An assessment of the factors affecting food choices and their corresponding association with overweight and obesity among school going children in urban Guwahati in the age group of 13-18 years

Dr. Siddhartha Dutta

Dissertation submitted in partial fulfillment of the requirements for the award of the degree of

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Achutha Menon Centre for Health Science Studies

Sree Chitra Tirunal Institute for Medical Sciences and Technology

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DEDICATION

This piece of work is dedicated to the Almighty God and my Parents and sister.

Certificate

I hereby certify that the work embodied in this dissertation entitled **"An assessment of the factors affecting food choices and their corresponding association with overweight and obesity among school going children in urban Guwahati in the age group of 13-18 year."** is a bona fide record of original research work undertaken by Dr. Siddhartha Dutta, in partial fulfillment of the requirements for the award of the degree of 'Master of Public Health' under my guidance and supervision.

Dr. P. Sankara Sarma, Phd;

Professor,

Achutha Menon Centre for Health Science Studies,

Sree Chitra Tirunal Institute for Medical Sciences and Technology,

Thiruvananthapuram, Kerala.

October 2011.

Declaration

I hereby declare that the work embodied in this dissertation entitled **"An assessment of the factors affecting food choices and their corresponding association with overweight and obesity among school going children in urban Guwahati in the age group of 13-18 year."** is the result of original research and has not been submitted for any degree in any other university or institution.

Dr. Siddhartha Dutta, MPH-2010,

Achutha Menon Centre for Health Science Studies,

Sree Chitra Tirunal Institute for Medical Sciences and Technology,

Thiruvananthapuram, Kerala.

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CONTENTS

LIST OF TABLES AND FIGURES

ABSTRACT

CHAPTERS Page No.

Chapter 1 INTRODUCTION.....1

Chapter 2 LITERATURE REVIEW..... 3

2.1 Nutrition transition..... 3

2.1.1 The change in developing countries.....5

2.1.2 The global scenario of sugar and edible oil.....6

2.2 Trends in energy intake..... 8

2.2.1 Snack food consumption..... 9

2.3 Overweight prevalence and trends among adolescents.....10

2.4 Mechanism of obesity development..... 11

2.5 The medical risks of obesity..... 12

2.6 Influences on adolescent's food consumption..... 14

2.7 Common eating behaviours among adolescents..... 14

2.7.1 Adolescent's perceptions on food and eating..... 15

2.8 The scenario in India.....16

2.8.1 The stature of the problem..... 16

2.8.2 Prevalence of overweight and obesity among adolescents of India...17

2.9 The scenario in Assam and North-eastern region of India.....18

2.10 Rationale for the present study.....18

2.11 Objectives.....19

Chapter 3 METHODOLOGY..... 20

3.1 Study design.....20

3.2 Study setting.....20

3.3 Sample size.....20

3.4 Sample selection procedure.....20

3.4.1 Selection of schools.....21

3.4.2 Selection of classes/sections.....21

3.4.3 Selection of study participants.....21

3.5 Data collection techniques.....21

3.6 Anthropometric measurements.....22

3.6.1 Procedures for measuring height.....22

3.6.2 Procedures for measuring weight.....22

3.7 Data entry.....22

3.8 Data analysis and statistical methods.....23

3.9 Variables used in the study..... 23

3.9.1 Dependent variables.....23

3.9.2 Independent variables..... 24

3.10 Ethical considerations..... 25

Chapter 4 RESULTS.....27

4.1 Sample description.....28

4.2 Dietary behaviours.....28

4.3 Junk food consumption.....30

4.4 Vegetable and fruit consumption.....30

4.5 Family influences.....31

4.6 Peer influences.....32

4.7 Availability and accessibility of vegetables and fruits.....34
4.8 Perceived weight status.....34
4.9 Knowledge 34
4.10 Body mass index.....35
4.11 Bivariate analysis.....36
4.12 Multivariate analysis.....40

Chapter 5 DISCUSSION AND CONCLUSION.....43

5.1 Discussion.....43
5.1.1 Dietary behaviours.....43
5.1.2 Family and peer influences.....45
5.1.3 Availability and accessibility.....45
5.1.4 Knowledge.....46
5.1.5 Overweight and obesity.....46
5.1.6 Junk food consumption.....46
5.1.7 Vegetable and fruit consumption.....47
5.2 Strength of the study.....48
5.3 Limitations of the study..... 48
5.4 Conclusion.....49
5.5 Recommendations..... 50

REFERENCES……51

APPENDICES

Appendix I Informed Consent
Appendix II Assent
Appendix III Questionnaire

LIST OF TABLES AND FIGURES

TABLE PAGE NO.

4.1 Sample characteristics by age and sex…….28

4.2 Dietary behaviours of study population…….29

4.3 Junk food consumption……31

4.4 Vegetable and fruit consumption…….31

4.5 Family influences…….32

4.6 Peer views……33

4.7 Availability and accessibility……34

4.8 Knowledge…….35

4.9 Body mass index classification…….35

4.10 Bivariate analysis of junk food consumption with other variables……37

4.11 Bivariate analysis of vegetable and fruit consumption with other variables…….38

4.12 Multivariate analysis for junk food consumption……40

4.13 Multivariate analysis for vegetable and fruit consumption…….41

FIGURE PAGE NO.

1 Nutrition transition……5

2 Conceptual framework……..26

ABSTRACT

An assessment of the factors affecting food choices and their corresponding association with overweight and obesity among school going children in urban Guwahati in the age group of 13-18 year.

Background:

There is an increased inclination to replace traditional meals with energy-dense imbalanced foods. Urban residence has been positively associated with frequency of intake of energy-dense foods in adolescents. As many healthy (or unhealthy) life-long practices begin in adolescence, it is important to study the dietary behaviour and the factors influencing food consumption in this age group.

Methods:

A cross-sectional and institutional study, adopting a multistage stratified cluster sampling procedure, was carried out on adolescents 13 to 18 years of age of both sexes from urban Guwahati, India.

Results:

Junk food consumption was highly associated with adolescents having lunch in school canteens, hotels and bakers (adjusted OR=2.828; 95% CI: 1.941-4.122), not having dinner with parents (adjusted OR=1.738; 95% CI: 1.244-2.429), eating dinner out (adjusted OR=1.906; 95%CI: 1.312-2.769) and low consumption of vegetables and fruits (adjusted OR=1.454; 95% CI: 1.039-2.037). Adolescents from government schools are less likely to consume vegetables and fruits (adjusted OR=0.379;95%CI:0.256-0.497).Those who brought tiffin to school are more likely to consume moderate amounts of vegetables and fruits (adjusted OR=1.557;95%CI:1.09-2.223). Dinner with parents results in more consumption of vegetables and fruits (adjusted OR=1.342;95%CI:1.014-1.775). Those adolescents whose parents never eat vegetables and fruits in front of them are also less likely to eat the same (adjustedOR=0.513;95%CI:0.384-0.685) and if vegetables and fruits are not available at home than consumption is less (adjusted OR=0.438;95%CI:0.282-0.681). The prevalence of overweight is 16.9%(15.8% among boys and 17.9% among girls).

Conclusions:

Adolescent's dietary behavior is associated with various personal and environmental factors.

CHAPTER 1

INTRODUCTION

Obesity is a public health problem that has raised concern worldwide. According to the World Health Organization (WHO), there will be about 2.3 billion overweight people aged 15 years and above, and over 700 million obese people worldwide in 2015.[1] Among today's most important public health problems overweight and obesity is escalating as a global epidemic. It is no longer a phenomenon confined only in the developed countries. It has been increasingly recognised as a significant problem in developing countries and countries undergoing economic transition.[2] The problem of overweight and obesity is confined not only to adults but also being reported among the children and adolescents of developed as well as developing countries. Now, WHO defines adolescents as young people between the ages of 10 and 19 years. Globally, International obesity task force (IOTF) estimate that up to 200 million school aged children are either overweight or obese, of those 40-50 million are classified as obese.[3] The most important consequence of childhood obesity is its persistence into adulthood with all its health risks. It is more likely to persist when its onset is in late childhood or adolescence.[4-7]

India is undergoing rapid nutritional transition. There is an increased inclination to replace traditional meals with energy-dense imbalanced foods. Urban residence has been positively associated with frequency of intake of energy-dense foods in adolescents. As many healthy (or unhealthy) life-long practices begin in adolescence, it is important to study the dietary behaviour and the factors influencing food consumption in this age

group. Dietary habits play an important role in the development of several chronic diseases that are the largest causes of morbidity and mortality in the world.[8] In a prospective study of low and high risk children it was found that the high risk group, who gained more weight during the 12 months study had altered dietary behavioural patterns, especially with increased consumption of fatty foods or soft drinks.[9] Eating a lot of fast food and not eating a lot of fruits, vegetables and whole grains have also been linked with obesity risk.[10,11]

A review reported that adolescent's eating behaviour is a function of individual (i.e. attitudes, beliefs, knowledge, food preferences, dieting, etc.) and environmental influences (i.e. social environmental, macro-system and physical environmental).[12] In particular, environmental influences on adolescent's eating behaviours and food choices include family members, teachers, peers, marketing and advertising, as well as accessibility and availability of foods. Factors influencing the food preferences of children and adolescents have received and continue to receive increasing research interest.[13,14,15]

A fundamental step in the prevention and control of obesity is the identification and understanding of factors contributing to the rapid increase of obesity. There are evidences that children and adolescents of urban families are increasingly becoming overweight/obese in recent times, possibly because of the change in dietary habits. Relevant research which aggregates food into dietary patterns and investigates the factors which influence food choices among adolescents in India is minimal. Moreover no such systemic study in Assam could be found. Controversies and gaps in understanding the role of dietary composition in subsequent weight gain and diet in the aetiology of overweight and obesity remains.[16]

CHAPTER 2

LITERATURE REVIEW

Over the past two decades, evidences have shown that the structure of dietary intakes and the prevalence of obesity around the developing world have been changing at an alarming pace.[17] Although initially these shifts were felt to be limited to higher-income urban populations, it is increasingly clear that these are much broader trends affecting all segments of society. These changes have actually occurred at a very rapid pace both in the low- and moderate-income countries. Large shifts have occurred in diet particularly in the last one or two decades of the 20th century. Modern societies seem to be converging on a diet high in saturated fats, sugar and refined foods but low in fibre - often termed the 'Western diet'. Along with it there is this shift toward increased obesity and noncommunicable diseases (NCDs) which in turn is further aggravated by lifestyles characterised by lower levels of activity.[18]

2.1 NUTRITION TRANSITION

Now nutrition transition has been described to pass through five patterns or stages.[19] Starting from the time of Palaeolithic man where the diet included mostly plants and low fat animals. The people were robust and lean with little nutritional deficiencies. Basically people back then were hunters and gatherers. The demographic profile was that of high fertility and high mortality. This stage in nutrition is known as the stage of collecting food. Then there was this stage of famine where diet was predominated by

cereals and was less varied. Women and children suffered most in this stage due to low fat intake and resultant nutritional deficiencies. Economy was that of agriculture and animal husbandry. There was high natural fertility, low life expectancy and high infant and maternal mortality.[20]

The last three stages of the nutrition transition are of more importance in the present context as they are the ones represented by most of the global population today.[21,22](figure 1). In stage 3, famine begins to recede as income rises; also called the stage of receding famine. Diet consists of fewer starchy staples with more fruits, vegetables and animal protein. However, low variety of diet continues to affect this stage. There is continued maternal and child health problems, although many deficiencies disappeared, weaning diseases (diarrhoea, retarded growth) emerged. Mortality declines slowly and then rapidly, fertility is static and then declines; there is cumulative population growth which ultimately explodes. In stage 4, changes in diet and activity patterns lead to the emergence of new diseases and increases disability. This is the stage of degenerative disease. Diet consists of more fat (especially from animal products), sugar, and processed foods; less fibre. There is shift in technology of work and leisure. There are fewer jobs with heavy physical activity, the service sector has become more and more mechanized, household technology revolution is ever growing; hence there is reduced opportunity for physical activity needed to compensate the energy dense diet which people are shifting to. Here comes the problem of obesity and bone density. Accelerated life expectancy shifts the epidemiologic transition to increased nutrition related noncommunicable diseases and thus increased disability period. In stage 5, behavioural change begins to reverse the negative tendencies of the preceding patterns and enable a process of "successful aging".[18] There is reduced fat and refined carbohydrate intake, increased fruit, vegetable and whole grain consumption. Sedentarianism is replaced by

purposeful changes in recreation and other activities. The result is reduced body fatness and improved bone health. Thus the disability free period of the population increases.[21,22]

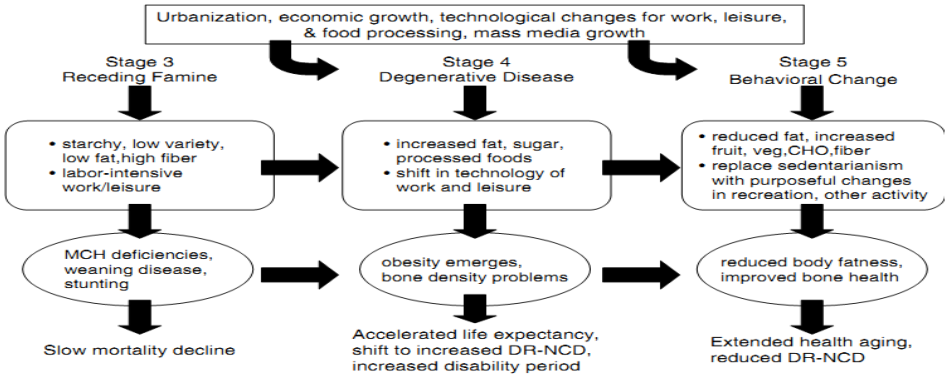


Figure 1

2.1.1 THE CHANGE IN DEVELOPING COUNTRIES

A range of factors (including urbanization, economic growth, technical change, and culture) drives all the changes.[19] The earlier patterns are not restricted to the periods in which they first arose but continue to characterize certain geographic and socioeconomic subpopulations.[19] But the concern regarding the global shift towards obesity is that the shift from the receding famine pattern (pattern 3) to one dominated by nutrition-related noncommunicable diseases has been very rapid in most low- and middle-income economies; moreover, there is evidence of a speeding up of this transition in higher-income, more economically developed economies.[23] A large number of lower- and middle-income countries (for example, Mexico, Thailand, China, and Indonesia) are experiencing an annual increase in overweight and obesity similar to that of United Kingdom and Australia among higher-income countries.[19] Countries with high income and urbanization levels not only had high absolute levels of overweight plus obesity, but they also had small urban-rural differences in overweight and very high ratios of overweight plus obesity to underweight. In more-developed countries, overweight among

women with a low socioeconomic status was high in both rural (38 percent) and urban (51 percent) settings. Even many poor countries—where underweight persists as a significant problem—had fairly high levels of overweight in rural area.[24]

2.1.2 THE GLOBAL SCENARIO OF SUGAR AND EDIBLE OIL

Globally, our diet is becoming increasingly energy-dense and sweeter. At the same time, high-fibre foods are being replaced by processed versions. There is enormous variability in eating patterns globally, but the broad themes seem to be retained in most countries. Sugar became the predominant sweetener most likely in the 17th or 18th century when the New World began producing large quantities of sugar at reduced prices.[25] The increase in consumption of soft drinks and sugared fruit drinks is a critical element in the shift in diet.[26,27,28] Recently, several health concerns have been consistently voiced. First, the high consumption of sugar-sweetened beverages has been linked with increased energy intake and obesity. Second, cancer researchers have voiced concerns over the reduced intake of more complex carbohydrates and high-fibre foods and replacement of these food sources with refined carbohydrates.[25] Third, milk has been increasingly substituted with soft drinks. It has been observed that calories from fluids are less sating than those from solid foods and often lead to overconsumption.[29]

In the United States, between 1977 and 1996, urbanization increased from 74 percent to 76 percent, while Gross national product per capita went from 19,930 to 28,350 US Dollars. [25] During this time, there was a remarkable increase of 83 kcal of caloric sweetener consumed per day for all persons in the United States 2 years of age and older. Now caloric sweetener consists of sugars, syrups, caramel, golden syrup, maple syrup, corn syrup, artificial and natural honey, maltose, glucose, sugar

confectionery and lactose. Despite fluctuations in production, India's sugar consumption has increased at an annual rate of 3.5 percent over the past decade, with a decline in consumption growth during the period. Driven by the continued switching from "gur" to sugar, rising incomes and growing population, India's sugar consumption is projected to increase at a high rate of 2.5 to 3 percent per annum (The Financial Express, dated August 6th, 2010). Although "gur" and "khandsari" are still the main sugar products consumed in rural areas, demand for white sugar is expected to continue to increase both in absolute and per capita terms. Moreover, the growth of sugar demand by food industries and other non-household users, estimated to account for about 60 percent of total consumption, could provide additional impetus. As income per capita and the proportion of the population residing in urban areas increased, so did sugar intake. Urbanization has correlated highly in the developing world with access to processed foods higher in sugar.[18]

In many developing countries, dietary change has begun with major increases in domestic production and imports of oilseeds and vegetable oils. For instance, between 1991 and 1996-97, global production of vegetable fats and oils rose from 60 to 71 million metric tons. [18] Although the increase in edible vegetable fat intake has affected both rich and poor countries equally, the net impact is relatively much greater on low–income countries. The Indian edible oil market is the world's fourth-largest after the USA, China and Brazil. A growing population, increasing rate of consumption and increasing per capita income are accelerating the demand for edible oil in India. India is a leading player in edible oils, being the world's largest importer (ahead of the EU and China) and the world's third-largest consumer (after China and the EU). Each year, India consumes over 10 million tonnes of edible oils. Edible oils have a high penetration of 90 percent in India. The Indian edible oil industry is expected to grow at a rate of 6 percent annually over the

next five years, said 'Rabo India' in its latest research report (Business Standard, dated June 5th, 2011).

2.2 TRENDS IN ENERGY INTAKE

Take away food (available in fast food places, restaurants and bakeries) contributes considerably to daily energy intake and accounts for roughly one-third of energy intake among certain subpopulations, particularly young adult males.[30,31] Fast food consumption has been associated with adverse health outcomes including increased risk of excess weight, body fatness, poor dietary quality, and insulin resistance/diabetes.[32] Mechanisms for the direct contribution of fast food intake to the development of diabetes and other obesity related co-morbidities have included low unsaturated to saturated fat ratio, greater portion sizes, and lower fiber content of fast food.[33] Increased consumption of food prepared outside the home has occurred concurrently with rapid weight gain. Many studies, some small in scale, have shown positive associations between the frequency of fast food consumption and body fatness, weight gain, overweight or obesity and total energy intake among both adolescents and adults.[34]

Over the past 20 years, evidences points out that the structure of dietary intakes and the prevalence of obesity among children around the world have been changing at an increasingly rapid pace.[17] Most available evidence, especially in the area of dietary behaviour, comes from the United States and other higher-income countries. Among the prominent trends in these settings are increased snacking and away from home consumption and a shift toward more fast food and calorically sweetened beverages.[35] There are concomitant increases in energy intake and a higher percentage of calories from energy-dense nutrient-poor foods and snacks eaten at greater frequency throughout the

day. Consumption of soft drinks, other sweetened beverages and fast food has increased dramatically for adolescents.[36] All these constitutes the category of foods called as **' Junk food'**. Junk food is an informal term applied to some foods that are perceived to have little or no nutritional value (i.e. containing "empty calories"); to products with nutritional value, but also have ingredients considered unhealthy when regularly eaten; or to those considered unhealthy to consume at all. The term was coined by Michael Jacobson, director of the Center for Science in the Public Interest, in 1972.

Although availability and consumption of fruits and vegetables has been increasing since 1970 the average number of servings per day remains far below the recommended levels. As children moved from the third to eighth grade, fruit and vegetable consumption decreased by 41percent and 25 percent, respectively, whereas soft drink consumption more than tripled. Concomitant decreases in milk and fruit juice intake were also observed. [37]

2.2.1 SNACK FOOD CONSUMPTION

In a comparative study on the dietary behaviour done among the children and adolescents of United States, Philippines, Russia and China it was found that children in Philippines and the United States consumed the most calories from foods prepared away from home.[35] The Philippines' youth consumed nearly 40% of total calories from foods prepared away from home. Snack foods were predominantly prepared away from home (81.6 percent in 2002 to 90.3 percent in 1998). The foods prepared away from home and consumed as snacks were typically small rolls and soft drinks purchased at small stores or bakeries, whereas the away from home foods consumed as meals more typically came from street vendors or small cafeterias and included rice and vegetable dishes and fried

foods such as egg rolls. In the United States, the percentage of calories consumed away from home increased significantly from 1977 to 1996, such that by 1996, more than one-third of calories were from away from home sources. By contrast, in 2003, Russian youth consumed only 15 percent of total calories, and in 2003, 32 percent of snack calories, away from home. The prevalence of snacking is much lower in China, with only 15.3 percent and 11.8 percent of Chinese youth reporting consuming any food as a snack in 1991 and 2000, respectively.[35]

2.3 OVERWEIGHT PREVALENCE AND TRENDS AMONG ADOLESCENTS

Consequently if we look at the increase in overweight prevalence among the adolescents we see that in Brazil it increased from 4.2 to 14.3 percent from 1974-97, in China from 6.4 to 7.7 percent between 191-97 and in USA it rose from 15.4 to 25.6 percent in the period from 1971-94.[18] Now these findings were from nationally representative data and overweight was defined as per the sex-age-specific body mass index (BMI) cut-offs recommended by the International Obesity Task Force (IOTF).

Although there is lack of studies from India which looks into the prevalence of junk food (ready-to-eat convenience foods containing high levels of saturated fats, salt, or sugar, and little or no fruit, vegetables or dietary fibre) consumption among adolescents, what can be of concern is the undeniable fact that there is an ever increasing prevalence of obesity among the urban adolescents of our country. Obesity in children appears to increase the risk of subsequent morbidity, whether or not obesity persists into adulthood. Outcomes related to childhood obesity include hypertension, type 2 diabetes mellitus, dyslipidaemia, left ventricular hypertrophy, non-alcoholic steatohepatitis, obstructive sleep apnoea, and orthopaedic and psychosocial problems. [4-7]

2.4 MECHANISM OF OBESITY DEVELOPMENT

In studies with adults, obesity was found to be a risk factor for cardiovascular events and mortality.[38] In adolescents, the accumulation of fat in the various parts of the body has been identified as a risk factor for the occurrence of cardiovascular and metabolic diseases. High consumption of soft drinks and a low intake of fruits and vegetables are food indicators associated with greater abdominal fat accumulation among adolescents.[39] Biological factors and energy balance are impacted by behavioural factors related to diet, activity and sedentary patterns, and other behaviours such as sleep, substance use and weight control behaviours.[40] Dietary choices and dietary patterns and specific eating behaviours, such as skipping breakfast, consumption of sugar-sweetened beverages affect caloric intake. Eating a lot of fast food and not eating a lot of fruits, vegetables and whole grains have also been linked with obesity risk.[41]

Although the mechanism of obesity development is not fully understood, it is confirmed that obesity occurs when energy intake exceeds energy expenditure. There are multiple aetiologies for this imbalance, hence, and the rising prevalence of obesity cannot be addressed by a single aetiology. Genetic factors influence the susceptibility of a given child to an obesity-conducive environment. However, environmental factors, lifestyle preferences, and cultural environment seem to play major roles in the rising prevalence of obesity worldwide. In a small number of cases, childhood obesity is due to genes such as leptin deficiency or medical causes such as hypothyroidism and growth hormone deficiency or side effects due to drugs (for example steroids).[42] Most of the time, however, personal lifestyle choices and cultural environment significantly influence obesity of adolescents. Over the last decades, food has become more affordable to larger

numbers of people as the price of food has decreased substantially relative to income and the concept of 'food' has changed from a means of nourishment to a marker of lifestyle and a source of pleasure. Clearly, increases in physical activity are not likely to offset an energy rich, poor nutritive diet. It takes between 1–2 hours of extremely vigorous activity to counteract a single large-sized (i.e., >=785 kcal) children's meal at a fast food restaurant. Frequent consumption of such a diet can hardly be counteracted by the average adolescent.[43]

It has been hypothesized that a steady decline in physical activity among all age groups has heavily contributed to rising rates of obesity all around the world. Physical activity strongly influenced weight gain in a study of monozygotic twins.[44] Numerous studies have shown that sedentary behaviours like watching television and playing computer games are associated with increased prevalence of obesity. Furthermore, parents report that they prefer having their children watch television at home rather than play outside unattended because parents are then able to complete their chores while keeping an eye on their children.[45] In addition, increased proportions of children who are being driven to school and low participation rates in sports and physical education, particularly among adolescent girls, are also associated with increased obesity prevalence.[45] Since both parental and children's choices fashion these behaviours, it is not surprising that overweight children tend to have overweight parents and are themselves more likely to grow into overweight adults than normal weight children.

2.5 THE MEDICAL RISKS OF OBESITY

It is of major concern, given the consequences that are associated with adolescent obesity both during adolescence and adult life which include increased

incidence of coronary artery diseases & hypertension, diabetes, obstructive sleep apnoea, oesophageal reflux & gastric emptying disturbances, osteoarthritis & flat feet, psychological dysfunction, self esteem & social isolation, dyslipidaemia and overall increase in morbidity and mortality in later life.[38] The most significant long-term consequence of childhood and adolescent obesity is its persistence into adulthood, with all the attendant health risks.

The long-term risk of type 2 diabetes increases significantly with increasing weight. Obesity is an independent risk factor for cardio vascular disease, defined as including coronary heart disease, myocardial infarction (MI), angina pectoris, congestive heart failure (CHF), stroke, hypertension, and atrial fibrillation.[38] A number of large-scale, prospective studies have confirmed a significant association between obesity and cancer. Body mass index was also significantly associated with higher rates of death due to cancer of the oesophagus, colon and rectum, liver, gallbladder, pancreas, kidney, breast, ovary, endometrium, non-Hodgkin lymphoma, and multiple myeloma.[38] Obesity is strongly associated with an increased risk of osteoarthritis of the knee. It has a major impact on patient mobility, disability, lost productivity, and patients may become disabled early in life. The pulmonary complications include obstructive sleep apnoea characterized by upper airway obstruction that occurs as repetitive episodes during sleep. Among the typical features of obstructive sleep apnoea are loud snoring, fragmented sleep, repetitive hypoxemia/hypercapnia, daytime sleepiness, and cardiovascular complications. An association between obesity and major depressive disorder (MDD) has long been recognized although a causal association is uncertain. Interestingly, many antidepressant drugs are associated with weight gain.[38]

2.6 INFLUENCES ON ADOLESCENT'S FOOD CONSUMPTION

In Social Cognitive Theory, the principle of "reciprocal determinism" postulates that behaviour, including dietary behaviour, is the result of environmental and personal factors, and in turn it affects these factors in constant reciprocal relationships.[46] People learn by observing others, with the environment, behaviour, and cognition all as the chief factors in influencing a particular development. Family and peer influences appear particularly promising influences on consumption of fruits, vegetables and junk foods by children. On the other hand parental influence on children's food consumption is a complex issue that appears to involve parental modelling, that is, whether parents eat and enjoy certain foods in front of their child; parenting techniques like authoritative or permissive; social influences like various forms of encouragement; and making foods available and accessible. Again personal factors, that is, the child's knowledge, what a child prefers, expects, believes and his/her self efficacy also largely determines the food choices.[46]

2.7 COMMON EATING BEHAVIOURS AMONG ADOLESCENTS

The cognitive, physical, social, and lifestyle changes during adolescence can create profound changes in their eating patterns. Teens as a group tend to snack, miss meals, eat away from home, consume fast foods, and diet (especially among females) more frequently than younger children. Snacking as already mentioned before constitutes about one third of the daily total caloric intake among adolescents of developed countries.

Meal skipping is common among adolescents, especially during middle and late adolescence. Breakfast is the most commonly skipped meal and is attributed to lack of

time, desire to sleep longer in the morning, lack of appetite, and dieting to lose weight. Skipping breakfast may affect concentration, learning, and school performance.[12]

Dinner is the most frequently consumed meal among adolescents and it also provides a larger proportion of intake of energy and key nutrients than any other meal or snack. Only about one-third of United State's adolescents ate dinner with their family nearly every day. Family meals are associated with better overall dietary quality among children and adolescents. Increasing frequency of family dinner was associated with more healthful dietary intake patterns, including more fruits and vegetables, less fried food and soft drinks, less saturated and trans fats and more fibre and micronutrients from food. During adolescence, teens spend less time with family and more time with friends.[12]

As teens become more independent, eating away from home increases. One-third of all teen eating occasions occur outside the home. Majority of these eating out occasions usually occurs in and around the school premises. On the other hand eating out at fast food restaurants has direct bearing on the nutritional status of adolescents. Many fast foods are high in fat and low in fibre and nutrients.[12]

In the United States dieting is a common and widespread practice among adolescents, especially girls. In 1999, 59% of high school girls and 26% of high school boys reported trying to lose weight during the 30 days preceding a national survey. Almost 20% of girls had gone without eating for 24 hours or more to lose weight, 11% had taken diet pills, and 8% had vomited or taken laxatives.[12]

2.7.1 ADOLESCENTS' PERCEPTIONS ON FOOD AND EATING

Adolescents report several key factors influencing their food choices and eating behaviours, such as taste, hunger, convenience, availability, and parental and cultural

influences. Many adolescents feel that healthy eating is not a primary concern during the teenage years and they feel that chronic diseases are connected with "older people".[12]

2.8 THE SCENARIO IN INDIA

In the words of the 35th President of the United States, John F. Kennedy, "Children are the world's most valuable resource and its best hope for the future", it is indeed true that the future is in the hands of the children. However, considering the present scenario, according to a survey by the Food and Agriculture Organization of United States (2006), on one side there is still prevalence of malnutrition and other deficiency diseases like anaemia, vitamin A and iodine deficiency, improper immunization and food insecurity, while on the other side overweight and obesity are rampant among children in India. According to the WHO health report (2006) many low and middle income countries are now facing a "double burden" of disease: while they continue to deal with the problems of infectious disease and under-nutrition, at the same time they are experiencing a rapid upsurge in chronic disease risk factors such as obesity and overweight, particularly in urban settings.

2.8.1 THE STATURE OF THE PROBLEM

In India, approximately 19 percent (190 million) of the growing population comprises school-aged children of whom 30 percent (48 million) currently reside in urban India. A significant and increasing number of these children belong to middle and high socio-economic groups.[47] As a consequence of the socio-economic and demographic transitions that are affecting developing countries such as India, it can be hypothesized

that the nutritional status of the children in middle and high-income groups could be affected by the changes in dietary habits and lifestyle, leading to an increase in the prevalence of overweight and obesity.

2.8.2 PREVALENCE OF OBESITY AND OVERWEIGHT AMONG ADOLESCENTS OF INDIA

Although no study could be found which looked specifically into the consumption of different food items and the factors influencing the consumption among school going adolescents of India, there are several studies which found out the prevalence of overweight and obesity among the adolescents of different cities and towns of India. A study conducted among the affluent public school children in New Delhi, revealed prevalence of overweight and obesity of about 25 percent and 7 percent, respectively.[48] Another study done in Delhi by Melissa H Stigler et al. reported a combined overweight and obesity prevalence of 16.6 percent.[49] Yet another study done in Delhi by U Kapil et al. revealed the prevalence of overweight and obesity to be 13 and 9.3 percent respectively.[50] Similarly, Subramanyam et al have reported that the prevalence of overweight and obesity among the affluent adolescent school children in Chennai, Tamil Nadu was about 15 percent.[51] The results of studies among adolescents from parts of Punjab, Maharashtra, Gujarat, Bangalore, Hyderabad and South India revealed that the prevalence of overweight and obesity was high (11 percent to 29 percent). [52-56]

2.9 THE SCENARIO IN ASSAM AND NORTH EASTEN REGION OF INDIA

No study could be traced which reported the prevalence of overweight or obesity among adolescents from any part of Assam. The "Sentinel Surveillance Systems for Cardio vascular disease in Indian Industrial Populations" involving ten centres from different parts of the country (survey period 2001-2003) studied the prevalence of overweight and obesity among industrial employees and their family members aged 10-69 years. Dibrugarh in Assam had the lowest prevalence of 0.5 percent. However the study population consisted of low income groups. Another study done in Imphal, Manipur among the school children of classes 8^{th} to 12^{th} reported the prevalence of overweight and obesity to be 4.2 and 0.8 percent respectively.[57] The reasons stated for such low prevalence when compared with other parts of India were more traditional low fat diet, less exposure to sedentary past times and greater time spent playing outdoors. Nevertheless, Guwahati being the largest metropolis and also the trade and industrial hub of north east India can be expected to be the obesity capital of north eastern region of India. The ever increasing fast food restaurant joints and bakery shops in the city can be thought of aggravating the overweight/obesity problems among the population of both adults and adolescents to levels concerning the future.

2.10 RATIONALE FOR THE PRESENT STUDY

Available evidences show that one of the effective ways to prevent obesity in the adult life may be prevention and management of childhood and adolescent overweight and obesity. A fundamental step in the prevention and control of obesity is the identification and understanding of factors contributing to the rapid increase of obesity

.There are evidences that children and adolescents of urban families are increasingly becoming overweight/obese in recent times, possibly because of the change in dietary habits. Relevant research which aggregates food into dietary patterns and investigates the factors which influence food choices among adolescents in India is minimal. Moreover no such systemic study in Assam could be found.

2.11 OBJECTIVES

1. To assess the dietary patterns of the school going adolescents in urban Guwahati.
2. To assess the factors that influence adolescent food choices and eating behavior.
3. To assess the association of overweight and obesity with the dietary pattern, if, any among the adolescents.

CHAPTER 3

METHODOLOGY

3.1 Study design

Cross sectional survey with self administered questionnaire (pre tested) among adolescents.

3.2 Study setting

Study was planned among adolescents studying in the schools of urban Guwahati, Assam, India. All participants were drawn from both the government and private owned schools of urban Guwahati. In total there are 52 private owned schools and 24 government schools in urban Guwahati (office of district education officer). Students from the 'madrasas' could not be included in the study.

3.3 Sample size

Based on previous studies we assuming the prevalence of bad eating behavior to be 16% and to get 95% confidence interval (CI), with 20% relative precision the sample size arrived at was 525. Twice this number, that is, a sample size of 1050 had to be taken to account for design effect.

3.4 Sample selection procedures

We used a multistage stratified cluster random sampling procedure.

3.4.1 Selection of schools

The list of all the schools in the urban Guwahati area was obtained from the office of the district education officer. From the list 6 private owned and 3 government schools were selected randomly from the two types of schools. This stratified random sampling of schools was done based on the proportion of government and private schools in urban Guwahati. All the selected schools had similar timings.

3.4.2 Selection of classes/sections

List of all the sections of classes 9^{th} and 10^{th} was prepared from the selected schools. From this list the required number of sections was selected randomly from each type of school in order to cover 1050 adolescents. In total 18 sections were selected.

3.4.3 Selection of study participants

All the students from each selected sections were taken up for the survey. It was also ensured that the selected students were in the age group of 13-18 years, that is, the adolescent age group.

3.5 Data collection techniques

Data collection was done by the principal investigator between 16^{th} June to 15^{th} September 2011. Self administered questionnaire was the tool used for the survey. They were collected after completion on the same day. The entire questionnaire session took about 30-35 minutes for the students to complete. It was supervised by principal investigator only.

3.6 Anthropometric measurements

All the participants were measured for height and weight to calculate the body mass index. In order to avoid inter-observer and inter-instrument bias, all the measurements were taken by the principal investigator using same instruments. Height was measured using a portable anthropometric rod (with an error of ± 0.1 cm) and weight was measured using SECA digital weighing scale (with an error of ± 100 grams).

3.6.1 Procedures for measuring height

The participants were asked to remove their footwear and any headgear if any. They were to face the principal investigator measuring height. Feet were placed together, heels against the back board and knees straight. They were made to look straight ahead and not tilt their head up. It was ensured that eyes were at the same level as the ears. The measure arm was gently moved down onto the head of the participant and the participants were asked to breathe in and stand tall. The height in centimetres was read at the exact point.

3.6.2 Procedures for measuring weight

The participants were asked to remove their footwear and socks. They were then asked to step onto scale with one foot on each side of the scale. They were to stand still, face forward, place arms on the side and wait until asked to step off. Weight was recorded in kilograms.

3.7 Data entry

Data entry was done using SPSS Statistics 17.0 for windows by principal investigator. Data was cleaned and scrutinized for missing values and consistency with the forms. All the hard copies are stored securely by the principal investigator.

3.8 Data analysis and statistical methods

Data analysis was done using SPSS Statistics 17.0 for windows. Univariate analysis was done to describe the sample characteristics. Bivariate analysis of independent variables (categorised) with dependent variables (junk food consumption, vegetable and fruit consumption) were done by cross tabulation and testing by Chi square. Multivariate analysis was done using Multiple binary logistic regression for adjusting possible confounding and interactions to arrive at two models explaining both the outcome variables.

For classifying body mass index of the adolescents into overweight/obese and non overweight and non obese the age and sex specific cut-off points for adolescents proposed by Cole et al was used.[58] These cut-off points are internationally accepted and also referred by the International Obesity Task Force (IOTF).

3.9 Variables used in the study

3.9.1 Dependent variables

1. Junk food consumption

This was arrived at after clubbing six questions relating to different types of junk food consumed in a day. Responses were categorised as 'yes' if the participant consumed any one type/item of junk food per day and as 'no' if they do not consume any type of junk food.

2. Vegetable and fruit consumption

This was arrived upon by combining three questions on the frequency of consumption of vegetables, green leafy vegetables and fruits per day by the participants.

Responses were categorised as ‘low’ and ‘moderate’ depending on whether the participants consumed less than one time fruit and two times vegetable per day or more than or equal to one time fruit and two times vegetable consumption per day.

3.9.2 Independent variables

1. Sex: To study the gender variations in terms of junk food and vegetables and fruits consumption.

2. Age: To see the changes in consumption pattern of junk foods and vegetables and fruits across age groups.

3. Type of school: Used as a proxy for the socio-economic status of the adolescents.

4. Dietary behaviour was captured using variables to find out the number of days the adolescents had breakfast in a week, reason for not eating breakfast, place of breakfast, breakfast had with whom, the number of days tiffin/lunch brought to school in a week, place of having lunch if not brought from home, family meals, that is, whether dinner was with parents or not and number of days of eating dinner out in a week.

5. Family influences on the choice of foods of the adolescents were assessed with the help of variables which looked into the normative beliefs, that is, what adolescents believe their parents think about eating vegetables and fruits; normative expectations, that is, adolescent’s beliefs about whether parents think they should or should not eat vegetables and fruits; parental modelling of eating, that is, whether parents eat vegetables and fruits in front of their children while having food with them.

6. Peer influences were assessed with the help of variables which looked into the normative beliefs, that is, what adolescents believe their friends think about eating

vegetables and fruits; normative expectations, that is, adolescent's belief about whether friends think they should or should not eat vegetables and fruits; peer modelling, that is, friends eating vegetables and fruits in front of them.

7. Availability: To see if adequate types of vegetables and fruits were available at home.

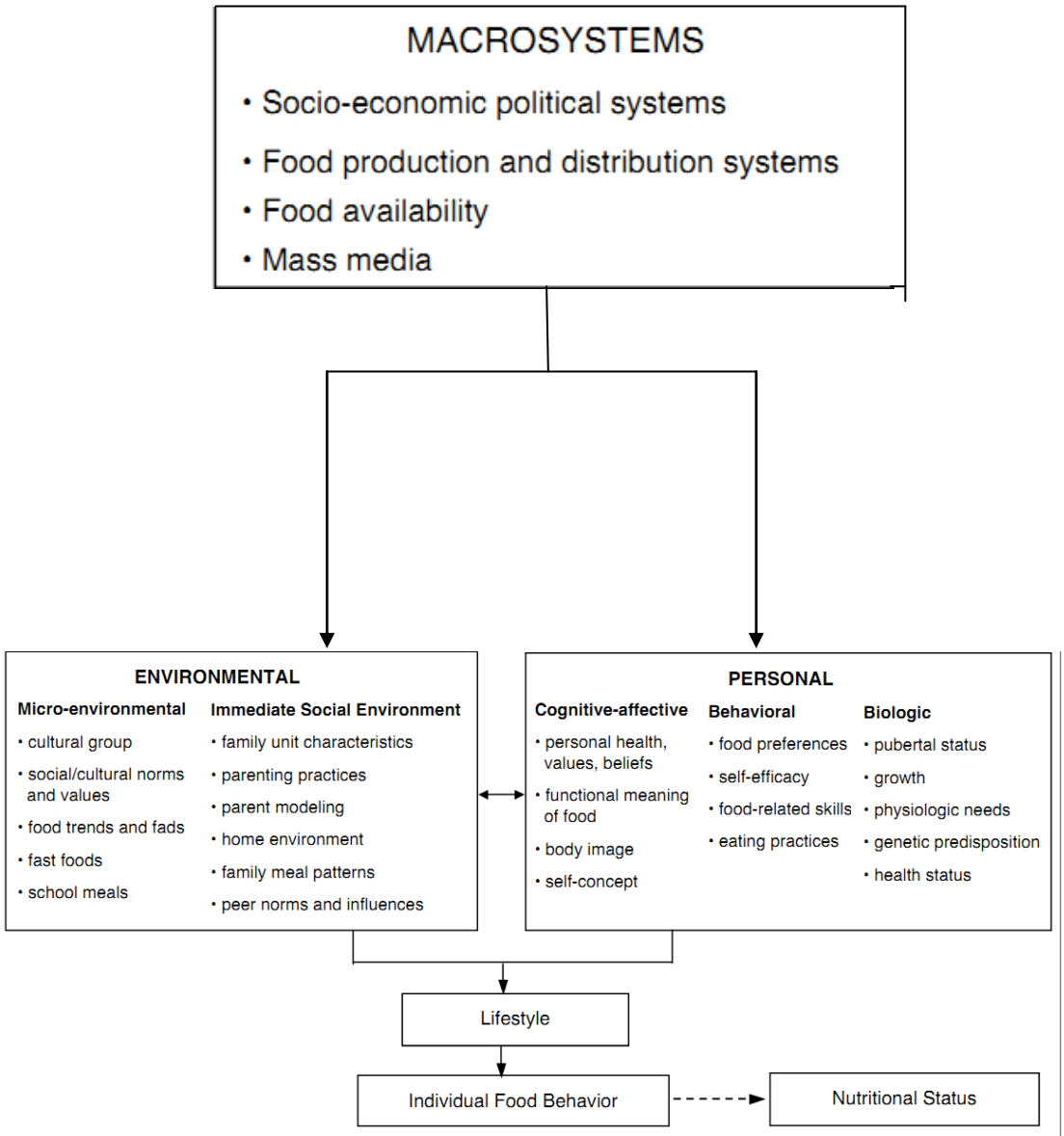
8. Accessibility: Captures whether vegetables and fruits were served to the adolescents even though they were available at home.

9. Perceived weight status: Adolescents were asked to describe themselves as underweight, right weight or overweight.

10. Knowledge: To know whether the adolescents were taught in any of their classes the benefits of healthy eating and the benefits of eating more vegetables and fruits.

3.10 Ethical considerations

Ethical clearance was obtained from Institutional Ethics Committee (IEC) of Sree Chitra Tirunal Institute for Medical Sciences and Technology. Written permission from the head of the schools was taken to conduct the survey in the selected schools.Written Informed Consent was obtained from the parents/guardians of the adolescents. On the day of the survey written Assent was obtained from the participating adolescents stating their willingness to take part in the survey.



Source: ©Mary Story. Reprinted from Story M, Alton I. Becoming a woman: nutrition in adolescence. In: Krummel DA, Kris-Etherton PM, eds. Nutrition in women's health. Gaithersburg, MD: Aspen Publishers;1996.

Figure 2 Conceptual framework

CHAPTER 4

RESULTS

This chapter primarily describes the outcomes of data analysis in concordance with the objectives. After scrutinizing the data entered, they were analysed using SPSS for windows version 17.0.

Following various steps, the data were analysed for identifying the baseline characteristics of the sample population and the association between independent variables and the outcome variables (junk food consumption and vegetable and fruit consumption). The results are organized first with the description of the sample characteristics, next distribution of variables capturing dietary behaviour across the sample, then variables assessing parental and peer influences, availability and accessibility of vegetables and fruits across the sample and finally personal factors like perceived weight status and knowledge across the sample is described. Body mass index classification of the sample population is done based on the Cole et al study.[58]

Bivariate analysis of some selected variables with the outcome variables and multivariate models predicting the outcome variables is attempted.

4.1 Sample description

Table 4.1: Sample characteristics by age and sex

AGE (years)	Boys n (%) N = 513(48.2)	Girls n (%) N= 551(51.8)	Total N= 1064
13	18(36)	32(64)	50
14	126(46.3)	146(53.7)	272
15	205(44.4)	257(55.6)	462
16	150(58.4)	107(41.6)	257
17	0(0)	9(100)	9
18	14(100)	0(0)	14

Nine schools were selected, 6 private and 3 government institutions, based on the proportion of private to government schools in Urban Guwahati. A total of 1064 adolescents in the age group of 13-18 years were recruited in the study, 682 (64.1%) from the private schools and 382 (35.9%) from the government schools. Of them 513 (48.2%) were boys and 551 (51.8%) were girls. Most of the adolescents, which is, 462 (43.4%), were of 15 years of age.

4.2 Dietary behaviours

This section includes questions regarding the dietary behaviours of the participating adolescents. Majority, that is, 817 (76.7%) of the sample population have breakfast before coming to school almost every day of the school week (≥ 5 days/week). Overwhelmingly 1008 (94.7%) adolescents have it in their home. Among those who do not have breakfast frequently 131 (53%) stated that they could not eat breakfast in the

early morning and 85 (34.4%) said that they do not have enough time for eating breakfast. 426 (40%) adolescents have breakfast with their parents, 390 (36.6%) have it alone while the rest eat breakfast with siblings and friends.

Table 4.2: Dietary behaviours of the study population

Had Breakfast (days/school week)	**N (%)**
Never	57 (5.4)
Infrequently (1-4 days/week)	190 (17.9)
Frequently (≥5 days/week)	817 (76.7)
Reasons for not taking breakfast	**N (%)**
Always eat breakfast	817 (76.7)
Cannot eat early in morning	131 (12.3)
No time for breakfast	85 (8.1)
Not always enough food at home	9 (0.9)
Other reasons	22 (2.0)
Place of breakfast	**N (%)**
Home	1008 (94.7)
Other places (canteen, shops, bakeries, hotels)	56 (5.3)
Breakfast on Sundays and holidays	**N (%)**
Always	704 (66.2)
Not always	360 (33.8)
Tiffin to school	**N (%)**
Frequently (≥5times/week)	288 (27.1)
Infrequently(<5times/week)	776 (72.9)
Place of lunch	**N (%)**
Home	424 (39.8)
Other places (canteens, shops, bakeries, hotels)	640 (60.2)

Table 4.2: Dietary behaviours of the study population (...continued)

Family meal (dinner)	**N (%)**
With parents	624 (58.6)
Not with parents	440 (41.4)
Eating dinner out	**N (%)**
Yes	486 (45.7)
No	578 (54.3)

None of the adolescents from the government schools take tiffin to school while 105 (15.4%) adolescents from the private owned schools never bring tiffin to school. On Sundays and holidays 878 (82.5%) adolescents have lunch with their parents while the remaining have lunch alone or with siblings. Interestingly 225 (21.2%) adolescents have dinner at home while watching television. As for dinning out 486 (45.7%) of the adolescents goes out for dinner at least once in a week. As expected none of the adolescents from the government schools dine out.

4.3 Junk food consumption

Six questions relating to different types of junk food consumption were clubbed together to arrive at a new variable ‘junk food consumption’. It was categorised into ‘yes’ and ‘no’ depending on whether the adolescents consumed at least one item of junk food per day or not in the past 7 days. (Table 4.3)

4.4 Vegetable and fruit consumption

Combining three questions on the frequency of consumption of vegetables, green leafy vegetables and fruits per day by the participants the variable ‘vegetable and

fruit consumption' was formed. Responses were categorised as 'low' and 'moderate' depending on whether the participants usually consume less than one time fruit and two times vegetable per day or more than and equal to one time fruit and two times vegetable per day.(Table 4.4)

Table 4.3 Junk food consumption

Consumption	N (%)
Yes	845 (79.4)
No	219 (20.6)

Table 4.4 Vegetable and fruit consumption

Consumption	N (%)
Moderate	556 (52.3)
Low	508 (47.7)

4.5 Family influences

Family influences on the choice of foods of the adolescents like parents encouraging consumption of vegetables and fruits, their views on eating vegetables and fruits, parents eating vegetables and fruits in front of children while having food together were seen among the sample population. Overwhelming majority of the adolescents reported that their parents encouraged them to eat fruits, vegetables and green leafy vegetables and were of the view that eating fruit and vegetables was a very good/good thing. (Table 4.5)

Table 4.5 Family influences on food choices

Encouragement to eat fruits	**N (%)**
Encourages	940 (88.4)
Neither encourages nor discourages	124 (11.6)
Encouragement to eat vegetables	**N (%)**
Encourages	996 (93.6)
Neither encourages nor discourages	68 (6.4)
Encouragement to eat green leafy vegetables	**N (%)**
Encourages	976 (91.7)
Neither encourages nor discourages	88 (8.3)
Views on eating fruits	**N (%)**
Very good/good thing	944 (88.7)
Do not care	120 (11.3)
Views on eating vegetables	**N (%)**
Very good/good thing	1009 (94.9)
Do not care	55 (5.1)
Views on eating green leafy vegetables	**N (%)**
Very good/good thing	1007 (94.7)
Do not care	57 (5.3)
Parental modelling of eating	**N (%)**
Always	390 (36.7)
Never/sometimes	674 (63.3)

4.6 Peer influences

Out of total sample 450 (42.3%) adolescents reported that their friends encourages them to eat fruits while 600 (56.4%) reported that their friends neither encourages nor discourages to eat fruits. 14 (1.3%) actually states that their friends

discourages them to eat fruits. Similarly 370 (34.8%) adolescents reported that their friends encourages them to eat vegetables, 666 (62.6%) of them states that their friends neither encourages nor discourages them to consume vegetables, while 28 (2.6%) of the adolescents reported that they were discouraged by their friends to eat vegetables. Likewise friend's views on eating fruits and vegetables are reported.(Table 4.6)

Table 4.6 Peer views

Views on eating fruits	**N (%)**
Very good/good thing	840 (79.0)
Do not care	224 (21.0)
Views on eating vegetables	**N (%)**
Very good/good thing	719 (67.6)
Do not care	345 (32.4)

Only 36 (3.4%) of the adolescents reported that their friends always eat fruits or vegetables when they are having food with them. 251 (23.6%) of the adolescents states that they have never seen their friends eating fruits or vegetables in front of them. 777 (73%) of the study participants said that their friends sometimes have fruits or vegetables while having food with them.

4.7 Availability and accessibility of fruits and vegetables

Table 4.7 Availability and accessibility

Any two fruits available at home in past week	**N (%)**
Yes	958 (90.1)
No	106 (9.9)
Any five vegetables available at home in past week	**N (%)**
Yes	859 (80.7)
No	205 (19.3)
Any two fruits served in past week	**N (%)**
Yes	600 (56.4)
No	464 (43.6)
Any five vegetables served in past week	**N (%)**
Yes	639 (60.1)
No	425 (39.9)

Although 90.1 per cent of the adolescents reported that fruits were available at their home, only 56.4 per cent of the total samples were served fruits. Similarly 80.7 per cent stated that vegetables were available but was served to only 60.1 per cent of them.

4.8 Perceived weight status

Out of the total sample population 462 (43.4%) of the adolescents feel that they are of the right weight. While 358 (33.6%) feel that they are underweight and the rest 244 (23%) are of the notion that they are overweight.

4.9 Knowledge

Knowledge regarding healthy eating and eating more fruits and vegetables was assessed through two questions.(Table 4.8)

Table 4.8 Knowledge

Benefits of healthy eating taught this school year	**N(%)**
Yes	623 (58.6)
No	441 (41.4)
Benefits of eating more fruits and vegetables taught this school year	**N(%)**
Yes	511 (48.0)
No	553 (52.0)

4.10 Body Mass Index

The body mass index (BMI) [Weight (kg)/Height $(m)^2$] of the study population ranges from 15.05 to 27.59 with a mean of 19.36 and a standard deviation of ±2.79. The classification into overweight/obese and non overweight and non obese was done according to the sex and age specific cut-off points proposed for adolescents by the study of Cole et al. [58] The BMI classification by sex is given in the following table. (Table 4.9). Not a single obese case was found in the sample.

Table 4.9 Body Mass Index classification

Sex	**N**	**Not overweight N(%)**	**Overweight N (%)**
Boys	513	432 (84.2)	81 (15.8)
Girls	551	452 (82.1)	99 (17.9)
Total	1064	884 (83.1)	180 (16.9)

4.11 Bivariate analysis

Bivariate analysis of the outcome variable junk food consumption was done with other independent variables. Cross tabulation and chi square test was done. P value of <0.05 was set for significance. The results of bivariate analysis are given in table 4.10.

There is no significant difference in proportion of junk food consumption between the groups of baseline variables like sex, age group and type of school. Across the groups in the variables place of lunch, family meal (dinner), dinning out and fruit and vegetable consumption there is found to be a significant difference in proportion of junk food consumption. Interestingly there is no significant difference in proportion of junk food consumption between overweight and non overweight.

Similarly bivariate analysis of the outcome variable vegetable and fruit consumption was done with the independent variables. There is found to be a significant difference in the proportion of consumption of vegetables and fruits between the groups of variables sex, age group, type of school, tiffin to school, place of lunch, family meal (dinner), parental modelling, availability and accessibility. The results are given in table 4.11.

Table 4.10 Bivariate analysis of junk food consumption with other variables

VARIABLE	JUNK FOOD CONSUMPTION Yes n(%)	No n(%)	p value
Sex			
Boys	414(80.7)	99(19.3)	0.325
Girls	431(78.2)	120(21.8)	
Age group			
13-15 yrs	628(80.1)	156(19.9)	0.389
16-18 yrs	217(77.5)	63(22.5)	
Type of school			
Government	300(78.5)	82(21.5)	0.635
Private	545(79.9)	137(20.1)	
Place of lunch			
Home	304(71.3)	120(28.7)	**< 0.001**
Other places	541(84.9)	99(15.5)	
Family meal			
Dinner with parents	472(75.6)	152(24.4)	**<0.001**
Not with parents	373(84.8)	67(15.2)	
Goes out for dinner			
Yes	411(84.6)	75(15.4)	**<0.001**
No	434(75.1)	144(24.9)	

Table 4.10 Bivariate analysis of junk food consumption with other variables(…continued)

VARIABLE	JUNK FOOD CONSUMPTION		p value
	Yes n(%)	No n(%)	
Vegetable & fruit consumption			
Moderate	429(77.2)	127(22.8)	0.058
Low	416(81.9)	92(18.1)	
BMI Category			
Overweight	150(82.9)	30(17.1)	0.227
Not overweight	695(78.7)	188(21.3)	

Table 4.11 Bivariate analysis of vegetable and fruit consumption with other variables

VARIABLE	VEGETABLE & FRUIT CONSUMPTION		p value
	Moderate n (%)	Low n (%)	
Sex			
Boys	231 (45)	282 (55)	< **0.001**
Girls	325 (59)	226 (41)	
Age group			
13-15	441 (56.3)	343 (43.7)	< **0.001**
16-18	115 (41.1)	165 (58.9)	

Table 4.11 Bivariate analysis of vegetable and fruit consumption with other variables (……continued)

VARIABLE	VEGETABLE & FRUIT CONSUMPTION		p value
	Moderate n (%)	Low n (%)	
Type of school			
Government	113 (29.6)	269 (70.4)	**< 0.001**
Private	443 (65)	239 (35)	
Tiffin to school			
Frequently	209(72.4)	79(27.6)	**< 0.001**
Infrequently	347(44.8)	429(55.2)	
Place of lunch			
Home	238(57.9)	172(42.1**)**	**0.004**
Other places	318(48.6)	336(51.4)	
Family meal			
Dinner with parents	365(58.5)	259(41.5)	**< 0.001**
Not with parents	191(43.4)	249(56.6)	
Parental modeling of eating			
Always	256(65.6)	134(34.4)	**< 0.001**
Never/Sometimes	300(44.5)	374(55.5)	
Availability			
Yes	506(58.9)	353(41.1)	**< 0.001**
No	50(24.4)	155(75.6)	
Served			
Yes	399(62.4)	240(37.6)	**< 0.001**
No	157(36.9)	268(63.1)	

4.12 Multivariate analysis

Predictor model for both the outcome variables junk food consumption and vegetable and fruit consumption was built by picking significant bivariate factors and important independent variables from the data. Tables 4.12 and 4.13 shows the suggested multivariate models. All variables are binary.

Table 4.12 Multivariate analysis for junk food consumption

Variable	Reference category	Adjusted Odds Ratio (95% C.I.)	p value
Sex			
Boys	Girls	0.763 (0.528-1.103)	0.15
Place of lunch			
Other places	Home	2.828 (1.941-4.122)	< **0.001**
Family meal (dinner)			
Not with parents	With parents	1.738 (1.244-2.429**)**	**0.001**
Eating dinner out			
Yes	Never	1.906 (1.312-2.769)	**0.001**
Vegetable and fruit consumption			
Low	Moderate	1.454 (1.039-2.037**)**	**0.03**
Parental modelling of eating			
Never/sometimes	Always	1.216 (0.867-1.705)	0.256
BMI Category			
Overweight	Not overweight	1.437 (0.897-2.301)	0.131

Table 4.13 Multivariate analysis for vegetable and fruit consumption

Variable	Reference category	Adjusted Odds Ratio (95% C.I.)	p value
Sex			
Boys	Girls	1.097 (0.801-1.501)	0.565
Type of school			
Government	Private	0.379 (0.256-0.497)	< **0.001**
Tiffin to school			
Frequently	Infrequently	1.557 (1.09-2.223)	**0.015**
Place of lunch			
Other places	Home	0.786 (0.569-1.085)	0.143
Family meal			
Dinner with parents	Dinner not with parents	1.342 (1.014-1.775)	**0.04**
Parental modeling Of eating			
Never/sometimes	Always	0.513 (0.384-0.685)	< **0.001**
Availability			
No	Yes	0.438 (0.282-0.681)	< **0.001**
Served			
No	Yes	0.757 (0.544-1.054)	0.1

In both the models it was found that family meal (dinner) was significantly associated with food consumption - those who take meal with family members are likely to be consuming more fruits/vegetables and less junk food compared to those who do not take meals with family members. No gender variation was found in terms of both junk food consumption and fruits and vegetables consumption. Also being overweight was not found to be associated with junk food consumption.

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Discussion

This study primarily aimed to look into the environmental influences affecting the junk food consumption. In addition a few personal factors were studied which are thought to have an effect on the food choices. While doing so, parental and peer influences on vegetable and fruit consumption were also judged. Basically a model was tried to build which would most predict the junk food, vegetable and fruit consumption by the adolescents.

Adolescents in the age group 13-18 years were chosen as it is a time of psychological maturation and a crucial period for development of dietary behaviours that continue into adulthood and influence the risk of chronic diseases later in life. Furthermore school going adolescents are in a midst of several inter-playing factors which moulds their lifestyle habits. Thus there is a call for understanding the factors influencing adolescent's dietary practices so as to design an effective dietary intervention program.

5.1.1 Dietary behaviours

About one fourth of the adolescents skipped breakfast on at least one day during the school week. Skipping breakfast, in particular, can be especially problematic for overweight and non-overweight youth alike, leading to nutritional problems and

interfering with learning and academic performance.[59] A greater proportion of adolescents studying in the private schools skipped breakfast than those from the government schools. It has most probably to do with early school timings of the private owned schools. Moreover students from the private schools have to catch their school buses at least an hour before the school starts. This view is supported by the fact that one fifth of the adolescents reported that they cannot eat early in the morning or there is not enough time to have breakfast. Breakfast eating appears to contribute to the overall nutritional adequacy of the diet and may provide an opportunity to consume foods such as grain products and fruits, widely regarded as important in the prevention of chronic disease.[60] Furthermore, substantial evidence suggests that eating breakfast acutely improves cognitive performance in terms of concentration and memory, with potential implications for educational attainment.[61] The percentage of adolescents skipping breakfast (23.3%) in this study is in concordance to studies done in the United States.[12]

Only 27.1 per cent of the adolescents always bring tiffin to school. As a result the study shows that a vast majority of the adolescents (60.2 per cent) have food items from the school canteen, shops, bakeries or hotels nearby during the tiffin break. In fact none of the participants from the government schools ever brought tiffin to school. As a result 84.5 per cent of adolescents from government schools consume junk food which are cheap to buy and easily available near the school premises.

Dinner is the most frequently consumed family meal among adolescents and it also provides a large proportion of intake of energy and key nutrients than any other meal or snack.[62] Increasing frequency of family dinner is associated with more healthful dietary intake patterns, including more fruits and vegetables, less fried food and soft drinks, less saturated and trans fats and more fibre and micronutrients from food. Family meals also provide an opportunity for family communication and interaction. The study

findings show that 41.4 per cent of the adolescents do not have dinner with parents and 21.2 per cent adolescents have dinner while watching television. Mass media had been found to be a influential factor affecting the food choices of children.[12]

Eating out has direct bearing on the nutritional status of adolescents. Many fast foods are high in fat and low in fibre and nutrients. The study found that 45.7 per cent of the adolescents go out for dinner at least once a week. In fact eating dinner out is strongly associated with junk food consumption ($p = 0.001$).

5.1.2 Family and peer influences

Family and peer influences have particularly promising effect on fruit and vegetable consumption.[63] This study found that vast majority of the adolescents reported that their parents encouraged them to eat fruits, vegetables and green leafy vegetables and were of the view that eating fruit and vegetables was a very good/good thing. Only 36.7 per cent of the adolescents reported that their parents always ate fruits and vegetables while having food with them. Parental modelling of eating was found to be significant factor associated with vegetable and fruit consumption. This has also been shown in studies done in various European countries.[63] Similarly majority of the adolescents reported that their friends encouraged them to eat fruits and vegetables and thought that eating fruits and vegetables is a very good thing.

5.1.3 Availability and accessibility

Although 90.1 per cent of the adolescents reported that fruits were available at their home, only 56.4 per cent of the total samples were served fruits. Similarly 80.7 per cent stated that vegetables were available but was served to only 60.1 per cent of them. This has more to do with the distribution of food among the members of the

household and also probably who prefer what items. Moreover preferential treatment to other members of the family could not be ruled out.

5.1.4 Knowledge

Majority of the adolescents reported that they were not taught the benefits of eating more fruits and vegetables in their school. However there were a proportion of adolescents from the same schools who reported otherwise. Hence this finding may be more due to the individual understanding of the adolescents.

5.1.5 Overweight and obesity

The overall prevalence of overweight among the sample population was found to be 16.9 per cent. This is comparable to that seen in studies done in Delhi, Chennai, Pune, Bangalore, Ahmadabad, Punjab and Trivandrum.[48,50,51,54,55,56] Guwahati being the economic hub and the largest metropolis of north east India very well explains this high prevalence of overweight among adolescents.

5.1.6 Junk food consumption

There are no gender variations in terms of junk food consumption. Also there is no significant difference in junk food consumption between adolescents of government schools and private owned schools. This may be due to the fact that cheap junk foods like ‘mixture’, fried ‘pakoris’ etc. are easily available near the government schools. Junk food consumption was three times higher among the adolescents who have lunch in hotels and bakery shops compared to those who have lunch at their home. Junk food consumption was significantly higher among those who do not have dinner with their parents or have dinner while watching television**.** Without parental control adolescents would definitely opt for junk foods which are high on sugar, salt and fat

content. Also lack of parental control gives the adolescents a sense of autonomy to choose their own choice of foods. Adolescents who go out for dinner has a two times higher chance of consuming junk foods compared to those who never dines out. Also adolescents who consume moderate amounts of vegetables and fruits daily are less likely to eat junk items compared to those who take low amounts of vegetables and fruits. These factors found to be significantly associated with junk food consumption had also been confirmed in other studies.[12,15]

Interestingly being overweight was not found to be associated with junk food consumption. This actually highlights the fact that junk food consumption is widely prevalent among the urban adolescents. Junk foods are being consumed by the non overweight and overweight alike. An overwhelming majority of the adolescents, 79.4 per cent, consumes junk food on a daily basis. So it would require to investigate into the other determinants of overweight and obesity such as sedentary lifestyle – like absence of participation in outdoor activities, hours of watching television or sitting in front of the computer and increased burden of academics; socio- economic status; heriditary factors; some medical conditions and use of certain medicines. It also emphasizes the fact that aetiology of being overweight or obese is a complex one and cannot be explained by taking only one factor into consideration.

5.1.7 Vegetable and fruit consumption

As indicated in previous studies[12,15,61,63] vegetable and fruit consumption was found to be significantly associated with family meal (dinner), parental modelling of vegetable and fruit eating in front of children, availability and accessibility ($p \leq 0.1$). In addition to these factors the study also showed significant association of type of school and whether tiffin was brought to school. Compared to private school adolescents the

adolescents from government schools are less likely to consume moderate amounts of vegetables and fruits. This would be mainly due to the differential purchasing ability of fruits and vegetables. Those who brought tiffin to school frequently are more likely to consume moderate amounts of vegetables and fruits. Definitely the adolescents who do not bring tiffin have food items from nearby shops and hotels and most of those items are junk foods. Although adolescents having lunch at home are more likely to consume more vegetables and fruits this association was not found to be significant (p=0.14). Adolescents having dinner with parents and if influenced by parents to eat vegetables and fruits through modelling are more likely to consume more amounts of fruits and vegetables. As expected availability and accessibility (served or not) significantly increases the chances of consuming more vegetables and fruits.

5.2 Strengths of the study

- To the best of my knowledge, first study in India looking at some of the environmental and personal factors that influence adolescent food choices.
- Also the first study to assess the prevalence of overweight and obesity among school going adolescents in Assam (as per principal investigator's knowledge).
- All the surveys and the physical measurements were taken by the principal investigator himself thereby avoiding inter-observer bias.

5.3 Limitations of the study

- The study was a cross-sectional survey and as such all the limitations of a cross sectional design apply to this study as well.
- Purely urban based study so results cannot be extrapolated to other areas.
- Adolescents from 'madrasas' and night schools were not a part of the study.

5.4 Conclusions

The present study tries to understand some of the environmental and personal factors influencing adolescent's eating behaviour and food choices. Conclusions of this study are:

- Early school timings act as a barrier to have regular breakfast resulting in skipping of breakfast by the adolescents.
- Vast majority of the adolescents consume junk foods of some kind or the other on a daily basis.
- Government school adolescents consume more unhealthy junk items.
- Majority of the adolescents feel that the benefits of eating more vegetables and fruits were not taught at school.
- Prevalence of overweight/obesity is comparable to that observed in studies done in big cities like Delhi, Chennai, Pune, Ahmadabad, Punjab, Bangalore and Trivandrum.
- Place of lunch, family meal (dinner), eating dinner out and moderate consumption of vegetables and fruits are important factors influencing junk food consumption by adolescents.
- Better economic status, taking tiffin to school, family meal (dinner), parental modelling of eating, availability and accessibility could contribute to moderate consumption of vegetables and fruits by adolescents.
- Arguably what we have seen from this study may be just the tip of the ice-berg. It is likely that a greater proportion of adolescents consume junk foods and a lesser proportion eats moderate amounts of vegetables and fruits.

5.5 Recommendations

- School timings needs to be changed so as to encourage children to eat a meal in the morning.
- Provide nutrition education and counselling to adolescents that focuses on the positive aspects of a healthy diet, such as increased energy levels, better academic performance, improved concentration, and better athletic performance.
- Teach adolescents to choose wisely when eating at fast food restaurants or buying foods at bakeries, shops and from street side vendors.
- Encourage parents to keep a variety of healthy foods in the home, within easy reach and counsel them on the importance of parental control on food choices of their children and the benefits of having family meals together.
- Work with school administration, parent-teacher organizations, school food service staff, local politicians and urban planners to develop policies that limit the sales of soft drinks, candy, snack foods, chips and fast foods within schools and to pass ordinances that limit the building or location of fast food restaurants, street side vendors and convenience stores close to schools.
- Mid day meal programme for government schools should be extended to cover adolescents also.

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Appendix I

INFORMED CONSENT

Achutha Menon Center for Health Science Studies

Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum

Title of study: - "An assessment of the factors affecting food choices and their corresponding association with overweight and obesity among school going children in urban Guwahati"

(Part fulfilment of course requirements for the MPH degree, AMCHSS, SCTIMST)

Dear Parent/Guardian,

I am Dr. Siddhartha Dutta currently doing Master in Public Health from Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum, Kerala. I am doing a study on the dietary patterns of school children in Guwahati and the factors affecting the food choices of children as a part of my course requirement.

The objectives of my study are to assess the dietary patterns of school children, to assess the factors affecting food choices of children and to assess the association of overweight with the food choices of the children.

There is a growing concern on the rise in consumption of various junk foods (e.g. chips, bakery items, food items from fast food restuarants) among the adolescents of our country especially in the cities. Increased consumption of such items causes a number of conditions among children like obesity and nutritional deficiencies. Obesity in adolescence may persist into adulthood and may increase the risk of diseases such as diabetes, heart diseases, joint pains etc. Nutritional deficiencies on the other hand affect school participation and learning. Thus a survey has been carried to look into the various food choices of the children and to understand the factors responsible for these food choices. Also height and weight of the children would be taken to assess the association of overweight with the food choices of the children.

For this purpose I would like to ask your child a set of questions about his/her dietary patterns and factors affecting his/her food choices. The whole questionnaire will take about 30 minutes to fill up. Then I would also like to take his/her weight and height to link presence or absence of overweight with the food choices of your child. There may be no direct benefit to your child from this study but the information obtained from this study will help to increase awareness about the benefits of healthy eating among children. The information given by your will be kept strictly confidential and will be used for

research purpose only. Information will not be disclosed to school authorities or anyone else under any circumstances.

I have sought the permission of the school authorities for conducting this study. However participation is purely voluntary. You are free to refuse participation of your child in this study. However I would really appreciate it if you give your consent for your child's participation in this study as it would provide us with valuable information.

Please tick your response

Yes, I am willing to let my son/daughter to participate in this study ☐

No, I am not willing to let my son/daughter participate in this study ☐

Signature of parent/guardian _____ Date _____

Relationship with the child _____

If you have any queries you can contact.

1. Dr. Siddhartha Dutta
   MPH 2010 , AMCHSS,
   SCTIMST, Trivandrum.
   Mobile No. 8891129883

2. Dr. P. Sankara Sarma
   Professor,
   AMCHSS, SCTIMST,
   Trivandrum.
   Ph. No. 0471-2524232

3. Dr. Anoop Kumar Thekkuveettil, Member Secretary,
   Institutional Ethics Committee, SCTIMST, Trivandrum.
   Ph. No. 0471-2520256

Thank you.

Appendix II

Assent

Achutha Menon Center for Health Science Studies

Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum

Title of study: - "An assessment of the factors affecting food choices and their corresponding association with overweight and obesity among school going children in urban Guwahati"

Dear Student,

I am Dr. Siddhartha Dutta currently doing Master in Public Health from Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum, Kerala. I am doing a study on the dietary patterns of school children in Guwahati and the factors affecting the food choices of children as a part of my course requirement.

The objectives of my study are to assess the dietary patterns of school children, to assess the factors affecting food choices of children and to assess the association of overweight with the food choices of the children.

I would like to ask you some questions about your dietary behaviour and some of the factors that may affect your food choices. Also I would like to take your height and weight to complete my study objectives. The whole questionnaire will take about 25-30 minutes to fill up. There may be no direct benefit to you from this study but the information obtained from this study will help to increase awareness about the benefits of healthy eating.

The information given by you will be kept strictly confidential and will be used for research purpose only. Information will not be disclosed to your parents, school authorities or anyone else under any circumstances.

I have sought the permission of school authorities and consent of your parents to let you participate in this study. However participation is purely voluntary. You may choose not to participate in this study if you do not want to. You may withdraw from this study at any time after joining. However I would really appreciate it if you give your assent for your participation in this study.

Please tick your response

Yes, I am willing to participate in this study ☐

No, I am not willing to participate in this study ☐

Signature of Student _____

Date _____

If you have any queries you can contact.

1. Dr. Siddhartha Dutta
   MPH 2010 , AMCHSS,
   SCTIMST, Trivandrum.
   Mobile No. 8891129883

2. Dr. Sankara Sarma
   Professor,
   AMCHSS, SCTIMST,
   Trivandrum.
   Ph. No. 0471-2524232

3. Dr. Anoop Kumar Thekkuveettil, Member Secretary,
   Institutional Ethics Committee, SCTIMST, Trivandrum.
   Ph. No. 0471-2520256

Thank you.

Appendix III

QUESTIONNAIRE

An assessment of the factors affecting food choices and their corresponding association with overweight and obesity among school going children in urban Guwahati

(Answer the questions based on what you really know or do. There are no right or wrong answers. Make sure to read every question. Tick the box in the answer sheet that match your answer.)

ID NO. ☐

Date_____

Name of school_____

1. Name_____

2. Sex ☐ (1= male, 2= female)

3. D.O.B (dd/mm/yy) ☐

4. Class _____ 5.Section/division_____

6. Address_____

7. Phone Number: _____

8. Religion 1.Hindu ☐ 2. Muslim ☐ 3.Christian ☐ 4.Sikh ☐

9. Community 1.Scheduled Caste ☐ 2.Scheduled Tribe ☐ 3.Other Backward Caste ☐

4. Others ☐

10. How often do you have breakfast during the school week (Monday to Friday/Saturday)?

a) Never ☐

b) Once ☐

c) Twice ☐

d) 3 times ☐

e) 4 times ☐

f) 5 times or more ☐

11. What is the main reason you do not eat breakfast?

a) I always eat breakfast ☐

b) I do not have time for breakfast ☐

c) I cannot eat early in the morning ☐

d) There is not always food in my home ☐

e) Some other reason (specify) _____

12. Where do you have breakfast during school week?

a) Home ☐

b) School canteen ☐

c) Shops/hotels /bakery shops ☐

13. With whom do you have breakfast?

a) Parents ☐

b) Siblings ☐

c) Friends ☐

d) Alone ☐

14. During Sundays / holidays how often do you have breakfast?

a) Never ☐

b) Rarely ☐

c) Sometimes ☐

d) Most of the time ☐

e) Always ☐

15. In a typical week how often do you bring your lunch to school?

a) Never ☐

b) Once ☐

c) Twice ☐

d) 3 times ☐

e) 4 times ☐

f) 5 times or more ☐

16. If you do not bring lunch to school where do you have it from?

a) School canteen ☐

b) Hotels/Restaurants/Bakery shops ☐

c) Home ☐

17. During Sundays/Holidays with whom do you have lunch?

a) Parents ☐

b) Siblings ☐

c) Alone ☐

18. What do you eat after reaching home from school?

a) Lunch ☐

b) Afternoon snack ☐

c) Any other items (specify)_____

19. During school week where/how do you usually have dinner at home?

a) Dining table with parents/grandparents ☐

b) Dining table with siblings ☐

c) Dining table alone ☐

d) While studying/doing homework ☐

e) While watching T.V. ☐

20. In a typical week how often do you go out for dinner?

a) Never ☐

b) Once ☐

c) Twice ☐

d) 3 or more times ☐

21. During the past 30 days, how many times per day did you usually eat fruit, such as apple, mango, banana, pineapple, papaya, jackfruit, guava, chikoo or litchi ?

a) I did not eat fruit during the past 30 days ☐

b) Less than one time per day ☐

c) 1 time per day ☐

d) 2 times per day ☐

e) 3 times per day ☐

f) 4 or more times per day ☐

22. During the past 30 days, how many times per day did you usually eat vegetables, such as ladyfinger, pumpkin, brinjal, cabbage, spinach, peas, tomato, cucumber, or beans?

a) I did not eat vegetables during the past 30 days ☐

b) Less than one time per day ☐

c) 1 time per day ☐

d) 2 times per day ☐

e) 3 times per day ☐

f) 4 or more times per day ☐

23. During the past 30 days, how many times per day did you usually eat green leafy vegetables?

a) I did not eat green leafy vegetables during the past 30 days ☐

b) Less than one time per day ☐

c) 1 time per day ☐

d) 2 times per day ☐

e) 3 times per day ☐

f) 4 or more times per day ☐

24. During the past 30 days, how many times per day did you usually drink carbonated soft drinks, such as Coke, Pepsi, Limca, or Fanta?

a) I did not drink carbonated soft drinks during the past 30 days ☐

b) Less than 1 time per day ☐

c) 1 time per day ☐

d) 2 times per day ☐

e) 3 or more times per day ☐

25. During the past 7 days, on how many days did you eat at a fast food restaurant or at those serving quick meals or ate items brought from them (eg. Chingoras, kachoris, patties, burgers, rolls, noodles, tikkis, or ice creams)?

a) 0 days ☐

b) 1-3 days ☐

c) 4-7 days ☐

26. During the past 7 days, on how many days did you eat items from a bakery shop such as pastries, cakes, bakery biscuits, buns, patties or sandwiches?

a) 0 days ☐

b) 1-3 days ☐

c) 4-7 days ☐

27. During a typical day how many cups per day do you usually drink beverages such as horlicks, complain, boost maltova etc.

a) I do not drink beverages ☐

b) 1 cup ☐

c) 2 cups ☐

d) 3 cups ☐

e) 4 or more cups ☐

28. During the past 7 days, on how many days did you eat potato chips(lays, unclechips, bingo etc.) kurkure, mixtures(chana) or pokoris.

a) 0 days ☐

b) 1-3 days ☐

c) 4-7 days ☐

29. During the past 30 days, how many times per day did you usually eat butter, ghee and milk sweets?

a) I did not eat butter, ghee and milk sweets during the past 30 days ☐

b) Less than one time per day ☐

c) 1 time per day ☐

d) 2 times per day ☐

e) 3 times per day ☐

f) 4 or more times per day ☐

30. Most people in my family think that eating or drinking of fruit or fruit juice is

a) A very good thing ☐

b) A good thing ☐

c) They do not care or I do not know ☐

31. Most people in my family think that eating vegetables is

a) A very good thing ☐

b) A good thing ☐

c) They do not care or I do not know ☐

32. Most people in my family think that eating green leafy vegetables is

a) A very good thing ☐

b) A good thing ☐

c) They do not care or I do not know ☐

33. How much do your parents/family encourage you to eat fruit?

a) Encourages ☐

b) Discourages ☐

c) Neither encourages nor discourages ☐

34. How much does your parents/family encourage you to eat vegetables?

a) Encourages ☐

b) Discourages ☐

c) Neither encourages nor discourages ☐

35. How much do your parents/family encourage you to eat green leafy vegetables?

a) Encourages ☐

b) Discourages ☐

c) Neither encourages nor discourages ☐

36. How often do your parents/family eat vegetables/green leafy vegetables/fruits when you are having food with them?

a) Never ☐

b) Sometimes ☐

c) Often ☐

d) Always ☐

37. How often do you have dinner together with your parents/family?

a) Never ☐

b) Sometimes ☐

c) Often ☐

d) Always ☐

38. How often do your friends eat fruits at lunch?

a) Never ☐

b) Sometimes ☐

c) Often ☐

d) Always ☐

39. How often do your friends eat vegetables at lunch?

a) Never ☐

b) Sometimes ☐

c) Often ☐

d) Always ☐

40. Most of my friends think that eating or drinking of fruit or fruit juice is

a) A very good thing ☐

b) A good thing ☐

c) They do not care or I do not know ☐

41. Most of my friends think that eating vegetables/green leafy vegetables is

a) A very good thing ☐

b) A good thing ☐

c) They do not care or I do not know ☐

42. How much do your friends encourage you to eat fruits?

a) Encourages ☐

b) Discourages ☐

c) Neither encourages nor discourages ☐

43. How much do your friends encourage you to eat vegetables?

a) Encourages ☐

b) Discourages ☐

c) Neither encourages nor discourage ☐

44. How much do your friends encourage you to eat green leafy vegetables?

a) Encourages ☐

b) Discourages ☐

c) Neither encourages nor discourages ☐

45. How often do your friends eat vegetables/green leafy vegetables/fruits when you are having food with them?

a) Never ☐

b) Sometimes ☐

c) Often ☐

d) Always ☐

46. Whether any 2 fruits were available in your home in the past week?

a) Yes ☐

b) No ☐

47. Whether any 5 vegetables/green leafy vegetables (not potatoes) were available in your home in the past week?

a) Yes ☐

b) No ☐

48. Whether any 2 fruits were served to you in your home or in the school canteen in the past week?

a) Yes ☐

b) No ☐

49. Whether any 5 vegetables/green leafy vegetables (not potatoes) were served to you in your home or in the school canteen in the past week?

a) Yes ☐

b) No ☐

50. How much do you weigh?

a) _____ kg

51. What is your height?

a) _____ cm. / ___feet ___ inch

52. How do you describe your weight?

a) Very underweight ☐

b) Slightly underweight ☐

c) About the right weight ☐

d) Slightly overweight ☐

e) Very overweight ☐

53. Which of the following are you trying to do about your weight?

a) I am not trying to do anything about my weight ☐

b) Lose weight ☐

c) Gain weight ☐

d) Stay the same weight ☐

54. During the past 30 days, did you exercise to lose weight or to keep from gaining weight?

a) Yes ☐

b) No ☐

55. During the past 30 days, did you eat less food, fewer calories, or foods low in fat to lose weight or to keep from gaining weight?

a) Yes ☐

b) No ☐

56. During the past 30 days, did you eat more food, more calories, or foods high in fat to gain weight?

a) Yes ☐

b) No ☐

(**Physical activity is any activity that increases your heart rate and makes you get out of breath some of the time. Physical activity can be done in sports, playing with friends, or walking to school. Some examples of physical activity are running, fast walking, cycling, dancing, or football)**

57. During the past **7 days**, on how many days were you physically active for a total of at least 60 minutes per day (DO **NOT** INCLUDE YOUR PHYSICAL EDUCATION OR GYM CLASS)?

a) 0 days ☐
b) 1 day ☐
c) 2 days ☐
d) 3 days ☐
e) 4 days ☐
f) 5 days ☐
g) 6 days ☐
h) 7 days ☐

58. During a **typical or usual** week, on how many days are you physically active for a total of at least 60 minutes per day (DO **NOT** INCLUDE YOUR PHYSICAL EDUCATION OR GYM CLASS)?

a) 0 days ☐
b) 1 day ☐
c) 2 days ☐
d) 3 days ☐
e) 4 days ☐
f) 5 days ☐
g) 6 days ☐
h) 7 days ☐

59. During the past 7 days, on how many days did you do stretching or strengthening exercises, such as toe touches, knee bends, push-ups or sit-ups?

a) 0 days ☐
b) 1 day ☐
c) 2 days ☐
d) 3 days ☐
e) 4 days ☐
f) 5 days ☐
g) 6 days ☐
h) 7 days ☐

60. During this school year, were you taught in any of your classes the benefits of healthy eating?

a) Yes ☐

b) No ☐

c) I do not know ☐

61. During this school year, were you taught in any of your classes the benefits of eating more fruits and vegetables?

a) Yes ☐

b) No ☐

c) I do not know ☐