wellman & Friedberg, 2002). At the early stage of life if obesity strikes than it causes

psychological complications for that particular person(Wang & Lobstein, 2006). As obesity leads to cardiac arrest, hypertension, peripheral arterial disease etc. patients affected with these have persistence of long & short term depending on the condition(Lavie, Milani, & Ventura, 2009).

There are a lot of existing discriminations about obesity in many countries which affect the obese people mentally & harmfully in a negative way. A study among some population in the United States has shown that all 100% of them would like to be normally fit & thin person rather being an extremely obese multi-millionaire(Carnell & Wardle, 2007). Another study shows that social consequences of obesity are also prominent in most of the society. For example especially in case of women the US society finds smartness & attractiveness in slimness of the body. They tend to think that obese people are not friendly and lucrative enough who tend to be gluttonous & lazy which spreads different types of rumors & prejudices around the society. They get discriminated in the workplace, educational & social institutions etc. bringing about their mental distress & depression(Wellman & Friedberg, 2002).

## 1.4 Health Related Impacts of Obesity

Obesity is linked up with various types of inflammatory conditions, mitochondrial dysfunctions, oxidative stress etc. leading towards complicated neurodegenerative diseases. It also works a high risk factor of empirical or cognitive impairment(Manna & Jain, 2015). The brain is affected structurally & functionally by obesity greatly which leads to a consequence of higher the BMI, lower the total area of brain of a person. Due to this middle aged overweight people have a greater chance of developing dementia.

Intake of greater caloric contents may lead to cognitive impairment which results in neurodegenerative diseases. The blood glucose & triglyceride levels may be affected by this

leading to metabolic syndrome which can cause complications in the central nervous system (CNS). These complications may further advance to Parkinson's & Alzheimer's diseases(Mazon, de Mello, Ferreira, &Rezin, 2017).

Functional changes of hormones i.e. insulin are also related with obesity which may lead to insulin resistance. As fat or lipid accumulation increases in obesity, the amount of fatty acid increases which brings about the onset of insulin resistance. As there are changes in insulin secretion, cognitive function declines & excitability of neuron is changed. That is why IGF-1or insulin-like growth factor is modified and neuronal decline occurs. The link between obesity and thyroid cancer remains questionable. But in female it is more common that BMI is a risk factor for thyroid cancer. Insulin resistance or IR is mainly responsible for Type 2 diabetes mellitus. Due to high BMI women below fifty years old have a greater risk of developing thyroid cancer as a relation has been found among these two factors(Harikrishna et al., 2019).

Another important phenomenon is maternal obesity which affects greater than one in five women in many countries as a metabolic complication during pregnancy. Overweight & obese women have direct impacts on their babies as they become more prone to be obese at the later stages of life. Due to high adiposity, in case of prenatal development & formation, placenta plays a vital role in this affecting maternal health. Thus maternal obesity greatly affects the future health of the children(Johns, Denison, & Reynolds, 2019).

## 1.5 Scenario of Obesity Worldwide

Various persistent & chronic diseases are rising around the world & obesity is a key factor behind this(Kelishadi, 2007). A research by WHO in 2005 showed that 1.7 billion were categorized as overweight & by 2015 approximately two or three billions of people will fall under the classification of overweight & around 700 million of them will be

obese(Ramachandran &Snehalatha, 2010). Another study has shown that around 115 million adult people have to bear the burden of health related complications due to obesity. People of the higher class residential area have higher BMI compared to the lower class areas. Rural people have lower BMI than the urban citizens therefore facing comparatively low obesity related health complications(Ofei, 2005). Obesity has been alarmingly increased over the past few years where it has been found United States remain the highest affected country by obesity. Not only obesity varies in the national levels but also there are remarkable differences among racial, socio economic, gender etc. criteria(Arroyo-Johnson & Mincey, 2016).

The worldwide prevalence of obesity has a major impact on female more than male as obesity affects greatly the reproductive health of women. During pregnancy women have to face neonatal morbidity, gestational diabetes, fetal macrosomia etc. caused by obesity(Mitchell & Shaw, 2015). The prevalence of obesity has been increased twice than before over the past 3.5 decennium. According to a study of 2013, the number of overweight children below five years old was higher than 42 million. Another study of 2014 showed that 15% women & 11% men were classified as obese who were aged 18 or more(Arroyo-Johnson & Mincey, 2016).

Race & ethnicity also matters in case of obesity. For example, the probability of obesity was found more prone to the people of central or South America also known as non-Hispanic blacks rather than the Asians, Hispanics & non-Hispanic whites. The rate of obesity was also higher in the women of this region than the others. Also the children & youth of Asia are the least affected victims of obesity compared to the black & Hispanic young generation(Williams, Mesidor, Winters, Dubbert, & Wyatt, 2015).

However also Asia is facing the magnitude of this epidemic during the past few decennium which differentiates between countries. Especially some specific regions of Asia such as the

people of Western Pacific region & East Asia are mostly affected by the obesity causing diseases such as diabetes & Cardiovascular diseases. The highest number of people affected by the type 2 diabetes mellitus is of India & China being the second highest(Ramachandran &Snehalatha, 2010).

Surrounding conditions & status & also health practices of the Caucasian-Asian people have been modified rapidly during the past few decennium & obesity has turned out to be one of the burning questions of health issue in these regions. In a survey some important factors have been found such as essential nutritional elements &healthy & neat environmental conditions are of grave importance in case of pregnancy & post-natal lifespan. The data for this survey was collected from the youth & children of Asian & Caucasian region(Oh, 2016). Primarily only in case of western countries it was thought that obesity & its related complications & diseases were of issues of concern. But during last few years due to industrialization, advancement & urbanization there has been a huge change in the lifestyle & dietary habit of the Asian people. Obesity leads to various chronic diseases as mentioned before & also Non Alcoholic Fatty Liver Disease(NAFLD) is a critical issue. Because of this in the United States it has become the second most prominent cause of liver transplantation & third most prominent for liver cancer(Fan, Kim, & Wong, 2017). In higher socio economic society, the BMI index & prevalence of overweight & obesity are greater than those of the low & middle income countries (LMIC). According to recent survey of WHO in 2011, female aging fifteen or more have a prevalence of obesity around higher 93% in Nauru, lower 3.7% in Ethiopia. Both male & female of US have an overweight percentage of 62% & obese 26% in comparison with Southeast Asia region where the overweight percentage of both genders is 14% & only 3% are obese. The highest rates of obese individuals are of America, Europe & Western Mediterranean regions(Mitchell & Shaw, 2015).

Another report shows that 38.3% female & 34.3% male in the US are obese & due to some factors such as race, gender & social status affect the pervasiveness of obesity across the country. From 2011-2014 the childhood obesity percentage in the US was 17% and it also varies according to the aforementioned factors. But the obesity prevalence of children, youth & adults of Canada is lower compared to the United States(Arroyo-Johnson & Mincey, 2016).

In the scenario of Europe It has been found that the percentage or pervasiveness of obesity is nearly 66% for male & 54% for female population(Duncan & Toledo, 2018). A study on the people of specific regions of Europe shows that not only appetite or hunger but also the state of being obese can occur due to poverty. Malnutrition, poor socio economic status & unfit weight are the critical issues for this(Salmasi & Celidoni, 2017). Greater than half of the grown-ups of developed country are obese & the countries where the rate of obesity is lower such as Switzerland, France, Korea, Japan has also risen significantly in comparison with the countries like UK, US, New Zealand, Australia etc.(Pagan, Haro, & Sánchez, 2016). In Europe, the obesity prevalence between men & women intersect & affected by the European nations & cultures. Some of the major criteria for this convergence are food habit & also agriculture, trades & policies. The report shows the obesity prevalence vary from 60-77% for European female & above 82% for the males(Duncan & Toledo, 2018).

## 1.6 Scenario of Obesity in Bangladesh & Developing Countries

Not only developed & advanced countries but also developing countries are facing the strike of the burden of obesity. A study of 2010 by WHO reported that a population of around 43 million among the young generation were categorized as obese and only from the developing countries the percentage was 81%(Banik& Rahman, 2018). As obesity leads to various chronic and life threatening diseases, it has been recognized as a major & critical health issue

also in the low and middle income countries as a report of 2010 shows that nearly 3.8% of disability adjusted life years (DALY), 3.9% years of life lost & 3.4 millions of deaths occurred due obesity related health disease and complications(Ghose, 2017). Between 1980 and 2013, the prevalence of grown up obese people has been risen minimum four times than before only in the developing & LMICs(Bishwajit, 2017).

Bangladesh is one of the most populous countries not only in the Southeast Asia but also in the world and facing a lot of transitions of economy & demography as it has been expected that the total population of Bangladesh would rise up from 165 million to 218 million from 2017 to 2050. A survey on the population aging from six to fifteen years over the nation showed that around 17.6% were categorized as underweight, 9.5 % overweight & 3.5% were obese. So it leads to a conclusion that overweight & obesity are soon to be one of most critical health hazards of this developing country(Banik & Rahman, 2018). It is turned out to be a major health issue in Bangladesh as currently in the country it has been seen that high rates of infectious disease & undernutrition among adults & children are becoming persistent & more common. In Bangladesh from 2004 to 2011 the rate of overweight &obesity has been increased at least twice than before. The percentages of overweight & obesity in 2004 were respectively 7.5% & 1.4% and in 2011 they were respectively 13.5% & 2.9% in the country(Ghose, 2017).

It has become more of a problem for the South Asian countries as the population of these is more prone towards various CVDs & diabetes if they become overweight(Banik & Rahman, 2018). However Bangladesh, being one of the most impoverished countries of this region, due to the great impact of micro & macro-nutrient insufficiency disorders i.e. various communicable, infectious diseases, anemia etc. obesity has become more of a significant phenomenon in our country. In a comparative study it has been found that the percentage of overweight & obesity is higher in Bangladeshi women than the Nepalese women(Bishwajit,

2017). The prevalence of obesity & overweight is greater in the teenage & children than adults of Bangladesh & much higher in the urban area especially in female. The most prominent causes are food habit change, urbanization, maternal health, more sedentary activities rather than physical activities etc.(Banik & Rahman, 2018).

## 1.7 Prevalence of Childhood Obesity

In 21st century, childhood obesity has turned out to be one of the most health related critical issues over the world and has become a major public issue of health in most of the countries(Kaiser Family Foundation, 2004). Most of the consequential studies of obesity are on adults and aged people but recently a lot of researches have been conducted on childhood obesity and the impact of this on children which are instant, intermediary & long term or persistent. According to a study of WHO in 2009, at least one in ten children aging 5 to 17 years were obese or overweight and total number was around 155 million(Wang & Lim, 2012).Nowadays childhood obesity has become an uprising matter of health concern and bringing about a lot of metabolic disorders and dysfunctions for the children. Therefore in developing countries especially in the impoverished ones this issue may turn out to be a matter of critical health & socioeconomic burden in the near future(Kelishadi, 2007). As in later stages of life obesity may lead to some serious health complications such as diabetes, CVDs & non communicable diseases, obesity in children, teenage & adolescents has been marked as a global epidemic health issue. It is not only a burden for the developing country rather it is most common in the developed countries like US, UK, Australia, Canada etc. where the prevalence of childhood obesity is much higher(Biswas, Islam, Islam, Pervin, & Rawal, 2017). Although childhood obesity is one of the easiest concerns to find out or identify but very complicated to cure. The occurrence of obesity is becoming more & more common in the children all over the world regardless of their nation, culture, race & ethnicity, gender etc.(Hamid et al., 2014). Already WHO has declared childhood obesity as one of the

most critical health issues of 21st century as it leads to a wide range of health & psychosocial outcomes(S. Rahman, Islam, &Alam, 2014).

The rising of obesity rate among children is alarming and not only the people affected by this bear the burden but also the total health care system is facing a lot of hurdles. Also the children affected by this face more & more consequences of obesity especially those who have extreme condition and a background of strong family obesity(Kumar & Kelly, 2017). The rate of childhood obesity has been increased twice as much greater in the children & fourfold among the adolescents during last thirty years, says a report of the Centers for Disease Control & Prevention (CDC, 2015). Both short term & long term effects are seen due to childhood obesity such as diabetes, unstable mental state, hypertension, high level of cholesterol etc.(NSW Council of Social service, 2011). The obese children face a lot of social discriminations due to their condition as they have low self-confidence& a poor presentation of their body. As a result it hampers them mentally & physically and creates obstacles in their growth. In addition, constant anxiety & depression are created among them(Gupta, Goel, Shah, &Misra, 2012). Throughout the world a lot of pediatricians have marked the curse of obesity in children leading to conditions like nonalcoholic fatty liver disease (NAFLD) & a more serious consequence nonalcoholic steatohepatitis, a condition where liver becomes inflamed. Also some of them are showing symptoms of fibrosis(McCarthy, 2014).

In case of determining obesity & overweight in the pediatric age group, a specific measurement is used gender specific BMI for age percentile curves. For gender & age, teenage & children who have a BMI >85 but <95 percentiles are categorized as overweight & who have a BMI >95 percentile are categorized as obese. But among the pediatric age group those who have BMI >99 are classified as extremely obese(MCGAVACK, 1961). However defining childhood obesity is a matter of complication because there are very uncertain & sudden modification & changes in the shape or composition in the body of the children.

World Health Organization (WHO) has classified several parameters for identifying childhood obesity among the children of age group five to nineteen. Children who have a BMI standard greater than +2SD & greater than +1SD are classified as obese & overweight respectively(Albataineh, Badran, &Tayyem, 2019). Childhood obesity is calculated in Body Mass Index as the weight of the body in kg/ square height in meters. Therefore the BMI must be elucidated according to gender & age criteria as the body mass index distribution changes with age among the pediatric age group(NSW Council of Social service, 2011). With many diseases & complications, obese children tend to face chronic kidney disease & due to severe & extreme condition of obesity, they might face early stage kidney dysfunctions & renal disorders and at a later stage of life complete kidney failure. Therefore it is high time the researches on childhood obesity found the methods of early detection & preventive measures for this phenomenon in order to improve the future consequences(Nehus & Mitsnefes, 2019).

## 1.8 Worldwide Trends of Childhood Obesity

The world is facing a lot of epidemics in this modern era due to the environmental conditions i.e. industrialization, urbanization etc. and childhood obesity has become one of the major concern of public health issue right now as this complex condition works as a determinant of various diseases(MCGAVACK, 1961). Obesity in pediatrics has been recognized as a burning question in the developed countries especially in the US. Most recently it has been found that at least one out of three children bear the burden of obesity & overweight only in the US(Kumar & Kelly, 2017). The pervasiveness of this phenomenon has increased thrice as much during the last twenty years. A report says that in the age range for childhood period (6 to 19) years defined by WHO, at least of 15% are overweight & more 15% are at the edge of to be overweight & 80% teenage are soon to be obese when they become adults(Kaiser Family Foundation, 2004). As it has become a widespread problem in the US, a study shows that only in that country all the complications regarding renal functions & kidney are because

of obesity at an early age with a percentage of 24-33%. Minimum 4 to 6% of children in the US are at the brink of extreme obesity which is considered when the BMI is >120% of the percentile of 95$^{th}$(Nehus & Mitsnefes, 2019). As United States being one of the most affected regions by childhood obesity the rate of NAFLD among children has become 3.9% to 10.7% during the past twenty years. At least of 7.6% of the children & teenage around the world are at risk of having some type of fatty liver complications(McCarthy, 2014). A study among the children of Canada in 2004 shows that the rate of overweight & obesity was similar in the both sexes and it was seventy times greater than the rate of 1979 and only obesity was 2.5 folds greater(Shields, 2006). However recently 25.4% & 25.1% were the prevalence of childhood obesity found respectively in Malta & US and declared as the highest in the world. The possibility of being obese after the childhood period is more prominent in the children of Estonian region where Swedish have comparatively lower probability(Hamid et al., 2014).

The rate has increased from5 to 18.5% during the last 38 years only among the US children & adolescents. However the rate has reduced to some extend in recent times showing a result of 0.1% per year during 2004-2016 where it was around 0.4-0.7% per year during 1978-2004 in the country. If in case of only five years old, children of 2010 when compared with those of 1997, they were 2% more likely to face obesity in adulthood. At that time among the white children the prevalence was only 1%but the Blacks & Hispanics had a rate of 5 and 3% respectively(P. M. Anderson, Butcher, &Schanzenbach, 2019). In Japan, the authority related to study this matter has declared childhood obesity as an alarming state of morbidity & mortality & a condition which must undergo special medical care. The trend was likely to increase until 2008 at an alarming rate but became sloth after that a little bit as modern female children want to be slim nowadays which might have worked as a key factor in this decline(Kubo, 2014). As it is becoming an epidemic around world now various metabolic syndromes can be identified at an early stage of childhood which is more widespread in the

developed & high socio economic society. Especially the risk of type 2 diabetes is increasing very quickly among the children of western part of the world(Kelishadi, 2007). A group of researchers conducted a survey where they found the rate of childhood obesity has gone upwards from 9.8 to 11.7% in northern part of India & in case of children living in the city area of China it has become 0.2 to 8.1% during the last 25 years(Uijtdewilligen, Waters, Müller-Riemenschneider, & Lim, 2016).

Right now the number of children below 5 years old who are in the brink of being obese are nearly twenty-two millions. Apart from the developed countries nowadays most of the underdeveloped & LMICs are also facing the uprising of this burden. Even in some of these countries the lack of proper nutrition & gaining overweight both exists side by side(Agrawal &Gensure, 2018). According to a report of 2000, it has not become a major concern of public health issue in case of children below 5 of the sub Saharan Africa & Asia like it has turned out to be in Western Europe, Northern Africa & all over the United States. On the other hand the prevalence of obesity & malnutrition both has been seen in some part of the world for instance 4.3% & 3.4% were the rates of being obese & suffering from lack of nutrition respectively in case of the pre-school age child in Asia. Even some parts of South America, which faced a lot of premature deaths due lack of proper nutrition & diet at a time, the rate of obesity & children suffering from nutritional value were respectively 5% & 1.8%. Morocco, Egypt & some Caribbean countries have the most alarming rate(Kelishadi, 2007).

The commonness of obesity is not that much prominent in non-Hispanic whites when compared to American Indians, Mexican & African Americans. It has been showed that in case of a child if one parent (father or mother) has the complications of obesity the chance of that child being obese increases twice or thrice as much and if both o the parents have obesity complications the chance increases to fifteen times as much. Although for sometimes the trend has reduced a little bit the rate of extreme obesity is rising for instance in 2012 at least

5.9% of children were the victims of extreme obesity in the US(Kumar & Kelly, 2017). As the amount of abdominal & midsection fat is greater in the people of east & south Asian origin in comparison with the western whites, they tend to be highly prone to have diabetes at a stage of life which affects their next generation. By this data it is thought that around 2030 the countries like Bangladesh, India, Pakistan, China, Philippines etc. will be the leading among the countries facing the complications of diabetes(Uijtdewilligen et al., 2016). The uprising burden of obesity in children is increasing day by day in Asia because of consumption of food with low health & nutritional value but highly calorie enriched and leading towards activities which do not need physical movement and an idle lifestyle(Wang &Lobstein, 2006). As in Asia there is versatility of developing & also developed, developing & LMICs, some of the countries are facing complications of both over & under nutritional problem & in the industrialized and modern area the percentage of obesity in children is alarming and also likely to face the consequences of this more than the other regions. So this problem is taking over the world in a massive measure(Hills, Mokhtar, Brownie, & Byrne, 2014).

## 1.9 Scenario of Childhood Obesity in Bangladesh

The burden of childhood obesity is still rising in the developing countries of Asia & Bangladesh being one of the victims of this. Therefore a lot of surveys, reports, studies & researches are being conducted on this in the countries of this region but in case of Bangladesh it is very less examined due to proper data & favorable conditions among the young generation. The rate of obesity is 1.4% in the children <5 years in Bangladesh, says a report by the UNICEF & Bangladesh Bureau of Statistics. Also a very recent study shows that in case of the children & teenage of school going age in the city of Dhaka, the prevalence of obesity & overweight was 17.9% & 23.6% respectively(S. Rahman et al., 2014). Some crucial factors such as urbanization, food habit change, lack of proper outdoor games &

improvement of economic condition to afford electronic devices & indoor game utilities, the children & adolescents of Dhaka are facing the severity of obesity lately specially in case of the children of rich families(Bhuiyan et al., 2013). Although according to a report of 2014 at least 1/3 of the young generation was suffering from malnutrition, battling the consequences of overweight & obesity among children has been marked as a major public health issue even in a impoverished and less resource full country like Bangladesh(Biswas et al., 2017)

Due to the geographic location, Bangladesh being one of the countries of Southeast Asia, the people of this country may have a lesser BMI but contains high adipose tissue gathering centrally & throughout the whole body in comparison with other regions' population. That is why Bangladeshi children have a higher risk of metabolic obesity(Ramachandran, Chamukuttan, Shetty, Arun, &Susairaj, 2012). In order to overcome the burden of obesity in young people various methodological steps should be taken by the government but the initiatives are not up to mark right now. There is also lacking of proper collective information & data about the prevalence of obesity among school going children in Bangladesh as this period is considered to be a prime time for them to gain overweight(Alam et al., 2016). A study on over ten thousand of school going children both in village & city area shows that the obesity & overweight percentage were 3.5% & 9.5% respectively where the number of boys & girls were almost same. But it is mostly prevailing in the children of the city or urban schools rather than the rural ones & the prevalence may turn out to be a matter of serious concern(Bulbul & Hoque, 2014). As growing up in cities like Dhaka, Chittagong etc. the children have a very few opportunities of playing in the field or park due to the overload of studies and lack of outdoor games facilities in the city. 1.9%female & 1.4% male children rising up in the urban area of Bangladesh are found to be obese, says a study report of 2012 on <5 years old(M. Rahman et al., 2015).

In Bangladesh, the obesity percentage in children is rising proportionally from 3.6% to 5.7% to 7.9% from 1998 to 2015 in a differential study with a gap of five years in between. A major cause behind the increasing prevalence of childhood obesity in Bangladesh is the lack of proper knowledge of the parents about appropriate nutritional value of food, liability factors and impact & consequences of this burden on their children. Although over the past few years the rate of malnutrition has been decreased in the country, the rate of excess nutrition leading to overweight & obesity has accelerated causing two fold burdens over the country. However the most important factor to raise a healthy & fit generation of children is the knowledge of the mothers as they are the ones who can construct the mind, behavior & habits of their children & should have the minimum understanding of the right thing to do in order to raise the children fit(Hossain et al., 2019). A study on the English medium school going children in Dhaka aging seven to fourteen years was conducted showing obesity & overweight prevalence of 24.1% & 20.5% in Bangladesh. Another research of 2011 shows that the rate of overweight & obesity was 25% & 21.88% in the children coming from well off & rich family background in Dhaka(M. Rahman et al., 2015).

However all the studies conducted on childhood obesity in Bangladesh are either in the cities or among urban school going children but no significant studies are found on the children of rural areas of Bangladesh. A survey on the female children of district school outside the capital shows the rate of obesity & overweight among them was 14% & 23%(Zabeen et al., 2015). In order to combat this public health issue proper studies are needed to be conducted both in the children of rural & urban areas of Bangladesh(Bhuiyan et al., 2013).

## 1.10 Scenario of Childhood Obesity in Bangladesh

A cluster of several issues such as social, economic, environmental, community, family background etc may lead to childhood obesity. However the etiological parameters behind

this occurrence among children are very much complicated. Nowadays children especially in the urban area are being overweight & obese because of excess weight gain in order to cope with unstable mental state & stress as it results in wrong overcoming habits such as eating more to suppress the depressed condition without being aware of the severe consequences(Kumar & Kelly, 2017). Numerous amounts of determinants have been identified which can work as causative factors behind childhood obesity. Mainly due to versatilities in genetic parameters & environmental factors childhood obesity is rising worldwide. These changeable environmental factors & unchangeable genetic factors are recognized as the prime causative factors behind obesity in children(Albataineh et al., 2019). The decline in physical activities of the urban children has led to more severe obesity problems as they cannot play outdoor games due to lack of playgrounds in the city & even lack of walking & running in the morning or afternoon due to heavy load of academic stuffs are also leading to childhood obesity. Now they are becoming used to look at the screens of TV, smart phones, laptops at stretch for a long time and being addicted to video games & other electronic devices(Gupta et al., 2012). In case of mothers, gaining weight before pregnancy, during pregnancy & food habit may cause overweight & obesity in their children. Nowadays decline in breastfeeding habit & bearing child at a later stage of life are also increasing the pervasiveness of obesity in children worldwide(Oh, 2016).

However modification of food habit is one of major concern behind this which has affected the amount of caloric consumption of children. Nowadays especially urban children like to have foods which are high in sugar, complex carbohydrates, sweetened soda & drink, junk food containing excess fat etc. Mainly fast food & sugar enriched drinks are alarming among these(Nehus & Mitsnefes, 2019). A study conveyed in the US showed that these types of drinks provide around 270 kcal/d being ten to fifteen percent of the total consumption of calorie(Kumar & Kelly, 2017). Another causative factor is socio economic status (SES). In

developed countries higher SES resembles lower possibility & in developing country higher SES resembles higher possibility of childhood obesity. It is because the urban children are used to a modern lifestyle, they move by family or private car rather than taking a walk to the schools and also get daily, weekly or monthly allowances from their parents making them enable to buy various luscious looking junk foods & drinks(Gupta et al., 2012). When the amount of energy intake is not equal to the energy expense, the extra energy remains in the body and leads to fat accumulation. Junk food leads to this type of result as they have lower amount of fiber, iron & calcium but higher amount of saturated fat, tasting salt etc. Urban children are used to have these as they are easily affordable to them and due to the lack of burning of energy they are turning obese day by day.

However the children who cannot take breakfast have a higher prevalence of obesity, at least twice as much than the children regularly taking breakfast as it works a defense mechanism against obesity. Due to missing breakfast, urban children take fast foods when they get hunger and thus gaining overweight(Albataineh et al., 2019).As an epidemic worldwide obesity at childhood leads to obesity in adulthood which works as the gateway of various complicated diseases like dyslipidaemia, high blood sugar & pressure, diabetes mellitus, atherosclerosis, coronary artery disease, stroke, arthritis etc.(Wang & Lim, 2012). However the impacts of childhood obesity can be instantaneous (liver, heart, pulmonary, metabolic etc. complications) &deep rooted for future (diabetes, osteoarthritis, heart attack, certain cancers etc. The prevalence of these diseases is more in the children when they are older. However all of these possibilities of obesity causing diseases are depending on how much severe the obesity is in childhood(Pedersen, Sørensen, & Baker, 2019)A general chart of childhood obesity causative factors is as follows.

*Table 3: A general list of causative factors of obesity in children & adolescents (MCGAVACK, 1961)*

| | |
|---|---|
| Country of birth | List of diet |
| Genetic factors | Sleeping period |
| Weight at birth | Family food habit |
| Maternal weight | Inactive & sedentary period |
| Race | Industrious activity |
| Epigenesis | Endocrine diseases |
| Socioeconomic status (SES) | Some specific medications |
| Residence (urban/rural) | |

Obesity can also result in different types of comorbidities in older children but not all of them show psychological & physical symptoms. Some of the children do not show any medical and health related critical situations relating to their overweight & obesity(Gurnani, Birken, & Hamilton, 2015). This problem does not only affect an individual's health but also creates impacts on their psychology & social state of health. It has also been seen that the children affected by obesity are greatly hampered in case of their academic & educational performances & tend to live a very miserable life at adulthood(Ghosh, Das, & Sen, 2019).

Obesity at an early age or teenage period may reduce the lifespan of those individuals. However girls who are affected by overweight & obesity may face complicated health issues such as high BP during labor period, irregular menstrual cycle & delay of conceiving naturally(S. Rahman et al., 2014). As previously discussed, due to childhood obesity a bunch of metabolic disorder may occur which may lead to consequences such as CVD, T2DMand PCOS etc. A study reports that in case of children of regular weight, excess weight & obesity

the rates of possibility of metabolic disorders are 3.3%, 11.9% & 29.2% respectively. However another study on a population aging 2 to 39 years old shows that they had a premature death due to various atherosclerotic complications as a result of high BMI & LDL level at early age(Gurnani et al., 2015). A general list of types of childhood obesity impacts is as follows:

Firstly,

Instant ⟶ Intermediary ⟶ Long term

Secondly,

Socioeconomic ⟶ Educational ⟶ Medical ⟶ Psychological

*Major classes of childhood obesity consequences*(Ghosh et al., 2019)

## 1.11 Preventive Measures of Childhood Obesity

The most important thing to focus in order to prevent obesity is specific changes in the lifestyle rather than thinking about weight only. However the role of child psychologists and pediatricians are also principle(K. L. Anderson, 2018). However changing the obesogenic surrounding around the childrenis also pivotal(Ghosh et al., 2019). Taking preventive measures against this is not an easy task & it may vary due to the age and extremity of complications in children. Heavy weight reduction & restriction on food should not be the primary approach as it may harm the health of children(Hamid et al., 2014). The aim of obesity management should be targeted as to decrease the obesity related health problems as well as a proper modification in lifestyle(Gurnani et al., 2015).

Obesity management programs are firstly launched on school children as it is considered as one of the most important places for modification of obese & overweight lifestyle. There are several reasons behind this as children have to stay for quite a long time in school where they eat once or twice daily, where educational health background is provided & they can involve themselves in direct physical exercises & outdoor games(Verrotti, Penta, Zenzeri, Agostinelli, & De Feo, 2014). Teachers, healthcare professionals, experienced & trained stuffs & some parents and students are mainly the trainers of these management programs(Uijtdewilligen et al., 2016).

# Chapter 2

# Research Methodology

## 2.1 Research Objectives & Goals

The major goal of this research is to find out the causes & reasons behind childhood obesity and what might be the impacts & consequences of this phenomenon. In addition, we also took effort to find out what might be the preventive measures & precautions against this problem.

## 2.2 Research Design

The questionnaire was prepared by a substantial literature review and then a draft questionnaire was formed. The questionnaire was then validated by a focus group discussion among three doctors. The suggestions were taken to finalize the questionnaire. After that the survey and result analysis were conducted.

## 2.3 Research Sample Size

A total of 450 samples were collected in Dhaka & Narayanganj areas. Among these 415 were found to be completely validated. The sample was then analyzed by SPSS version 20.

## 2.4 Research Questionnaire

RQ 1: What is your occupation?

RQ 2: What is your income?

RQ 3: Any history of family obesity?

RQ 4: What are your thoughts on being fat or thin?

RQ 5: What are your thoughts on dietary habit leading to different diseases?

RQ 6: What are the criteria you consider while buying food?

RQ 7:  What are the most important factors in case of a child's present & future health?

RQ 8: What is the gender of your children?

RQ 9: What is the age of your children?

RQ 10: What is the height of your children?

RQ 11: What is the weight of your children?

RQ 12: How frequently do your children eat vegetables daily in average?

RQ 13: How many times do your children eat fast food in a week?

RQ 14: How frequently do your children drink sodas in a week?

RQ 15: How many times do your children play outdoor games or exercise in a week?

# Chapter 3

## Result & Discussion

In our study, the main focus was on the children of slum area. The study mainly runs in Dhaka & Narayanganj. We collected a total of 450 samples but 415 among those were found validated. In Dhaka we focused on the children of Korail Slum as it is nearby they need our concern firstly and in Narayanganj we focused on the slum areas around the banks of the Shitalakkha river as the access of our information was more easy.

In these area people of various occupation were found such as rickshaw puller (9.9%), garment worker (2.4%), labor (14.9%), housewife (5.3%), driver (23.9%), maid servant (17.3%), industrial worker (11.6%), bus helper (3.4%), waiter (2.7%), newspaper seller (1%), security guard (1.9%), shopkeeper (2.9%), businessman (1.4%), hawker (1%) and car painter (0.5%).

*Table 4: Respondent's Occupation*

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Rickshaw Puller | 41 | 9.9 | 9.9 | 9.9 |
| Garment Worker | 10 | 2.4 | 2.4 | 12.3 |
| Labor | 62 | 14.9 | 14.9 | 27.2 |
| Housewife | 22 | 5.3 | 5.3 | 32.5 |
| Driver | 99 | 23.9 | 23.9 | 56.4 |
| Maid Servant | 72 | 17.3 | 17.3 | 73.7 |
| Industrial Worker | 48 | 11.6 | 11.6 | 85.3 |
| Bus Helper | 14 | 3.4 | 3.4 | 88.7 |
| Waiter | 11 | 2.7 | 2.7 | 91.3 |
| Newspaper Seller | 4 | 1.0 | 1.0 | 92.3 |
| Security Guard | 8 | 1.9 | 1.9 | 94.2 |
| Shopkeeper | 12 | 2.9 | 2.9 | 97.1 |
| Businessman | 6 | 1.4 | 1.4 | 98.6 |
| Hawker | 4 | 1.0 | 1.0 | 99.5 |
| Car Painter | 2 | .5 | .5 | 100.0 |
| Total | 415 | 100.0 | 100.0 | |

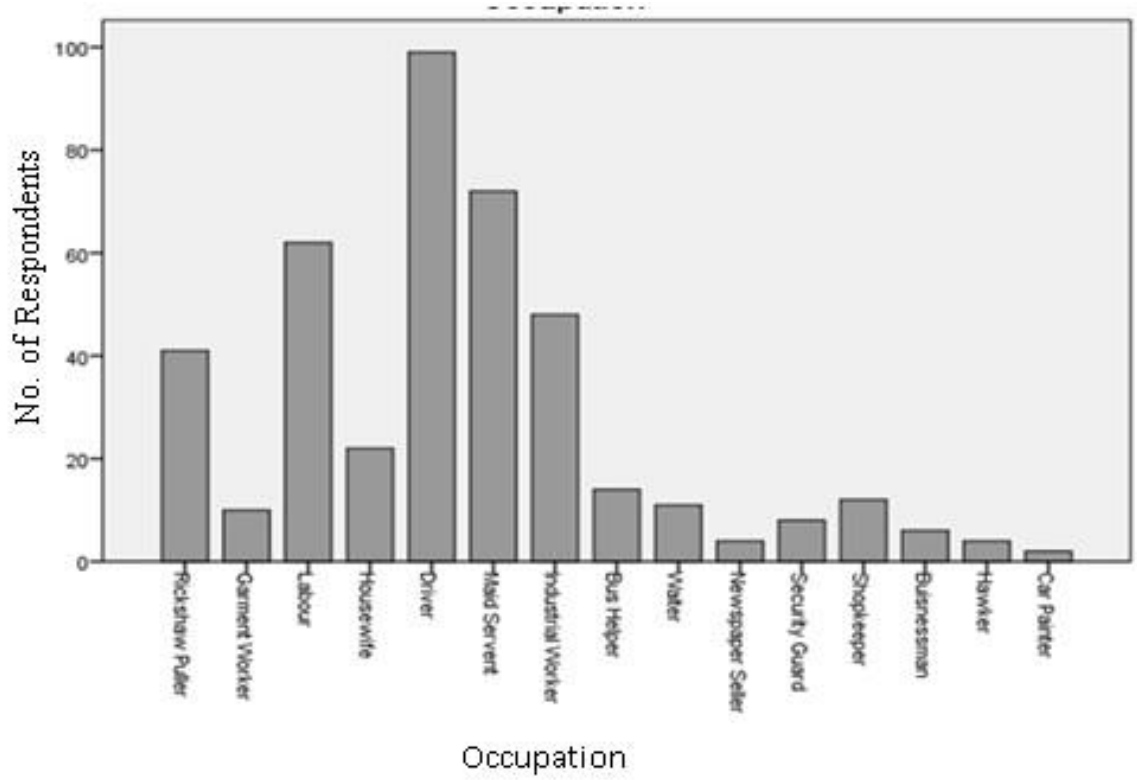


*Figure 1: Respondent's Occupation*

In our study, we wanted to know more about the respondents' history of family obesity such as if their parents or grandparents were obese or not and other members of the family. We found 77.3% people had no family history of obesity and 22.7% said they had previous history of this phenomenon.

*Table 5: Respondent's history of family obesity*

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Yes | 94 | 22.7 | 22.7 | 22.7 |
| No | 321 | 77.3 | 77.3 | 100.0 |
| Total | 415 | 100.0 | 100.0 | |

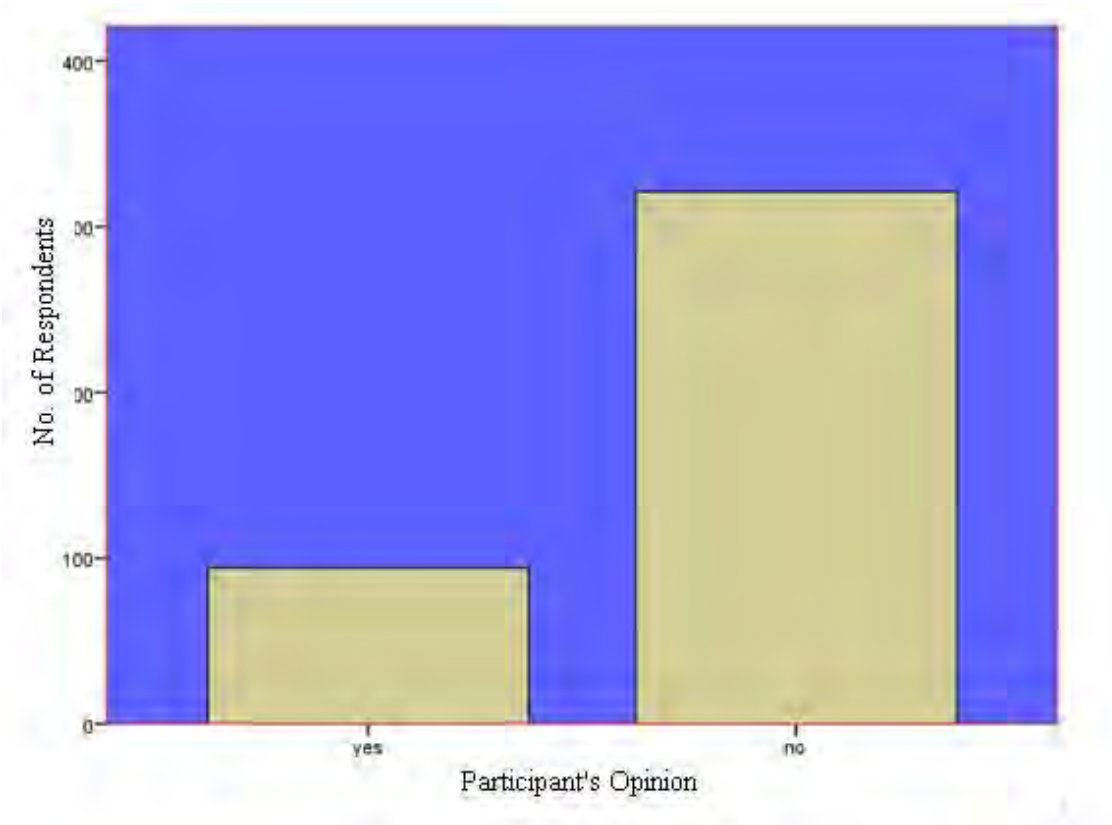


*Figure 2: Respondent's history of family obesity*

In some literature review we found that this statement “Being fat or thin is a natural phenomenon. Do you think you can do anything to change this?” was somewhat not clear among the people. So we found we need to inspect on this statement. In our study, 43.4% said yes & 56.6% said no in this regard.

*Table 6: People’s perspective on the statement “Being fat or thin is a natural phenomenon. Do you think you can do anything to change this?”*

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Yes | 180 | 43.4 | 43.4 | 43.4 |
| No | 235 | 56.6 | 56.6 | 100.0 |
| Total | 415 | 100.0 | 100.0 | |

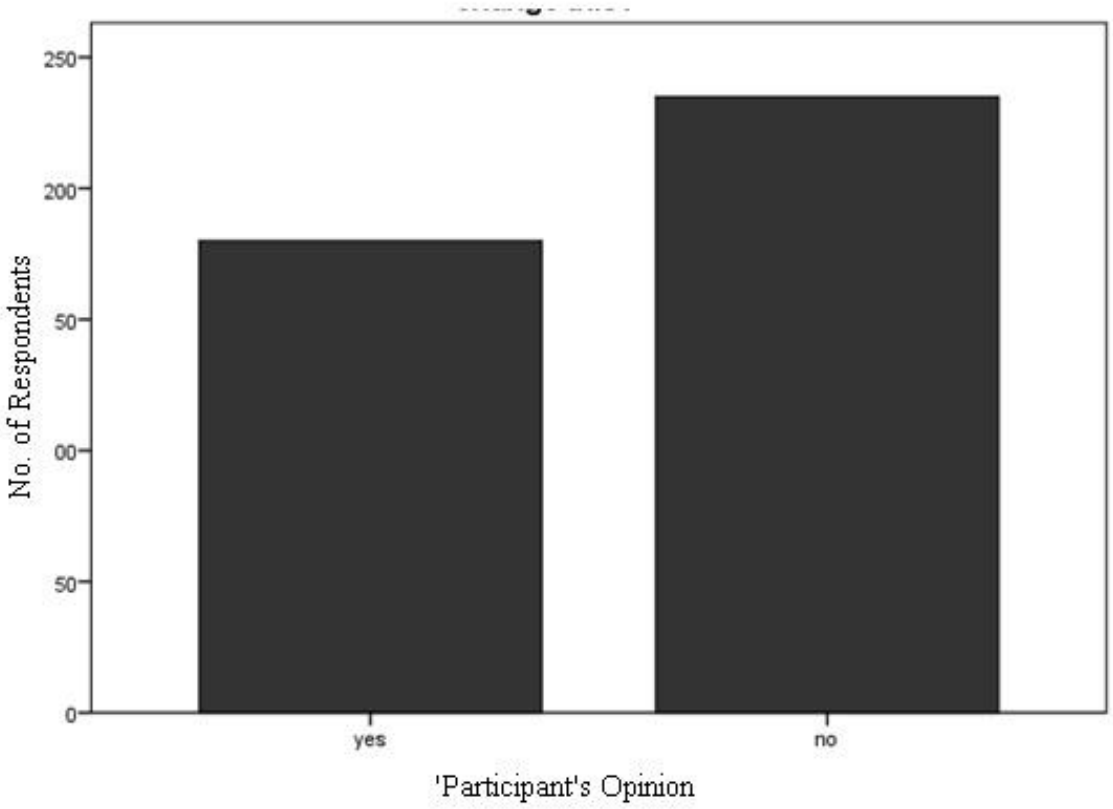


*Figure 3: People’s perspective on the statement “Being fat or thin is a natural phenomenon. Do you think you can do anything to change this?”*

In our literature review we found that there is a prime linkage in between dietary habit & obesity. In our study, only 39% said they had knowledge about this. On the contrary 61% people said they had no idea that dietary habit may lead to various diseases.

*Table 7: People's perspective on the statement "Dietary habit may lead to various diseases. Do you have any idea about this?"*

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Yes | 162 | 39.0 | 39.0 | 39.0 |
| No | 253 | 61.0 | 61.0 | 100.0 |
| Total | 415 | 100.0 | 100.0 | |

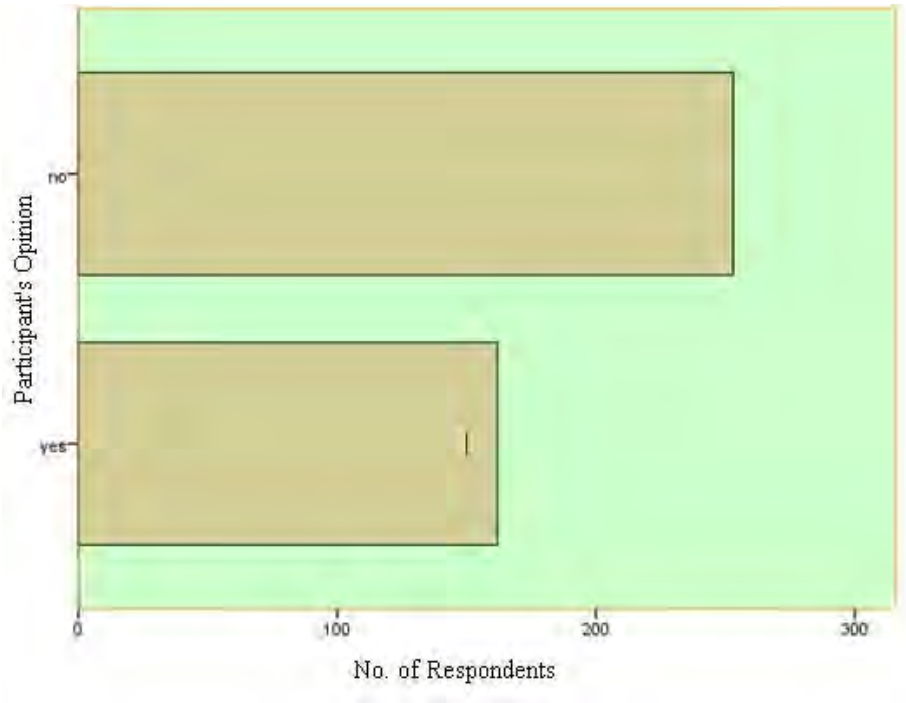


*Figure 4: People's perspective on the statement "Dietary habit may lead to various diseases. Do you have any idea about this?"*

In our study of childhood obesity, we found the majority of the people said they think the foods are needed to be safe to eat. 99.5% people said it is very important & only 0.5% people said it is somewhat important.

*Table 8: People's opinion on "How safe the food is to eat"*

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| very important | 413 | 99.5 | 99.5 | 99.5 |
| somewhat important | 2 | .5 | .5 | 100.0 |
| Total | 415 | 100.0 | 100.0 | |

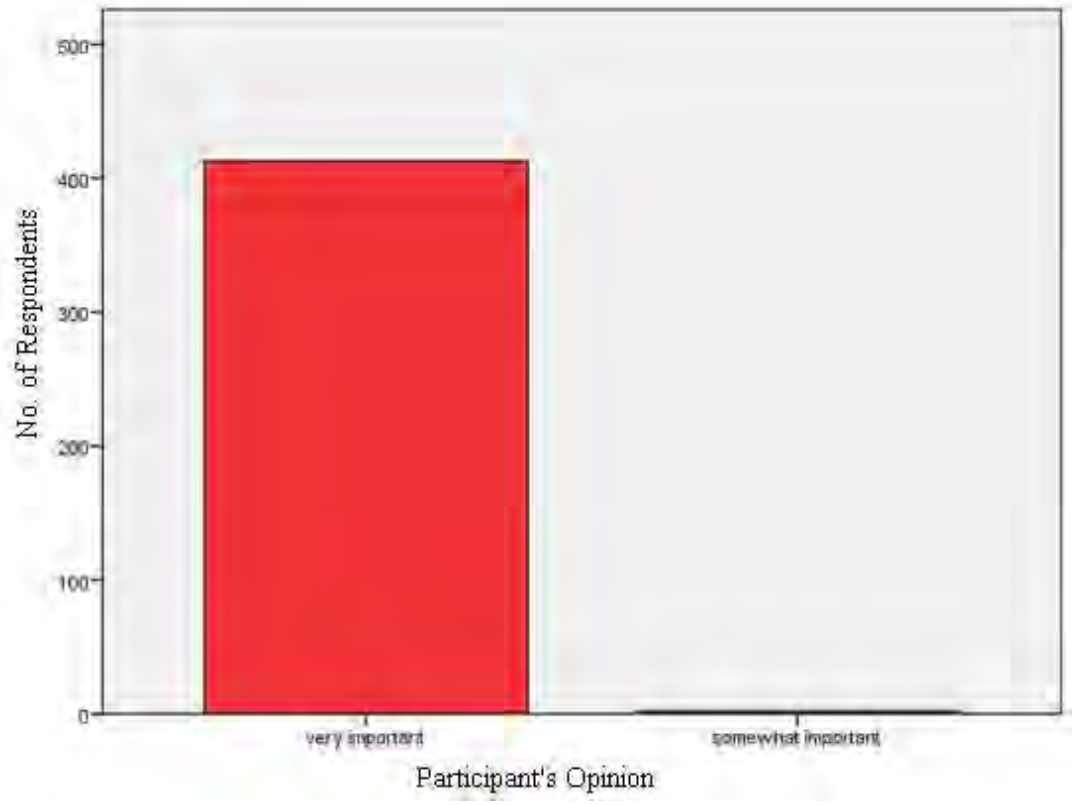


*Figure 5: People's opinion on "How safe the food is to eat"*

In our study we took opinion on the fact about how healthy the food is & its nutritional value. We found 40.2% people said it is somewhat important & 7.7% people said it is not that much important. So almost half of the people lacks knowledge about the nutritional benefits of the food.

*Table 9: People's opinion on "Nutrition (how healthy the food is)"*

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| very important | 216 | 52.0 | 52.0 | 52.0 |
| somewhat important | 167 | 40.2 | 40.2 | 92.3 |
| not too important | 32 | 7.7 | 7.7 | 100.0 |
| Total | 415 | 100.0 | 100.0 | |

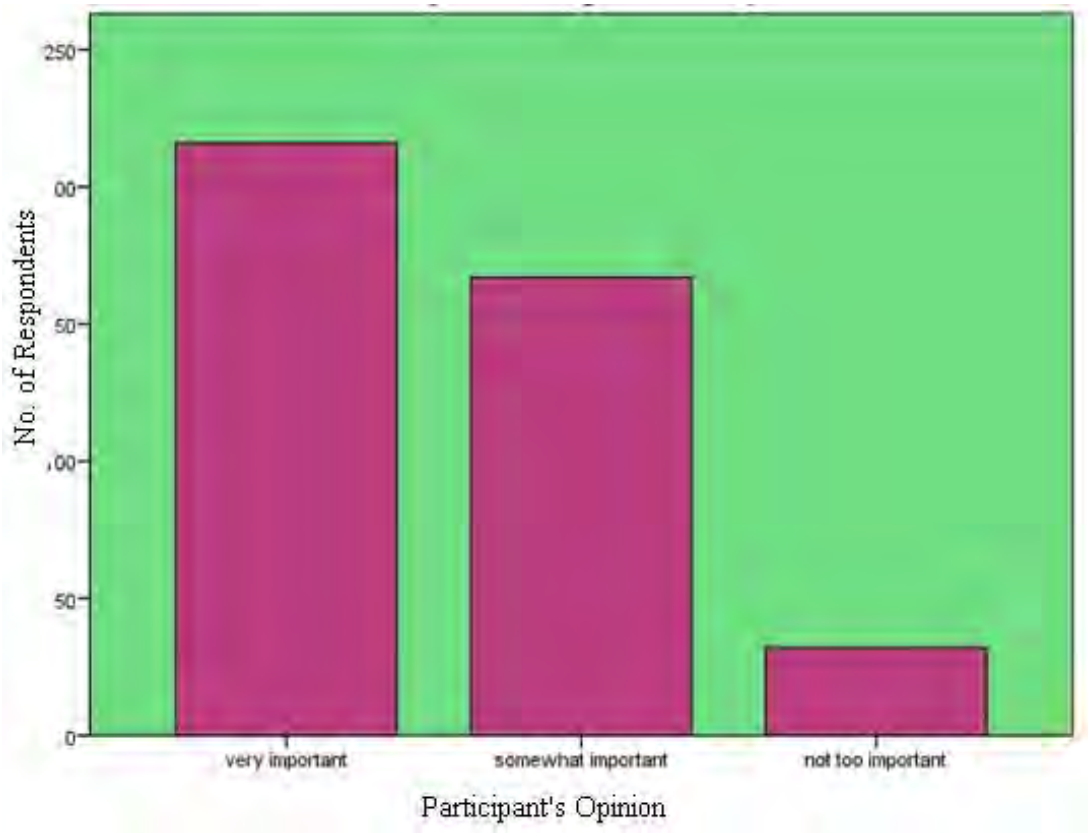


*Figure 6: People's opinion on "Nutrition(How healthy the food is)"*

In our country the overall income of slum area people is very low. As a result price is a big factor to consider while buying food. In our study we found 66.5% of people said price of the food is very important to them. So still the majority of people need to consider the price while buying food.

*Table 10: People's opinion on "Price"*

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| very important | 276 | 66.5 | 66.8 | 66.8 |
| somewhat important | 97 | 23.4 | 23.5 | 90.3 |
| not too important | 40 | 9.6 | 9.7 | 100.0 |
| Total | 415 | 100 | 100.0 | |

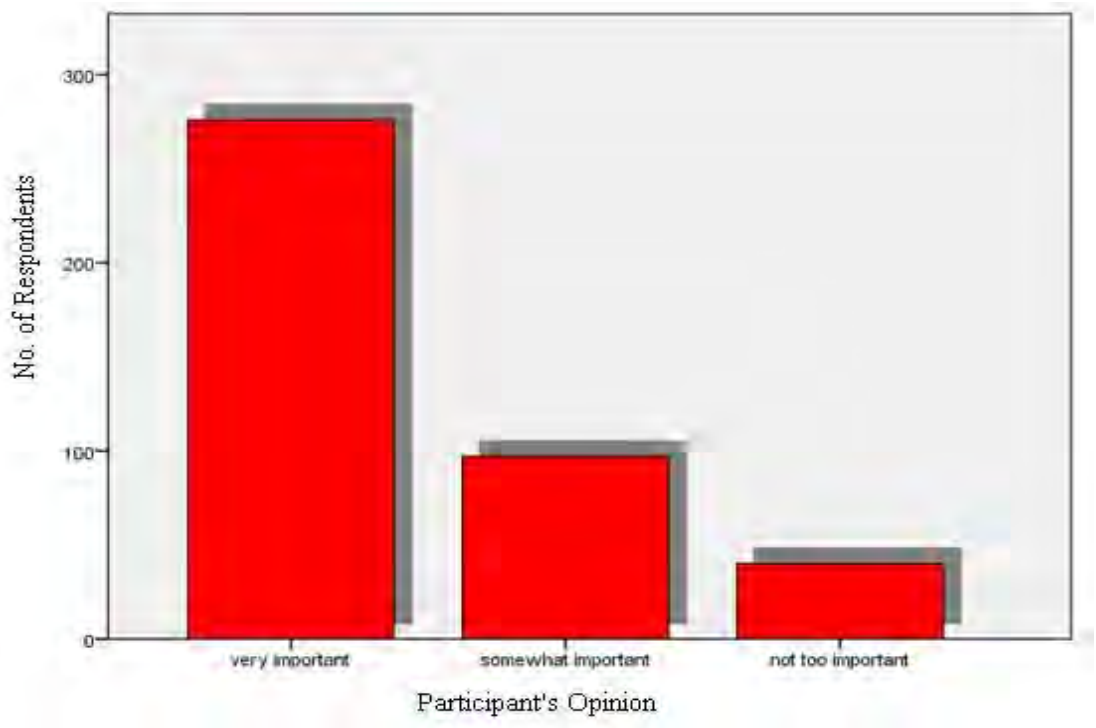


*Figure 7: People's opinion on "Price"*

As there is a huge knowledge gap among the people of slum are due to not having a minimum level of education, 67.2% people said that it is very important that the foods need to be kept in a healthy manner while rest of the people said it is not that much of a matter of concern.

*Table 11: People's perspective on "How well the food keeps"*

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| very important | 279 | 67.2 | 67.2 | 67.2 |
| somewhat important | 89 | 21.4 | 21.4 | 88.7 |
| not too important | 47 | 11.3 | 11.3 | 100.0 |
| Total | 415 | 100.0 | 100.0 | |

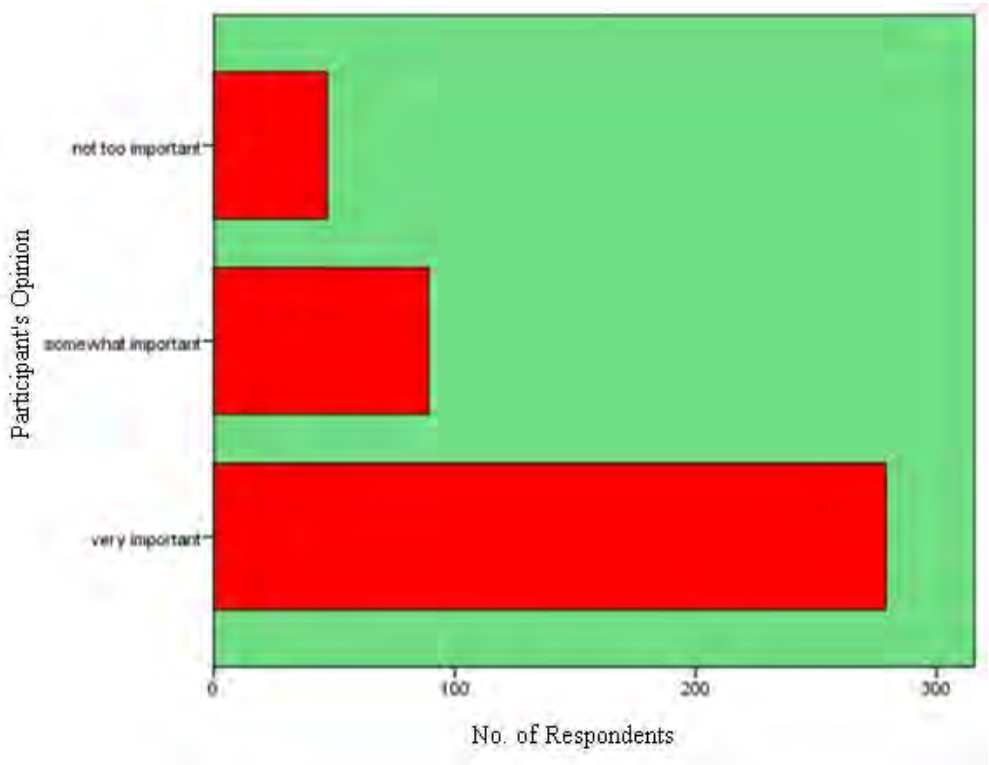


*Figure 8: People's perspective on "How well the food keeps"*

As there is lack of knowledge & education among the slum area people they hardly understand the importance of physical exercise their children need to have daily. As a result only 12% people said that it is very important that their children get daily exercise.

*Table 12: People's perspective on "How much exercise a child gets"*

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| very important | 50 | 12.0 | 12.0 | 12.0 |
| somewhat important | 130 | 31.3 | 31.3 | 43.4 |
| not too important | 212 | 51.1 | 51.1 | 94.5 |
| don't know | 23 | 5.5 | 5.5 | 100.0 |
| Total | 415 | 100.0 | 100.0 | |

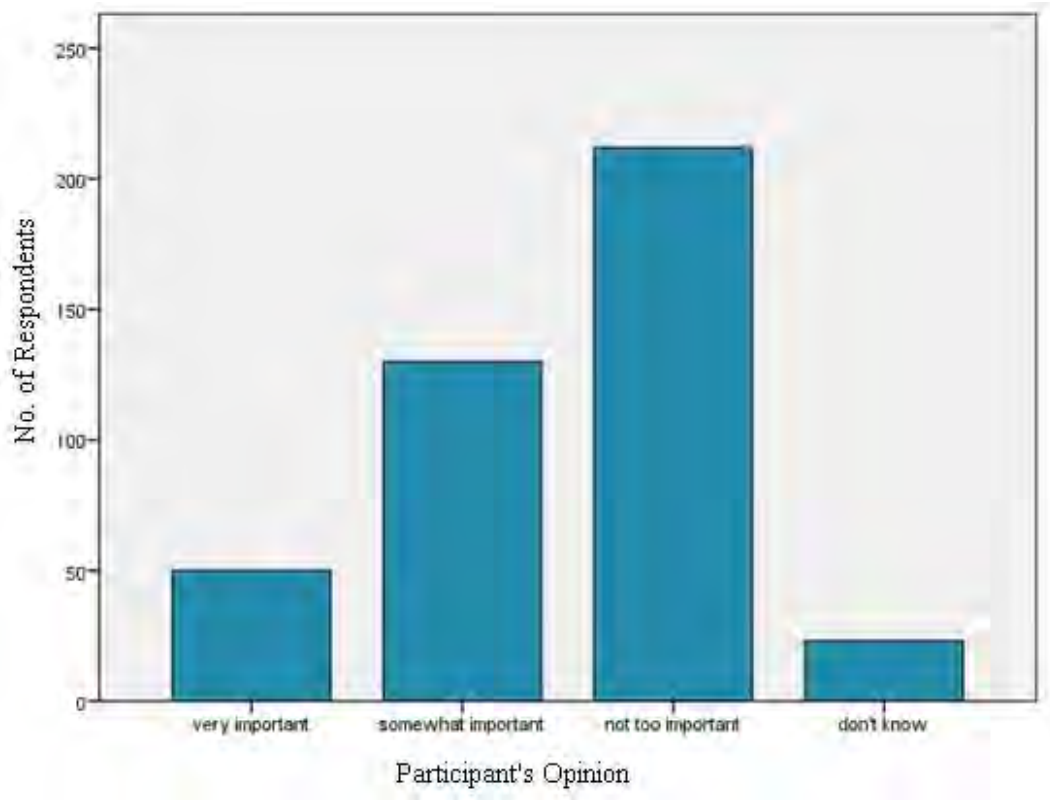


*Figure 9: People's perspective on "How much exercise a child gets"*

In our study we found that slum area people still know hardly about the importance of vegetable and how beneficial vegetables are to their children's health. In this regard only 6.5% people said that their children eat vegetable more than twice a day.

*Table 13: People's perspective on "On an average day, how often does each child eat vegetables? (Includes vegetable salad, green & fibrous vegetables etc.)"*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Never | 12 | 2.9 | 2.9 | 2.9 |
| | Rarely | 161 | 38.8 | 38.8 | 41.7 |
| | Once | 215 | 51.8 | 51.8 | 93.5 |
| | twice or more | 27 | 6.5 | 6.5 | 100.0 |
| | Total | 415 | 100.0 | 100.0 | |

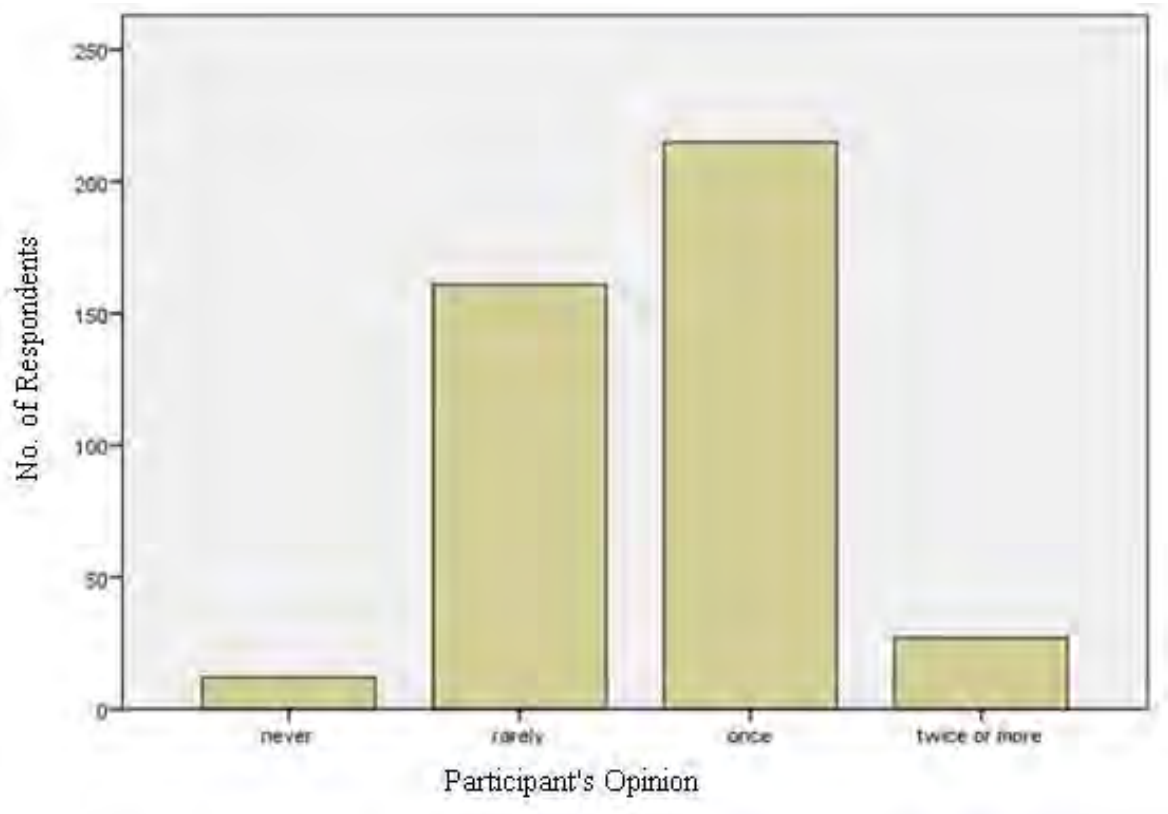


*Figure 10: People's perspective on "On an average day, how often does each child eat vegetables? (Includes vegetable salad, green & fibrous vegetables etc.)"*

In our study we asked opinion about how often the children are taking fast in a week such as samucha, singara, beguni etc. 37.6% said their children eat those foods 1-2 times a week, 38.3% said 3-4 times & 5.5% said their children eat 5 times or more in a week. In the literature review it is shown that children who take more fast foods suffer more from overweight & obesity related health complications such as diabetes, CVDs & various metabolic disorders & dysfunctions. As a result this section needs a major concern.

*Table 14: People's opinion on "How many times a week does each child eat fast food? (Includes singara, samucha, beguni etc.)"*

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| never or rarely | 77 | 18.6 | 18.6 | 18.6 |
| 1-2 times | 156 | 37.6 | 37.6 | 56.1 |
| 3-4 times | 159 | 38.3 | 38.3 | 94.5 |
| 5 times or more | 23 | 5.5 | 5.5 | 100.0 |
| Total | 415 | 100.0 | 100.0 | |

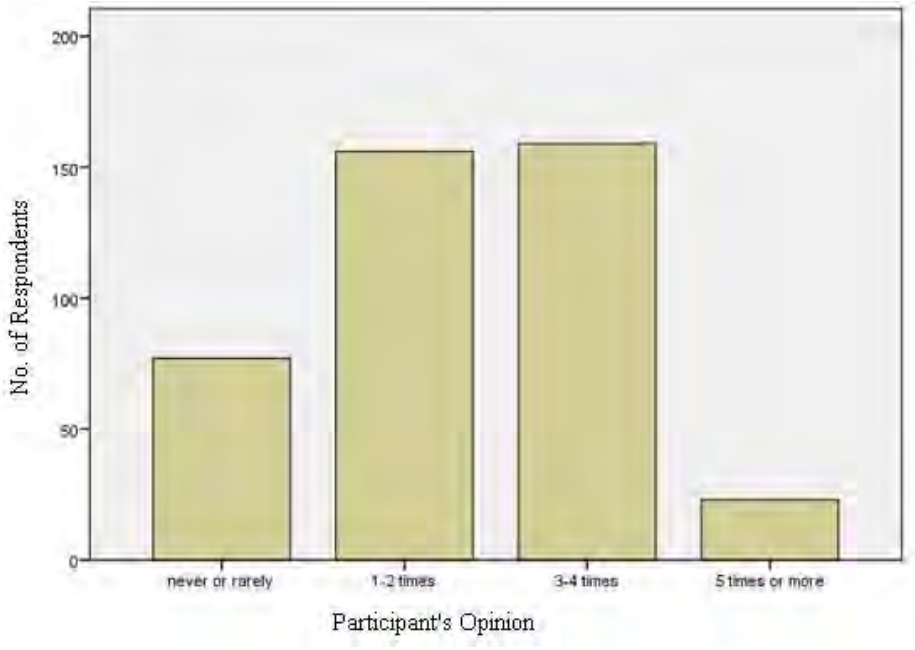


*Figure 11:People's opinion on "How many times a week does each child eat fast food? (Includes singara, samucha, beguni etc.)"*

Carbonated beverages, sodas & sweetened drinks are one of the most dangerous junk foods of all. They contain a high amount of sugar which may lead to overweight & obesity. In our study we asked people how many sodas their children take each week. 33% said 1-4 sodas, 36.9% said 5-7 sodas & 2.9% people said their children take 8 or more sodas per week. The consequences are the same as of the consequences of the children taking more fast food.

*Table 15: People's opinion on "How many sodas per week does each child drink?"*

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | never or rarely | 113 | 27.2 | 27.2 | 27.2 |
| | 1-4 sodas | 137 | 33.0 | 33.0 | 60.2 |
| | 5-7 sodas | 153 | 36.9 | 36.9 | 97.1 |
| | 8 or more sodas | 12 | 2.9 | 2.9 | 100.0 |
| | Total | 415 | 100.0 | 100.0 | |

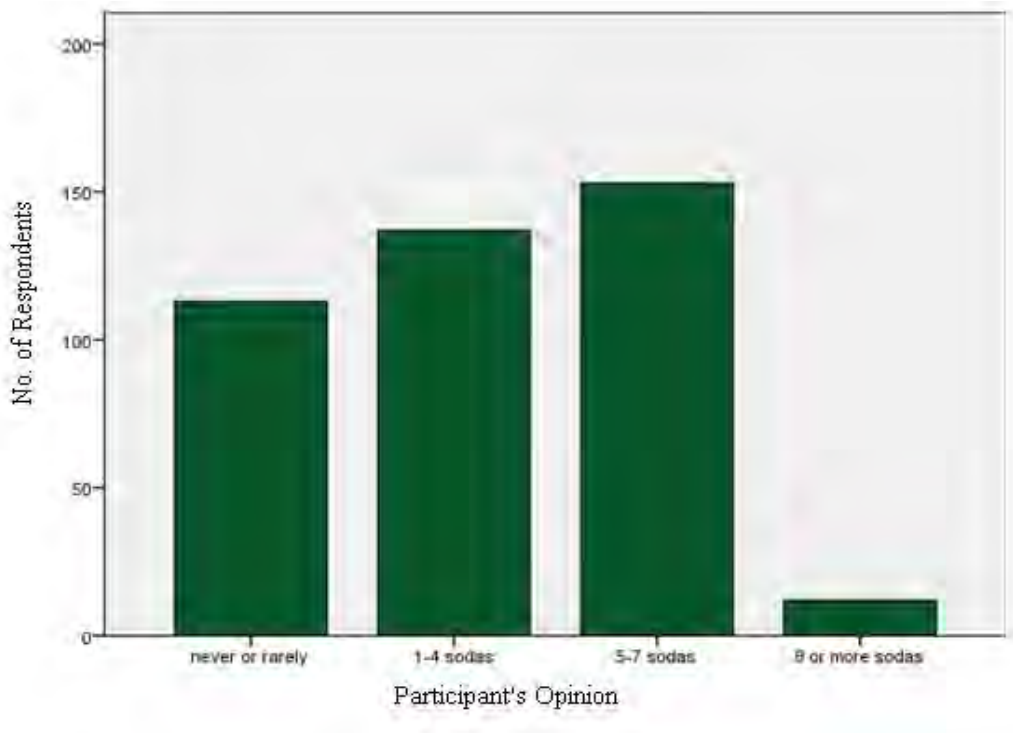


*Figure 12: People's opinion on "How many sodas per week does each child drink?"*

As playing outdoor games & physical exercises are important to stay fit & to overcome the curse of obesity, we asked people that how many times a week their children exercise enough ill sweating or breathing hard for quite some time. Here 41% people said never or rarely in this regard. As a result we can see that they lack the knowledge about the importance of exercise to their children's health.

*Table 16: People's opinion on "How many times per week does each child play or exercise enough to make him/her sweat and breathe hard for 20 or more minutes?"*

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| never or rarely | 170 | 41.0 | 41.0 | 41.0 |
| 1-2 times | 104 | 25.1 | 25.1 | 66.0 |
| 3-4 times | 77 | 18.6 | 18.6 | 84.6 |
| 5 or more times | 64 | 15.4 | 15.4 | 100.0 |
| Total | 415 | 100.0 | 100.0 | |

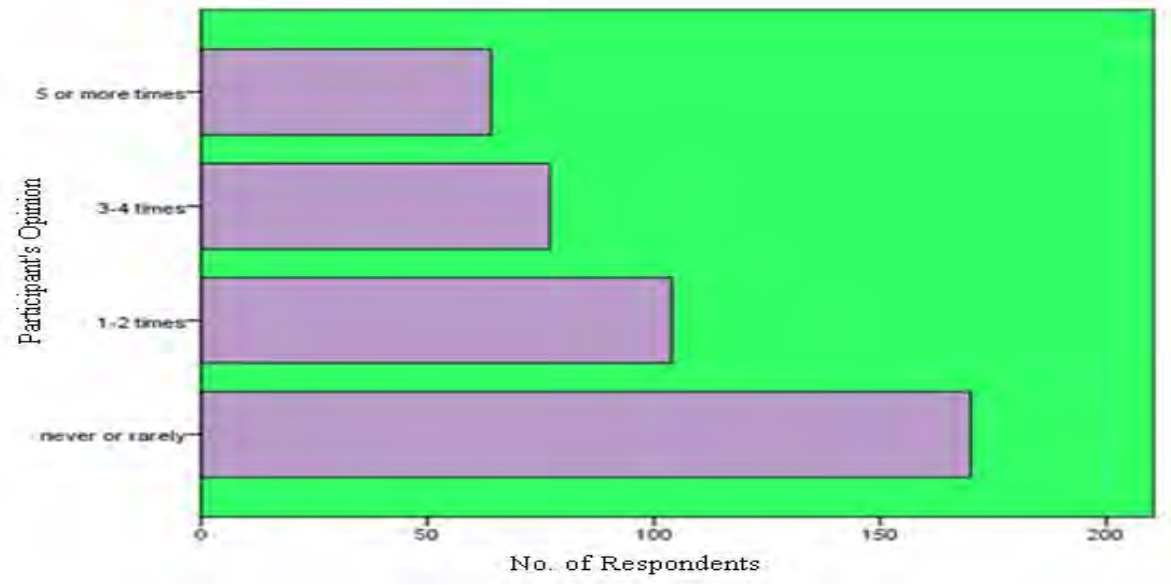


*Figure 13: People's opinion on "How many times per week does each child play or exercise enough to make him/her sweat & breathe hard for 20 or more minutes?"*

# Chapter 4

# Recommendations

According to some studies in case of recommendations some of the major preventives measures taken are food habit changing such as taking foods enriched with fiber & proper nutritional value& less calorie with versatility, not eating too fast and stop when full, junk & fast foods should be discouraged and healthy foods should be offered etc.(Hamid et al., 2014). Mothers should not go through over or under nutrition & avoiding tobacco during pregnancy. Children should be breastfed until 6 months exclusively & then 12 months or above continuously & when a little bit older children should have a routine meal & snacks & lots of fresh fruits. When old enough to understand (13-18 years), they need to undergo a minimum of daily physical exercise & should choose a healthy diet on their own(Brown, Halvorson, Cohen, Lazorick, & Skelton, 2015). In case of pharmacological options where physical, behavioral & diet counseling do not work significantly should be handled with precautions. Primarily used medications are anorexiant drugs which generally impacts the metabolism & nutrition loss. Eventually these reduce only a negligible weight but have some side effects & should be administered under the supervision of healthcare professionals. These drugs should be suggested especially in case of puberty after adolescents(Ghosh et al., 2019). However surgical interventions should be considered in case of children having a BMI greater than 40 & those who were not benefitted through 6 months of various obesity management programs, suggested by the APSA guidelines(Hamid et al., 2014).

# Chapter 5

# Conclusion

Based on our study it has been found that the evidence based data on childhood obesity is frightening which indicates an exponential increase in the prevalence of obesity in children & the impacts of this phenomenon leading to metabolic consequence especially in the developing countries like Bangladesh. In order to face the challenges of the rising burden of childhood obesity, concentrating on decrease in caloric intake & increasing caloric burn through a healthy lifestyle is mandatory. In order to address & overcome this critical concern of public health, a universally accepted set of criteria is needed to identify overweight, obesity & metabolic disorders in children & adolescents. Obesity in an early age may lead to serious health complications during adulthood & the threat of this situation may lead to significant health consequences even for several decades. The scenario of childhood obesity in Bangladesh is still prevailing & becoming prominent in the children of urban area where in case of rural area underweight is more predominant. Our study on this matter in some areas found that 22.7% of people had family history of obesity, 61% people have no knowledge about the link between dietary habit & various diseases, 99.5% think the food needs to be safe. About 7.7% think not much of importance about the nutritional value of the food, 66.5% need to consider the price of the food & only 67.2% people think the food needs to be kept in healthy manner. Only 12% people are concerned about their children's exercise. Due to this, this is becoming a major concern of public health in Bangladesh. However in the near future in order to take action against this problem & consequences due to this we need to address the social viewpoint & outlook of childhood obesity especially in LMICs for taking necessary preventive measures by the government & other stakeholders.

# Chapter 6

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# Appendix A.

## Questionnaire on Childhood Obesity

1. Name:

2. Occupation:

3.Address:

4. Income:

5. Any history of family obesity?

6. Being fat or thin is a natural phenomenon. Do you think you can do anything to change this?

*Yes *No

7. Dietary habit may lead to various diseases. Do you have any idea about this?

*Yes *No

When you buy food, how important is each of the following?

Scale: 1. Very important 2. Somewhat important 3. Not too important 4. Not at all important

| | | | | |
|---|---|---|---|---|
| 8. How safe the food is to eat | 1 | 2 | 3 | 4 |
| 9. Nutrition (how healthy the food is) | 1 | 2 | 3 | 4 |
| 10. Price | 1 | 2 | 3 | 4 |
| 11. How well the food keeps | 1 | 2 | 3 | 4 |

| | | | | |
|---|---|---|---|---|
| 12. How easy the food is to prepare | 1 | 2 | 3 | 4 |
| 13. Taste (whether child likes the food) | 1 | 2 | 3 | 4 |

In your opinion, how important are the following things are to a child's present and future health?

Scale: 1. Very important 2. Somewhat important 3. Not too important 4. Don't know

| | | | | |
|---|---|---|---|---|
| 14. What a child eats | 1 | 2 | 3 | 4 |
| 15. How much a child eats | 1 | 2 | 3 | 4 |
| 16. How much exercise a child gets | 1 | 2 | 3 | 4 |
| 17. What the child weighs | 1 | 2 | 3 | 4 |

Please answer the following questions for each of your children:

| | **Child 1** | **Child 2** |
|---|---|---|
| 18. Sex | ☐ Male<br>☐ Female | ☐ Male<br>☐ Female |
| 19. Age | _____ years old | _____ years old |
| 20. Height | | |

| | | |
|---|---|---|
| (in feet & inches) | _____ ft _____ in<br>Or ____ cm | _____ ft _____ in<br>Or ____ cm |
| 21. Weight (in Kg) | ___ ___ kg | ___ ___ kg |
| 22. Not counting juice, how often do your children ages 5 to 18 eat fruit on an average day? | ☐Never<br>☐Rarely<br>☐Once<br>☐ Twice or More<br>☐ Don't know | ☐Never<br>☐Rarely<br>☐Once<br>☐ Twice or More<br>☐ Don't know |
| 23. On an average day, how often does each child eat vegetables? (Includes vegetable salad, green and fibrous vegetables etc.) | ☐Never<br>☐Rarely<br>☐Once<br>☐ Twice or More<br>☐ Don't know | ☐Never<br>☐Rarely<br>☐Once<br>☐ Twice or More<br>☐ Don't know |

| | | |
|---|---|---|
| 24. How many times a week does each child eat fast food? (Includes singara, samucha, beguni etc.) | ☐ Never or rarely<br>☐ 1-2 times<br>☐ 3-4 times<br>☐ 5 or more times<br>☐ Don't know | ☐ Never or rarely<br>☐ 1-2 times<br>☐ 3-4 times<br>☐ 5 or more times<br>☐ Don't know |
| 25. How many sodas per week does each child drink? | ☐ Never or rarely<br>☐ 1-4 sodas<br>☐ 5-7 sodas<br>☐ 8 or more sodas<br>☐ Don't know | ☐ Never or rarely<br>☐ 1-4 sodas<br>☐ 5-7 sodas<br>☐ 8 or more sodas<br>☐ Don't know |
| 26. How many times per week does each child play or exercise | ☐ Never or rarely<br>☐ 1-2 times | ☐ Never or rarely<br>☐ 1-2 times |

| | | |
|---|---|---|
| enough to make him/her sweat and breathe hard for 20 or more minutes? | ☐ 3-4 times<br>☐ 5 or more times<br>☐ Don't know | ☐ 3-4 times<br>☐ 5 or more times<br>☐ Don't know |