EVALUATION OF NUTRITION PECULIARITIES IN ASSOCIATION WITH NUTRITION AND HEALTH DISORDERS AMONG 5-8 GRADES SCHOOLCHILDREN IN GUJARAT, INDIA

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1. SUMMARY

Researcher: Parth Ramesh Bhai Desai

Title: Nutrition peculiarities in association with nutrition and health disorders among 5-8 grades schoolchildren in Gujarat, India.

This study aims is evaluation of nutrition peculiarities in association with nutrition and health disorders among 5-8 grades schoolchildren in Gujarat, India.

To assess the nutritional peculiarities according to food habit in 5-8 grades school children and to detect as association between genders, age, grade. This study is a self-composed survey based in which the participants are randomly selected. In total 273 students participated. the response rate of this study is 91%. This research contains 54 pages.

This study included participants and was provided with an original questionnaire. The data input was analyzed when our survey was completed. Further research, calculation and other methodologies were performed once input data were carried out; frequencies and comparisons between different variables were calculated and demonstrated in line with the targets and the research objectives must be achieved by means of study. Different chemicals have caused different health problems. Age also sometimes constitutes a major factor in high health risks.

91% of respondents was reported vegetarian food consumer among whole population. There was positive finding with nutrition habits. Gender comparison was also with positive finding towards our goal of study. There will be a high chance of nutrition peculiarities among this population.

Major focus of study was to assess nutrition habit among selected population to get results of peculiarities of nutrition. Underweight, normal weight an overweight category was divided to find out risk of irregular nutrition on health of respondents. The overall results were based on the researcher's expectations and showed a positive approach to science.
2. ACKNOWLEDGEMENT

This book is based on research conducted in India on school children. I am grateful for a number of friends and colleagues in encouraging me to start the work, persevere with it and finally to publish it. I consider myself as a very lucky individual as I had a chance for learning and professional development.

Bearing in mind I am using this opportunity to express my deepest gratitude and special thanks to the my supervisor, Prof. Ricardas Radisauskas who in spite of being extraordinarily busy with his duties took time out to hear, guide and keep me on the correct path and allowing me to carry out my project.

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In addition, a thank you to the principle of Shreesahjanand high school for allowing me to collect data from their school.

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I also thankful to my friend who helped me a lot in the completion of this project.
3. CONFLICT OF INTEREST

The researcher reports no conflict of interest.
4. ABBREVIATIONS AND TERMS

RDA (Recommended Daily Allowance)
IDD (Iodine deficiency disorders)
FM (fat mass)
BMC (bone mineral content)
MM (muscle mass)
MUAC (mid-upper arm circumference)
FFM (fat free mass)
CVDs (cardiovascular diseases)
CDC (Centers for Disease Control and Prevention)
NCDs (non-communicable diseases)
BMI Body Mass Index
NCHS (National Health and Statistics Center)
5. INTRODUCTION

India is in the phase of socio demographic and health transition. Optimal nutrition and good health are important for overall human development. Most of the developing countries, nutrition initial step has been focussing on children and women. Nutrition deficiency has been increasing among adolescents. Adolescents who are living in rural area are more likely to suffer from malnutrition compare to urban adolescents. The school going age is the active period of physical growth and development for the children. Now days malnutrition is big problem in India and poses some serious threat in some part of India poor nutrition the main reason is educational difference between rural and urban adolescents. There were many studies conducted which shown that malnutrition affects full growth on growing adolescents.

In present study, many risk factors have taken into consideration for malnutrition for instance gender, age, fast food, snacks and sugar consumption. Due to these risk factors, many diseases can occur among adolescents. Obesity and Anemia is the main illness can be developed from risk factors (1).

There is difference in nutritional status of people living in urban area and rural area urban population is most abandoned people in the community (1) and in this study peeps in to nutrition peculiarities among school going children living in urban area of Gujrat India.

The school going age is the active period of physical growth and development for the children. Now days malnutrition is big problem in India and poses some serious threat in some part of India poor nutrition contributed to the 5.6 million child death per year and half of the total death takes places only in India (UNICEF 2006). The percentage of the underweight in India children 47% in 2007 (national health and family survey).

Undernutrition makes the child more prone to infection and respects its effect in contributing to child mortality (2). A growing body of evidence suggests that childhood malnutrition leads to adverse health effects during adulthood (3). The main nutrition problem in India among school going children are protein energy malnutrition (PEM), vitamin A deficiency (VAD), iron deficiency anemia (IDA), iodine deficiency anemia (IDD), and the factor that affect the nutrition among the school children (4).

Are house hold income, limited resources, as well as local availability of health care services.

Gujarat is one of the economically progressive states in India in terms of industrial growth and infrastructure development; still the prevalence of undernutrition continues to be high in the state (5). There is also wide disparity in the prevalence of undernutrition among the state of India ranging from high Madhya Pradesh 55 % respectively low in Tamilnadu 25%.

Malnutrition is one of the largest public health problems in developing countries. India contributes the one third of total malnutrition children in the world, with prevalence as high as 29.4%
chronic malnutrition experienced during early life inhibits growth, retards mental development reduce motivation and energy level, causing reduction in educational attainments. In India, government has taken steps to combat malnutrition among school children, by providing them one nutritious meal at school called mid-day meal. But mid-day meal is provided only in the government school but not in private schools.

Malnutrition and under nutrition are often used interchangeably. As “malnutrition” includes both over nutrition and under nutrition, “under nutrition” will be used in this thesis.

Micronutrient deficiency is a serious public health problem in most developing countries. In India, iron deficiency, vitamin A deficiency, and iodine deficiency related disorders constitute topics of urgent interest for public health.
6. AIM AND OBJECTIVES

Aim:
The evaluation of nutrition peculiarities in association with nutrition and health disorders among 5-8 grades schoolchildren in Gujarat, India.

Objectives:
1) To determinate the nutrition peculiarities among 5-8 grades school children by sex, age and school grade.
2) To assess the food habits in students dependently from nutritional health by sex, age and school grade.
3) To evaluate associations between the nutrition peculiarities, food habits and nutritional health status of schoolchildren.
7. Literature review

7.1 Evaluation of nutrition disorders causes among schoolchildren’s

The study was conducted to recruit children from school. A total of 50 school-going kids were randomly selected from a primary school in Trichy district, Tamil Nadu, between the age group of 8–11 years. To evaluate the children's nutritional status, physical measurements such as body weight, height, mid-upper arm circumference (MUAC) and children's head circumferences were measured. Study found that 90% of students were normal, 10% of students were mild based on nutritional status of height for age (stunted). Just as the weight-for-height nutritional status (wasted) found that 50% of students were normal, 36% were mild, and 14% were moderate (6).

A cross-sectional community-based study was conducted in rural Madhya Pradesh. A total of 8777 pre-school children have been clinically examined for VAD and blood vitamin A levels have been estimated by dried blood spot method in a sub-sample. The prevalence of night blindness and the spot of Bitot, an objective sign of VAD, was 0.8% and 1.4% respectively, and the prevalence increased significantly with age (p<0.001). The proportion of children with vitamin A deficiency in the blood (<20 μg/dL) was 88%. The prevalence of Bitot's spot was significantly higher (p<0.001) among children in lower socio-economic communities, 3-5 years of age group and those of mothers with illiteracy. VAD is a major public health issue among Madhya Pradesh rural children. Children aged 3-5 and those belonging to lower socio-economic communities are at high VAD risk (7).

In a cross-sectional study, from 10 talukas, 15,900 school-going children were studied in the 6-12-year age group. Cluster sampling method selected a total of 15 clusters. In children, Goitre was evaluated and samples of urine and salt were studied for concentration of iodine. The overall prevalence of goitre among the studied children was 20.5%. The median concentration of iodine was 70 mg/l, indicating a mild iodine deficiency; iodine insufficiency was also found in 61% of the urine samples examined. In 54.3% of the salt sample, Iodine content was found to be adequate (8).

A cross sectional descriptive study was done in various government primary schools of district Faridkot, Punjab, India. The study was conducted on 849 children. Overall incidence of vitamin deficiency features was 18.96%. The features of vitamin A, B complex, C, and D deficiency were seen in 7.18%, 18.02%, 3.06% and 8.48% respectively. Some children have more than one deficiency features (9).

The study was conducted during the period from September 2014 to July 2015 in, GMERS Medical College, Dharpur-Patan. In this study, 9 schools and consent of adolescent parents were
examined for signs of various nutritional deficiencies by 842 adolescents from 10 schools in Ahmedabad City. 409 (48.6%) were female out of a total of 842 adolescents. The study adolescents' median age was 15.8±1.96 years. Maximum adolescent numbers were in the 10-14-year age group (60.5%). The mean age was 15.3±1.89 years for female and male adolescents and 15.9±2.02 years respectively. The study found that 7.0% children had a vitamin A deficiency. Complex signs of vitamin B deficiency were seen in 23.2% children. In 10.5% children, signs of vitamin C deficiency were observed. In 13.2% children, PEM was observed. In 121 (14.4%) children, essential fatty acid deficiency was observed.

Deficiencies in nutrients are prevalent throughout the world. Because of nutritional deficiencies, diseases and morbid conditions have been described. Nutrient deficiencies need to be addressed because they can lead to chronic long-term health problems such as rickets, iron deficiency anemia, goiter, obesity, heart disease, type 2 diabetes, stroke, cancer, and osteoporosis. In this review, we surveyed the extent and severity of nutritional deficiencies in Israel through a selective and comprehensive review of past reports and studies over the past 40 years. Israel's population has multiple nutritional deficiencies, including iron, calcium, zinc, folic acid, and B12, C, D, and E vitamins, covering all age groups, several minorities, and specific regions. Some of the nutrients in Israel are mandatory and many of them are voluntarily implemented by local industries. We propose ways of preventing and treating nutritional deficiencies as a step towards promoting food fortification in Israel.

Above all research papers suggested that different nutrition habits can affect health status of school children. Vitamins deficiency, mineral deficiency and other growth related problems can occur by inadequate nutrition habits.

7.2 Food habit evaluation among adolescents in the world

Unhealthy eating and lack of exercise during adolescence culminated into earlier onset and increasing burden of atherosclerotic cardiovascular diseases (CVDs) worldwide. Among urban Indian adolescents, prevalence of these risk factors of CVD seemed to be high, but data regarding their pattern and predictors was limited. To address this dearth of information, a survey was conducted among urban adolescent school-students in Kolkata, a highly populated metro city in eastern India.

The study assessed the food habits, food preferences, and dietary pattern of school going urban adolescents in Baroda, India. Both quantitative and qualitative methods were used in this study.
A quantitative survey was carried out using a pre-tested self-administered structured questionnaire among 1,440 students from class 6 to 12 in 7 English medium and 23 Gujarati medium schools. Focus group discussions, 5 each with adolescent boys and girls, were held, along with 5 focus group discussions with teachers of Gujarati and English medium schools. Nearly 80% of adolescents had consumed regular food, like dal, rice, chapati, and vegetables, including green leafy vegetables. Nearly 50% of them had consumed chocolates, and about one-third consumed fast foods. Nearly 60% of adolescents had their breakfast daily while the remaining missed taking breakfast daily. Nearly one-third of adolescents were missing a meal once or twice a week. A large majority had consumed regular foods. However, more than half of them had consumed chocolates, soft drinks, and over one-third had taken fast foods (13).

A total of 45 studies reported in 43 articles were included in the review. Most studies considered the acute effect of a single breakfast 34. The acute studies looked at breakfast compared with no breakfast 24 and/or comparisons of breakfast type 15. The effects of chronic school breakfast program interventions were evaluated in 11 studies. The findings suggest that breakfast consumption relative to fasting has a short-term (same morning) positive domain-specific effect on cognition. Tasks requiring attention, executive function, and memory were facilitated more reliably by breakfast consumption relative to fasting, with effects more apparent in undernourished children. Firm conclusions cannot be made about the acute effects of breakfast composition and the effects of chronic breakfast interventions because there are too few studies and these largely report inconsistent findings. This review also highlights methodologic limitations of the existing research. These include a lack of research on adolescents, few naturalistic breakfast manipulations or testing environments, small samples, and insensitive cognitive tests (14).

In developed countries, regular breakfast consumption is inversely associated with excess weight and directly associated with better dietary and improved physical activity behaviors. Cross-sectional study. Setting: Eight schools (Private and Government) of Delhi in the year 2006. Participants: 1814 students from 8th and 10th grades; response rate was 87.2%; 55% were 8th graders, 60% were boys and 52% attended Private schools. Main outcome measures: Body mass index, self-reported breakfast consumption, diet and physical activity related behaviors, and psychosocial factors. Data analysis: Mixed effects regression models were employed, adjusting for age, gender, grade level and school type (SES). Significantly more Government school (lower SES) students consumed breakfast daily as compared to Private school students. More 8th graders consumed breakfast daily vs. 10th graders. A dose–response relationship was observed such that overall prevalence of overweight and obesity among adolescents who consumed breakfast daily (14.6%) was significantly
lower vs. those who only sometimes (15.2%) or never (22.9%) consumed breakfast. This relationship was statistically significant for boys but not for girls. Intake of dairy products, fruits and vegetables was 5.5, 1.7 and 2.2 times higher among those who consumed breakfast daily vs. those who never consumed breakfast (15).

Childhood obesity is a known precursor to obesity and other non-communicable diseases (NCDs) in adulthood. However, the magnitude of the problem among children and adolescents in India is unclear due to paucity of well-conducted nationwide studies and lack of uniformity in the cut-points used to define childhood overweight and obesity. Hence an attempt was made to review the data on trends in childhood overweight and obesity reported from India during 1981 to 2013. Literature search was done in various scientific public domains from the last three decades using key words such as childhood and adolescent obesity, overweight, prevalence, trends, etc. Additional studies were also identified through cross-references and websites of official agencies. Prevalence data from 52 studies conducted in 16 of the 28 States in India were included in analysis. The median value for the combined prevalence of childhood and adolescent obesity showed that it was higher in north, compared to south India (16).

The understanding of obesity as a growing health problem in Africa and Tanzania. This study sought to determine the prevalence of overweight and obesity among primary school children aged 8–13 years in Dar es Salaam, Tanzania. A cross-sectional analytical research design was used to study overweight and obesity in primary schools in Dar es Salaam, Tanzania. The target population was 150,000 children aged 8–13 years. Stratified random sampling was used to select 1781 children. Weight and height were taken and WHO standards for children were used to determine weight status. Findings showed that the prevalence of overweight and obesity was 15.9% and 6.7%, respectively (N=1781). However, 6.2% of the children were underweight. There were significant differences in mean BMI between children in private and public schools (p=0.021), between male and female (p<0.001), and across age groups of 8–10 and 11–13 years (p<0.001). Conclusion. The prevalence of overweight and obesity among primary school children is significant and requires management and prevention strategies (17).

Malnutrition among under-five children is an important concern for the health authorities in India. The aim of the present review was to assess the burden of under-nutrition and over-nutrition, its determinants and strategies required to tackle malnutrition among under-five children in India. Existing evidence shows that the prevalence of under-nutrition among under-five children was high and varied widely (under-weight: 75%, stunting: 74%, wasting: 42.3%) depending on the assessment methodology adopted. Studies on assessment of over-nutrition status among under-five children were limited. Distribution of various types of risk factors and its influence on nutrition status of children
in a given set up should be analyzed for planning the control measures. Strengthening public health interventions for mild malnutrition cases and vulnerable groups, effective implementation and evaluation of the strategies at regional level, research on overweight, obesity and its etiological factors and steps for improving socioeconomic development are the prerequisites for tackling malnutrition among under-five children in India (18).

The nutrition transition has brought about rapid changes in the structure of the Indian diet. The replacement of traditional home-cooked meals with ready-to-eat, processed foods has contributed to an increased risk of chronic diseases in urban Indians. Improving the nutrition of Indians by promoting healthy food consumption in early life and in adolescence would help to reduce these health risks. However, little is known about the quality and quantity of foods and beverages consumed by urban Indian adolescents. Therefore, the aim of this study was to describe the food consumption patterns in a sample of urban Indian adolescents (19).

This study examined the influence of nutrient intake status, dietary habit, and academic stress on their academic achievement of primary school children. Two hundred and twenty-four graders were surveyed at Bucheon-si, Gyeonggido. The study included 24-hour recall, anthropometric measurement, evaluation of stress levels, and academic performance. In the index of height, weight, the subjects were normal, but in girls there was a higher percentage of underweight and in boys vice versa. The overall intake of nutrients and dietary habits was fairly good, but Ca and folate intake was less than 75% of KDRIs, and dietary habits of boys were lower. Not all subjects had a high level of academic stress. The higher the amount of nutrient intake, the higher the academic performance and the relationship with the intake of nutrients. The intakes of energy, protein, phosphorus, potassium, zinc, polyunsaturated fatty acids and n-6 fatty acids (p<0.05) were particularly relevant. The overall academic performance was higher for those who eat out less often. Children with higher dietary habits showed improved academic performance (p<0.05) (20).

A quantitative survey of 1,440 students from class 6 to 12 in 7 English medium and 23 Gujarati medium schools was conducted using a pre-tested self-administered structured questionnaire. Focus group discussions were held, five each with adolescent boys and girls, as well as five focus group discussions with Gujarati teachers and medium English schools. Nearly 80% of adolescents had eaten regular foods such as dal, rice, chapati, and vegetables, including green leafy vegetables. Nearly 50% had eaten chocolates, and about one-third had eaten fast foods. Nearly 60% of adolescents had breakfast every day while the rest missed breakfast every day. Once or twice a week, almost one-third of adolescents were missing a meal. Regular food was consumed by a large majority. More than
half of them, however, consumed chocolates, soft drinks, and more than one-third took fast foods (21).

A cross-sectional survey was used in the study of 281 children aged 6-10 from remote primary school in Purulia. Primary schools have been selected randomly. The variables studied included: age, pupil sex, socio-economic status of parents, and selected House Holds family size. Pupils and parents were interviewed using the prepared template of the Nordic questionnaire. Children's weight and height were measured. And the standard method used to calculate the Body Mass Index (BMI). This study results in a proportion of girls and boys being 55.8% and 44.2% respectively. Children of the lower socioeconomic class were poor in nutritional status compared to their counterparts from the upper socioeconomic class. Children with BMI 4 had family size compared to 16.4% in those with House Holds (22).

A cross-sectional study in which we investigated nutritional status in school-age slum children and analyzed malnutrition-related factors using a pre-designed and pre-tested questionnaire, anthropometric measurements and clinical examination in urban slums in Bareilly, Uttar-Pradesh (UP) India from December 2010 to April 2011. The mean boys and girls height and weight in the study group was lower in all age groups than the CDC 2000 standards. In terms of nutritional status, stunting and underweight prevalence was highest in age group 11 years to 13 years, whereas the prevalence of waste was highest in age group 5 years to 7 years. With the exception of refractive errors, all diseases are more common among girls, but only for anemia and rickets this gender difference is statistically significant. The risk of malnutrition among children living in joint families, children whose mother was the 6th standard and children with working mothers was significantly higher (23).

A cross-sectional study was conducted in Gujarat, Western India on apparently healthy adolescents (10-14 years, n=604) from different SES. The results included anthropometric measurements, body composition, and concentrations of serum 25 OHD and hemoglobin. Girls were found to be significantly taller and heavier than boys from this study and also had significantly increased fat mass (FM) and bone mineral content (BMC), whereas boys had significantly increased muscle mass (MM) and fat-free mass (FFM). 9% of boys and girls showed waste, while 9% of boys and 6% of girls were at risk of excess weight (p>0.05). Similarly, 10% of boys and 7% of girls were stunted and 31% of boys and 21% of girls were subnormal (p<0.05) in height. By contrast, 63% of boys and 43% of girls were under-fat, 8% of boys and 6% of girls were over-fat, 10% of boys and 5% of girls were over-fat (p<0.05). We found a high prevalence of hypovitaminosis D, 34% of boys
and 30% of girls had insufficient serum 25OHD concentration and 60% of boys and 69% of girls. One fifth of the study population had mild / moderate anemia (23).

A cross-sectional study of eighteen basic schools in the metropolitan area of Santiago in children 5th and 6th grade. In terms of physical capacity, boys and girls aged 9–12 years from basic schools were evaluated. There was also an anthropometric evaluation that included weight, height and triceps and thicknesses of the sub-scapular folding of the skin. Food intake was assessed through a 24-hour recall, socio-economic level through the ESOMAR method, and physical activity through a questionnaire. The average prevalence of overweight and obesity was 40%, with the highest prevalence in males and the lowest socio-economic prevalence. A majority of children (64%) had low physical activity levels. In the higher and lower socio-economic levels, respectively, a higher fat and protein intake and a higher carbohydrate intake were found. Both males and females showed adequacy in macronutrient intake above 75% except for fiber, with both groups showing a deficit in the consumption of fruits, vegetables, legumes, fish and milk products as recommended by Chile (24).

Between May 2014 and April 2015, a cross-sectional descriptive study was conducted on 839 subjects, of which 408 (48.63%) were boys and 431 (51.37%) were girls. Participants were selected from various villages in the West Bengal State, India districts of Howrah, Birbhum, and East and West Midnapore. The study result is the current investigation, approximately 54% of adolescents have been stunted and 49% have been thin. The adolescents belonging to the lower class of society were much more likely to be stunted and thin. Other variables such as the occupation of father, education of mother, economic status and sanitation showed significant and negative association with under-nutrition. However, there was a significant and positive association with under-nutrition in the working status of the mother. Adolescents of working mothers were more likely than those who did not work outside the home to be stunted and thin. Higher educated women's adolescents were less likely to be undernourished than poor and uneducated women's adolescents (25).

A cross-sectional descriptive study was conducted among primary school children of Greater Visakhapatnam Municipal Corporation Andhra Pradesh during the months of Dec’2013 and Jan’2014. A total of 120 children were studied. A pre tested semi structured questionnaire was used for collecting the data. Outcome of this study is total of 120 children were studied. The age of the children ranged from 5 years to 12 years. 87% of the children were 10 years and below and the mean age of the study population was found to be 7.9 years. 59% of the children were boys. 52% of the children were from upper lower class and 47% were from lower middle class. Majority of the study population were Hindus (78%). The prevalence of under nutrition was found to be 60%, of which
36.8% were moderate to severely undernourished. Most of the children belong to lower middle (46.7%) and upper lower (51.6%) income groups. About 60% of the parents of the children were illiterates. Vitamin A deficiency (bitot’s spots) was seen in 19.49% of children. Nutritional anemia (palmar pallor) was found in 17.4% (26).

In 200 primary school children aged 5–9 years of both sexes, a cross-sectional observational study was conducted. The kids were grouped into five grades of nutrition. Measurement of basic demographic measurements such as height and weight. The study was carried out for a period of six months at the Government Medical College, Aurangabad, Maharashtra, India. Home visits collected the parents' information about their job, education, accommodation, family members, and residential location. According to Kumar, the children's socioeconomic classification was made into five classes. Information on the diet of the child was gathered by a one-day recall method. Children were divided into five grades of nutrition: normal nutrition and I–IV grades depending on the child's weight for their age. As the degree of malnutrition progressed, this study showed a progressive reduction in IQ development. Only 26 of the 200 students studied with normal nutritional status were found. Ninety children in grade 1, 46 in grade II, 30 in grade III and 8 in grade IV were found. A decrease in IQ from 114.94±4.10 to 110.75±3.33 was noted in normal nutrition to grade II nutritional status as far as superior IQ is concerned. It is evident that nutritional grades III and IV did not notice a single case (27).

A cross-sectional data was collected from 2545 girls aged 10 to 14 years attending Govt based on anthropometric measurements (height, weight). Schools approved in Kharagpur City and Block Dantan-II. Using some anthropometric indices, the nutritional status was evaluated. For each girl, weight and height were recorded and converted to nutritional indices (weight-for-age, height-for-height, National Center for Health Statistics reference standards BMI-for-age Z-scores). Mean nutritional indices (underweight, stunting, and thinness) were found to be much lower among rural girls than urban girls. The prevalent overall underweight, stunting and thinness rates were 27.9%, 32.5% and 20.2% respectively. In rural areas they were 35.4%, 35.7% and 26.3% respectively, whereas in urban areas they were 19.6%, 29.0% and 13.6% respectively. The present study shows that in rural areas of India, early adolescent school girls posed major health problems under nutrition. Therefore, special emphasis is needed to formulate various programs for rural communities in development and health care to prevent under nutrition (28).

A study is conducted to assess the nutritional status of rural and urban school children in the Bankura district of West Bengal (16-18 years of age). A total of 80 school children [rural school children and urban school children belonging to the 16-to 18-year-old age group and were studied
from September 2015 to February 2016. For Group 1, significantly higher were found the important clinical signs such as pallor, hair changes, eye changes, teeth changes, skeletal changes, goiter, skin changes and bones, etc. In Group 2 school children, the mean height, weight and body mass index were significantly higher than in Group 1. According to their BMI, WC and WHR, the prevalence of underweight in Group 1 school children was significantly higher than in Group 2. The overall underweight prevalence was 65%. The present study highlights that rural school goes to Bankura district children belonging to the lower socioeconomic classes and suffer from different degrees of malnutrition compared to their counterparts. In the present study, these high levels of malnutrition highlight the great need for nutritional intervention (29).

This study analyzes the nutritional status of adolescents in Haryana District, India's urban and rural schools. Sampling was performed using stratified random sampling technique. The study population was divided into two rural and urban strata and two sub-strata based on the type of school in each stratum, i.e. government or private. With 500 subjects per substratum, the sample size selected for the study was 2000. The standard procedure took height and weight. Stunting (height for age) and thinness (BMI for age) were calculated in accordance with the standards of the National Health and Statistics Center (NCHS). For boys and girls, the data were analyzed separately and significant tests were applied wherever applicable. It was found that the mean adolescent weight and BMI in the 13–14 age group was higher in rural areas (38.83 kg and 16.97) than in urban areas (38.59 kg and 16.95). Mean height, however, was similar in both urban and rural areas for this age group (30).

Looking at another cross-sectional study conducted in Hyderabad's urban slum in primary school, the sample size was 412 school children. Simple random sampling was used in the study, the data is collected using pre-designed and pre-tested and pre-coded schedule (interview technique, observation, clinical examination) (31).

A cross-sectional study was conducted in a private sector primary school in Faisalabad's middle-class area. A Total of 432 children between the ages of 4-12 years were studied. A systematic random sampling technique was applied for sample collection and standardized technique recommended by Jolliffe was used for assessing nutritional status. In the Prenursery group more girls were stunted than boys, the ratio being 70%:30%, on the contrary underweight was more in boys than in girls, with the ratio of 57%:43%. In the Primary section both stunting and underweight were more in boys as compared to the girls. The ratios were 54.8%:45.2% and 82.9%:17% respectively (32).

A cross-sectional design of the study has been adopted. Using multi-stage stratified random sampling method, one private and one government school were selected. For height and weight, a
total of 1566 school children aged 6-12 years were measured. Data were collected on demographic details, dietary habits, and child and education status physical activity, occupation, their parents’ monthly income. Study results were 1566 children, underweight 385 (24.5%), overweight 132 (8.4%) and obese 65 (4.1%). In government school, a majority of underweight children 226 (32.5%) were found. All overweight and obese children were found in private schools, with the exception of two overweight children in government schools. The determinants of their nutritional status were found to be the child's socioeconomic status, dietary habits, and physical activity (33).

From July 2014 to December 2014, a descriptive cross-sectional study was conducted among 720 school children aged 6 to 14 from urban and rural areas in Rajasthan district of Bikaner with the aim of assessing prevalence and types of malnutrition. The method used for sampling was stratified random sampling. The study tool used was a questionnaire that had been pre-tested. SPSS17.0 was used to perform data analysis. This study results in the prevalence of underweight and overweight (based on age weight) being 19.72% and 0.70% respectively. It was found that 9.86% of the study population was stunted. In 22.22% and 1.95% children, thinness and obesity (based on BMI-forage) were observed. It was therefore found that the overall prevalence of malnutrition was 24.17% (34).

Food consumption, food selection, food habits, healthy food and food patterns among adolescents were suggested in above researches. Effect of breakfast skipping, more consumption of fast food can lead to several health impacts such as underweight, malnutrition, overweight, obesity and so on.

7.3 Evaluation associations between the nutrition peculiarities, food habits and body weight disorders among schoolchildren

This study aims to assess the prevalence and associated factors of fruit and vegetable intake among school teenagers in Southeast Asia. Data was collected from nationally representative (total 16,084) samples of school children aged between 13 and 15 years in five countries in South-East Asia by self-report questionnaire. Overall, 76.3% of the 13 to 15-year-olds had inadequate fruits and vegetables consumptions 28% reported consuming fruits less than once per day and 13.8% indicated consuming vegetables less than once per day. The lack of protection and physically inactivity were related to inadequate fruit and vegetable consumption in a multivariable analysis, sedentary behavior and overweight were protective of the inadequate consumption of fruits and vegetables. The results highlight the need for intervention programmers, aimed at enhanced fruit and vegetable consumption with the objective of integrating other risk factors such as physical activity with adolescent health promotion in close proxy factors such as family environment and distal factors (35).
In comparison with other developing countries, Pakistan has one of the highest prevalence of malnutrition among children. This narrative review was carried out to examine the empirical literature on the status of children in Pakistan. The objective of this review was to understand the methodological approaches employed in previous studies, to evaluate the overall childhood malnutrition situation and to identify areas not yet studied. This study was carried out for collection and synthesis by different science database search engines of the relevant data from previously published documents. This study included the most relevant and current publications from 2000–2016. Studies containing data concerning child malnutrition in Pakistan have been evaluated. A total of 28 articles have been reviewed and nearly similar methods have all been used. Most researchers performed quantitative and descriptive cross-sectional studies in order to identify the causes of child malnutrition through structured interviews. Only one study employed the mixing method for the collection of data from participants. 20 of 28 papers used a weight for age, age for height, and height for a weight of the Z-score method in order to assess malnutrition among children. The themes that emerged again and again in the reviewed literature have been early marriages, large family sizes, high fertility rates with low birth distance, poor income, lack of breast feeding and exclusive nursing. Qualitative and mixed methodology studies are needed to gain insight into the factors behind child malnutrition in Pakistan (36).

The study took place from June 2012 to May 2013 and included 1768 children in different areas of the city of Dhaka (980 children; 788 girls) from eight specifically selected schools. Use internationally accepted BMI cut-off points to define undernutrition, overweight and obesity. In boys, mean height, weight, BMI, MUAC, waist and hip circumference values were higher than in girls except at 12 years when they were found to be significantly higher among girls than among boys (p<0.05). The average overweight prevalence of children was 10.0% (children 10.2%; girls 9.8%). Obesity was 5.0% (children 4.3%; girls 5.8%). The low weight prevalence was 16.3% for boys and 12.7% for girls. The prevalence of underweight was significantly higher in poor than in rich children (22.1% vs 11.2%) and that of obesity was higher in rich than in poor children (9.9% vs 1.3%; p<0.001). An important predictor of overweight and obesity (p<0.001) developed was a family history of obesity and hypertension. The evidence shows that in urban areas of Bangladesh there is also underweight and Obesity which poses a challenge to Bangladeshi children's nutritional health (37).

Obesity in children is an emerging global challenge to public health. There is no evidence of the nutritional transition in the developing Indo-Asian countries. These analyses have been conducted to determine the nutritional trends in urban Pakistan for children of school age. Data on the nutritional
status of children aged 5 to 14 years from two independent population-based representative surveys, the urban component of the National Health Survey of Pakistan (NHSP; 1990–1994) and the Karachi survey (2004–2005), were analyzed. In both surveys, children were compared by the use of standardized data from normative data from children in the United States, trends for underweight age and sex (95% CI) (more than 2 SD below the reference weight for age), sunset (more than 2 SD below the height-for-age reference) and overweight, and obese (BMI) (85th percent of or more body mass index). A logistic regression analysis was used to analyze the association between physical activity and being overweight or obese in the Karachi survey. The city NHSP included 2074 children and the Karachi survey included 1675 children. The prevalence of underweight children was 29.7% versus 27.3% (p=0.12), stunting was 16.7% versus 14.3% (p=0.05), and prevalence of overweight and obese children was 3.0 versus 5.7 (p<0.001) in the NHSP and Karachi surveys, respectively. Inverse correlations were between physical activity and being obese or overweight (38).

They conducted these analyses to determine the trends in nutritional status of school-aged children. Above researches shows that consumption of unhealthy and food low nutrition leads to underweight and overweight in child age among population.
8. RESEARCH METHODOLOGY

This study design as a self-composed, cross-sectional survey-based research. This study approved by the Department of Environment and Occupational Medicine and LSMU Bioethics center (No. BEC-VS(M)-81, DATE: 06-03-2019).

8.1 Sampling

The research conducted among a school in India, in a multilevel sampling, grade, age, socioeconomic status. To achieve significant statistics in my survey the sample size is (n=273). The participants are students that randomly selected from 5 to 8 grades. The student population includes 190 male (69.6%) and 83 female (30.4%) and ages of participants are between 10 to 16 with mean age of (13). This study includes 32 students from 5 grade (11.7%), 33 students from 6 grade (12.1%), 38 students from 7 class (14.3%), 169 students from 8 grade (61.9%).

8.2 Data collection

The questionnaire was distributed by the researcher in school. The students had the option to refuse participation in the survey. The researcher did not attempt to persuade any potential respondent to participate.

8.3 Questionnaire

A self-reported questionnaire was used in this study. The questionnaire consisted of 4 parts; the first parts sociodemographic (age, gender, school grades ) and the 2 part is consisted of question about how often students have eaten breakfast, 3 part is about a typical or usual week like how many times students eating fresh fruit or vegetables or meat or cheese or soft drink. To identify the eating the following response option were provided never in a day, somedays (1 to 3 days most days (4 to 5 days) expect when assessing with age the age scale was divided in 3 groups once to three groups 10 to 11, 12 to 14, and 15 to 16 and for school grade divided in two group (5-6 grade) in 1 group and (7-8 grade) in 2 group. According to WHO criteria of body mass index we divided three group for

- To better analyses the result regarding how many times students are having breakfast. than the whole scale was divided (0 times per week) never, (1 to 3 days) someday, (4 to 5 days) expect
weight as follows: underweight: <18.5, normal weight: 18.5 to 24.9, overweight: 25.0 to 29.9. Body mass disorders were calculated by provided standard formula of body weight and height to assigned respondents to underweight, normal weight and overweight groups. To enhance knowledge of school children about body mass index we gave task to calculate their body mass index by their own then select their category in given questionnaire.

8.4 Statistical analysis

Statistical analysis of the data performed using SPSS 20.0 package for windows. The data analyzed by assessing the frequencies of general socio demographic information, and the other nutrition peculiarities by gender, age and school grades.

For cross tab analysis used Pearson 2-sided chi square, degree of freedom and p value and for two proportion calculation used z test with p value.

The method of step by step logistic regression analysis was used to evaluate it, including into the model dependent variable as healthy and unhealthy nutrition peculiarities and independent variables as gender, schoolchildren age, school-grade level, some nutrition peculiarities provided with odds ratio (OR) calculation with 95% confidence interval (CI).

Significance level provided as p<0.05.
9. Results

9.1 Characteristics of the participants

Baseline characteristics of respondents are presented in Table 1. In this study more than 2/3 of respondents (69.3%) was males, more than half (59.3%) was in 10-13 age groups and 76.2% of respondents studied in grades 7-8.

Table 1. Baseline characteristics of study participants

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>190 (69.5)</td>
</tr>
<tr>
<td>Females</td>
<td>83 (30.5)</td>
</tr>
<tr>
<td>Age groups (years)</td>
<td></td>
</tr>
<tr>
<td>10-13</td>
<td>162 (59.3)</td>
</tr>
<tr>
<td>14-16</td>
<td>111 (40.7)</td>
</tr>
<tr>
<td>School grades</td>
<td></td>
</tr>
<tr>
<td>5-6</td>
<td>65 (23.8)</td>
</tr>
<tr>
<td>7-8</td>
<td>208 (76.2)</td>
</tr>
</tbody>
</table>

9.2 To determinate the nutrition peculiarities among 5-8 grades school children by sex and age

9.2.1 Nutrition peculiarities among respondents

As seen in table the consumption of meat is low only 1.5% of the students were reported for the eating every day. 90% of the students reported for never consuming meat and same findings shows for the fish consumption is only 1.1 % students reported for eating fish every day. That prove that most of the students are vegetarian. Among all eating habits the vegetable consumption is higher than other food approximately 75% students were reported for eating vegetables every day. 13.2% reported for never consumed milk, 41% students were reported for the consuming soft drink most of days in week only 10% of the students were reported for the fresh fruit every day.
<table>
<thead>
<tr>
<th>Food items or food groups</th>
<th>Never Consumed per week N (%)</th>
<th>&lt; once a week (1to3) Days N (%)</th>
<th>Someday in week (4to5) days N (%)</th>
<th>Most days In week (5to6) N (%)</th>
<th>Every day in week (7 days) N (%)</th>
<th>Total N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat</td>
<td>246 (90.1%)</td>
<td>12 (4.4%)</td>
<td>7 (2.6%)</td>
<td>4 (1.5%)</td>
<td>4 (1.5%)</td>
<td>273 (100%)</td>
</tr>
<tr>
<td>Fish</td>
<td>249 (91.2%)</td>
<td>5 (1.8%)</td>
<td>9 (3.3%)</td>
<td>7 (2.6%)</td>
<td>3 (1.1%)</td>
<td>273 (100%)</td>
</tr>
<tr>
<td>Fresh fruit</td>
<td>39 (14.3%)</td>
<td>24 (8.7%)</td>
<td>80 (29.3%)</td>
<td>89 (32.6%)</td>
<td>28 (10.3%)</td>
<td>273 (100%)</td>
</tr>
<tr>
<td>Fresh vegetables</td>
<td>2 (7.0%)</td>
<td>15 (5.5%)</td>
<td>33 (12.1%)</td>
<td>20 (7.3%)</td>
<td>203 (74.4%)</td>
<td>273 (100%)</td>
</tr>
<tr>
<td>Fresh juices</td>
<td>22 (8.1%)</td>
<td>79 (28.9%)</td>
<td>119 (43.6%)</td>
<td>38 (13.9%)</td>
<td>15 (5.5%)</td>
<td>273 (100%)</td>
</tr>
<tr>
<td>Soft drinks or sugar drinks</td>
<td>19 (7.0%)</td>
<td>61 (22.3%)</td>
<td>74 (27.1%)</td>
<td>114 (41.8%)</td>
<td>5 (1.8%)</td>
<td>273 (100%)</td>
</tr>
<tr>
<td>Corn flakes</td>
<td>88 (32.2%)</td>
<td>85 (31.1%)</td>
<td>48 (17.6%)</td>
<td>22 (8.1%)</td>
<td>30 (11.0%)</td>
<td>273 (100%)</td>
</tr>
<tr>
<td>Porridge</td>
<td>160 (58.6%)</td>
<td>18 (6.6%)</td>
<td>19 (7.0%)</td>
<td>68 (24.9%)</td>
<td>8 (2.9%)</td>
<td>273 (100%)</td>
</tr>
<tr>
<td>Milk</td>
<td>36 (13.2%)</td>
<td>48 (17.6%)</td>
<td>43 (15.8%)</td>
<td>117 (42.9%)</td>
<td>29 (10.6%)</td>
<td>273 (100%)</td>
</tr>
<tr>
<td>Cheese</td>
<td>87 (31.9%)</td>
<td>63 (23.1%)</td>
<td>72 (26.4%)</td>
<td>25 (9.2)</td>
<td>26 (9.5%)</td>
<td>273 (100%)</td>
</tr>
<tr>
<td>yogurt or other dairy product</td>
<td>19 (7.0%)</td>
<td>62 (22.7%)</td>
<td>45 (16.5%)</td>
<td>117 (42.9%)</td>
<td>30 (11%)</td>
<td>273 (100%)</td>
</tr>
<tr>
<td>Biscuits, pie, chips, cake</td>
<td>13 (4.8%)</td>
<td>63 (23.1%)</td>
<td>54 (19.8%)</td>
<td>95 (34.8%)</td>
<td>48 (17.6%)</td>
<td>273 (100%)</td>
</tr>
</tbody>
</table>
Table 3. Meat consumption frequency among responders by sex

<table>
<thead>
<tr>
<th>Meat consumption characteristics</th>
<th>Sex</th>
<th></th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Never</td>
<td>167</td>
<td>87.9</td>
<td>79</td>
<td>95.2</td>
<td>246</td>
</tr>
<tr>
<td>Someday</td>
<td>17</td>
<td>8.9</td>
<td>2</td>
<td>2.4</td>
<td>19</td>
</tr>
<tr>
<td>Everyday</td>
<td>6</td>
<td>3.2</td>
<td>2</td>
<td>2.4</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>190</td>
<td>100</td>
<td>83</td>
<td>100</td>
<td>273</td>
</tr>
</tbody>
</table>

\( \chi^2=3.998, \text{ df}=2, p=0.135 \)

Meat consumption frequency among responders by sex are presented in Table 3. There was no statistical significance by gender for meat consumption.

\[ \chi^2=15.190, \text{ df}=2, p=0.001 \]

**Figure 1.** Meat consumption among respondents by age

When we analyze the meat consumption by age group in younger age group 84.6% reported for never eating fish and in older age group 98.0% reported for never eating meat. in younger age group 3.7% reported for eating meat every day and 1.8% reported for eating meat every day.

Fish consumption frequency among responders by sex are presented in Table 4. Evaluated fish consumption characteristics among respondents was detected, that 91.2% of schoolchildren never eating fish, 5.1% - eating fish in somedays and only 3.7% of respondents eating fish everyday. The study found significant correlations between fish consumption characteristics and sex. Boys who took
the fish daily were significantly more compared to females, respectively, 9.8% and 1.9%, respectively (p<0.05).

Table 4. Fish consumption frequency among responders by sex

<table>
<thead>
<tr>
<th>Fish consumption characteristics</th>
<th>Sex</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Never</td>
<td>169</td>
<td>88.9</td>
</tr>
<tr>
<td>Someday</td>
<td>11</td>
<td>5.8</td>
</tr>
<tr>
<td>Everyday</td>
<td>10</td>
<td>5.3</td>
</tr>
<tr>
<td>Total</td>
<td>190</td>
<td>100</td>
</tr>
</tbody>
</table>

\(\chi^2=5.252, \text{ df}=2, \text{ p}=0.072\)

Figure 1. Fish consumption among respondents in age group

In younger age group 87% reported for the never eating fish and in in older age group 97.3% reported for eating fish every day and 4.9% reported for the eating fish everyday in younger age group and 1.8% reported for the eating fish everyday in older age group.
(\chi^2=4.452, \text{df}=2, \text{p}=0.108 \text{ for vegetables and } \chi^2=13.029, \text{df}=2, \text{p}=0.001 \text{ for fruits})

**Figure 3.** Vegetable and fruit consumption among respondents by gender

To analyze the vegetable and fruit consumption in gender significantly shown that difference 78.4% male students were reported for the eating vegetable everyday female respondents were higher in consuming vegetables 89.2%. for the fruit consumption 50.0% male reported for eating fruit everyday compare to female respondent are consuming very less 26.5%.

(\chi^2=20.838, \text{df}=2, \text{p}=0.0001 \text{ for vegetables, } \chi^2=5.371, \text{df}=2, \text{p}=0.068 \text{ for fruits})

**Figure 4.** Vegetable and fruit eating among respondents by age group

Figure 4 shows that, the consumption of the vegetable 72.8% younger students reported for eating everyday and in older age group 94.6% students reported for eating vegetables every day. The consumption of vegetable and fruit by age group has not shown any statically significance.
Figure 5. Corn flakes and porridge eating among respondents by gender

The consumption of corn and porridge has shown significantly associated by age group 60.5% male reported for never eating corn in compare to 69.9% female never eating corn. In comparison to porridge 77.4% male reported for never eating porridge in week and 37.3% female reported for never eating.

Figure 6 Corn Flakes and Porridge eating by age ($\chi^2=7.856$, df=2, $p=0.020$, $\chi^2=7.750$, df=2, $p=0.021$)

The same food compassion with age group in younger age group 56.8% reported for never eating corn and 73% in older age group 73% reported for never eating corn. the consumption of porridge among
all age group is also very less in younger age group 66.7% reported for never eating porridge in week and in older age group 63% reported for never eating porridge.

**Figure 7** Milk and Cheese eating by gender ($\chi^2=6.660$, df=2, $p=0.036$, $\chi^2=12.722$, df=2, $p=0.002$)

Figure 7 shows that the consumption of milk and cheese in gender difference more female children reported for the drinking milk everyday 65.1% in compare to female 48.4% reported for drinking milk every day. In compare to milk the consumption of cheese is very less among male and female, 21. % male reported for eating cheese everyday and only 13% reported for eating cheese every day.

**Figure 8** Milk and Cheese eating by age ($\chi^2=16.404$, df=2, $p=0.0001$, $\chi^2=2.362$, df=2, $p=0.307$)
The consumption of milk in younger age group is higher than older age group 21% students were reported for consuming milk every day in compare to 8.1% students from older age group drinking milk every day. or cheese consumption by age group has not shown any significance.

\[ \chi^2 = 31.681, \text{ df}=2, \text{ p}=0.0001 \]

**Figure 9 Biscuits, cake, pie eating among respondents by gender**

The consumption of biscuits, cake and pie are higher in male 61.1% male reported for eating everyday and 32.5% female respondents eating every day.

\[ \chi^2 = 27.774, \text{ df}=2, \text{ p}=0.0001 \]

**Figure 10 Biscuits, cake, pie eating by age**

(Figure 10 Biscuits, cake, pie eating by age (\(\chi^2=27.774, \text{ df}=2, \text{ p}=0.0001\))
When we compare biscuits, cake, pie eating habits with age group older group more students were reported for eating everyday 64% and in younger age group 44.4% reported for eating every day.

9.2.2 Body weight disorders among respondents

Body weight characteristics among responders by sex are presented in Table 5.

Table 5. Body weight characteristics among responders by sex

<table>
<thead>
<tr>
<th>Body weight characteristics</th>
<th>Sex group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Underweight</td>
<td>32</td>
<td>16.8</td>
</tr>
<tr>
<td>Normal weight</td>
<td>142</td>
<td>74.7</td>
</tr>
<tr>
<td>Overweight</td>
<td>16</td>
<td>8.5</td>
</tr>
<tr>
<td>Total</td>
<td>190</td>
<td>100</td>
</tr>
</tbody>
</table>

$\chi^2=1.655$, df=2, p=0.437

When we distinguish weight with gender there no statistical significance have been shown (p=0.437). When we analyze the body weight ratio with age group here in first age group most of students are reported normal weight 72.8% follow by 23 students reported as underweight 14.2%, and for overweight only 13.0% students reported and in the second age group (n=90) 81.1% students were reported normal weight, and (n=18) 16.2% were reported for underweight and in same age group only (n=3) 2.7% students were reported for overweight.

So in second age group more students are underweight campare to first age group and more students are overweight campare to first age group.

Table 6. Body weight characteristics among responders by age

<table>
<thead>
<tr>
<th>Body weight characteristics</th>
<th>Age group (years)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10-13</td>
<td>14-16</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Underweight</td>
<td>23</td>
<td>14.2</td>
</tr>
<tr>
<td>Normal weight</td>
<td>118</td>
<td>72.8</td>
</tr>
<tr>
<td>Overweight</td>
<td>21</td>
<td>13.0</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>100</td>
</tr>
</tbody>
</table>

$\chi^2=8.654$, df=2, p=0.013
As demonstrated in table no 6 when comparing the frequency of weight with school grade the first group has shown 18.5% were reported underweight, students were normal weight 64.6%, and same as follow students were reported overweight 16.9%. And in second group most of students reported they were normal weight (n=166) 79.8% and leading by 29 students were underweight 13.9% and so on in the same group only 6.2% students were reported of overweight.

Table 7. Body weight association with school grade

<table>
<thead>
<tr>
<th>Body weight</th>
<th>School grades</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5-6</td>
<td>7-8</td>
</tr>
<tr>
<td>Underweight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>12</td>
<td>18.5</td>
<td>29</td>
</tr>
<tr>
<td>Normal weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>42</td>
<td>64.6</td>
<td>166</td>
</tr>
<tr>
<td>Overweight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>11</td>
<td>16.9</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>65</td>
<td>100</td>
<td>208</td>
</tr>
</tbody>
</table>

χ²=8.591, df=2, p=0.014

9.3 Evaluation of food habits among respondents

9.3.1 Unhealthy food habits assessing with sex and age

To analysis the unhealthy food habits the option were provide to responders were never, someday and every day. Although unhealthy food habits were shown significantly correlate with each other the food habits with sex, leading with 54.2% female were eating fast food every day and follow by only (n=29) 15.3% male responders reported for eating fast food every day so according to this result female responders were more commonly eating fast food then male responders.

To analyze unhealthy habits with school grades school grades were divided in two group first group 5 to 6 (n=65) and the second group 7 to 8 (n=208), here we can see in table no 8 the first age group only 2 students were reported for eating fast food every day and same as in second age group 34.6% students were reported eating fast food everyday which is more higher than the first group and responders who reported that they never eat fast food in first group (n=53) (81.5%) and in second group (n=77) 37% they never eats fast food.

In compression with age group 1 age group responder were reported for 55.6% were not eating fast food every day and in second group 36% were not eating fast food every food.
In below table 8. After checking for soft drink consumption in gender differences here in male students were found it difficult to avoid energy drink 46.8 % were drinking on every day in compare to female student were found less consumers 36.1% (χ²=44.087, p=0.001).

**Table 8.** Unhealthy food habits (fast food) compression with sex and age group

<table>
<thead>
<tr>
<th>Fast Food habits</th>
<th>Sex</th>
<th>Age group</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>10-13</td>
<td>14-16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Never</td>
<td>107</td>
<td>56.3</td>
<td>23</td>
<td>27.7</td>
<td>90</td>
<td>55.6</td>
</tr>
<tr>
<td>Someday</td>
<td>54</td>
<td>28.4</td>
<td>15</td>
<td>18.1</td>
<td>30</td>
<td>18.5</td>
</tr>
<tr>
<td>Every day</td>
<td>29</td>
<td>15.3</td>
<td>45</td>
<td>54.2</td>
<td>42</td>
<td>25.9</td>
</tr>
<tr>
<td>TOTAL</td>
<td>190</td>
<td>100</td>
<td>83</td>
<td>100</td>
<td>162</td>
<td>100</td>
</tr>
</tbody>
</table>

In compression with school grades responders from 1 group were less consuming soft drink 20% then second group students were consuming higher 51%. Age group compression findings the younger age group students were consuming less 32.7% then the older age group 59.5% (χ²=12.671, p=0.002).

**Table 9.** Unhealthy food habits (drinking soft drink) with sex and age

<table>
<thead>
<tr>
<th>Soft drink habit</th>
<th>Sex</th>
<th>Age group</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>10-13</td>
<td>14-16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Never</td>
<td>67</td>
<td>35.3</td>
<td>13</td>
<td>15.7</td>
<td>61</td>
<td>37.7</td>
</tr>
<tr>
<td>Someday</td>
<td>34</td>
<td>17.9</td>
<td>40</td>
<td>27.1</td>
<td>48</td>
<td>29.6</td>
</tr>
<tr>
<td>Every day</td>
<td>89</td>
<td>46.8</td>
<td>30</td>
<td>36.1</td>
<td>53</td>
<td>32.7</td>
</tr>
<tr>
<td>TOTAL</td>
<td>190</td>
<td>100</td>
<td>83</td>
<td>100</td>
<td>162</td>
<td>100</td>
</tr>
<tr>
<td>P value</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
9.3.2 Breakfast habits in school children

To analyze the breakfast habits in school children the responders were divided according to school grades. Here in table in 5 grades out of 32 responders only 19 students were having breakfast every day and 9 students were having breakfast most days, and 3 students were having breakfast someday and there are 0 students for never. The higher number of students who were having breakfast every day is from 8 grade out of 169 students 80.8% were having breakfast every day only 10.6% students from 8 grades complain for not having breakfast never.

\[(\chi^2=49.761, \text{df}=2, \ p=0.001)\]

**Figure 11.** Frequency of breakfast eating among respondents by school grade

Breakfast someday and there are 0 students for never. The higher number of students who were having breakfast every day is from 8 grade out of 169 students 80.8% were having breakfast every day only 10.6% students from 8 grades complain for not having breakfast never.

When we look for 7 grades schoolchildren the highest number of students who were having breakfast every day is 40% out of 39 responders and students who never having breakfast were only 1 out of 39 and in 6 grades out of 32 students only 6 were reported for breakfast every day and 1 student reported for having breakfast never.
\[ \chi^2 = 8.476, \text{ df}=2, \text{ p}=0.014 \]

Figure 12. Breakfast habits among respondents with gender

To analyze the breakfast habit between male and female out of 190 male 124 (83.1%) students were reported for having breakfast every day and only 11 students were reported for having breakfast never. \((\chi^2=8.476, \text{ df}=2, \text{ p}=0.014)\)

To compare the breakfast habit with females out of 83 (65.8%) female students 69 were reported for having breakfast every day, according to this chart females are more intend to having breakfast every day.

\[ \chi^2 = 118.422, \text{ df}=2, \text{ p}=0.001 \]

Figure 13. Breakfast habits among respondents with age groups
In compression with age group the older age group 82 % students were eating breakfast every day in camper to younger age group only 63.6% were eating breakfast every day.

9.4 Associations between the nutrition peculiarities, food habits and nutritional disorders of respondents

9.4.1 Body weight relation to nutrition peculiarities

Evaluated fish consumption characteristics among respondents was detected, that 91.2% of schoolchildren never eating fish, 5.1% - eating fish in somedays and only 3.7% of respondents eating fish everyday. Fish consumption frequency among responders by body weight are presented in Table 4. The study found significant correlations between fish consumption characteristics and body weight ($\chi^2=9.047$, df=4, p=0.06). Schoolchildren’s who took the fish daily were significantly more had underweight compared to pupils who had normal body weight, respectively, 9.8% and 1.9%, respectively (p<0.05).

Table 10. Fish consumption frequency among responders by body weight

<table>
<thead>
<tr>
<th>Fish consumption characteristics</th>
<th>Body weight</th>
<th></th>
<th></th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Underweight</td>
<td>Normal weight</td>
<td>Overweight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Never</td>
<td>34</td>
<td>82.9</td>
<td>195</td>
<td>93.8</td>
<td>20</td>
<td>83.4</td>
</tr>
<tr>
<td>Someday</td>
<td>3</td>
<td>7.3</td>
<td>9</td>
<td>4.3</td>
<td>2</td>
<td>8.3</td>
</tr>
<tr>
<td>Everyday</td>
<td>4</td>
<td>9.8*</td>
<td>4</td>
<td>1.9</td>
<td>2</td>
<td>8.3</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>100</td>
<td>208</td>
<td>100</td>
<td>24</td>
<td>100</td>
</tr>
</tbody>
</table>

$\chi^2=9.047$, df=4, p=0.060

To proper analyze here we çampare meat eating habit with weight in this 41 students who are underwight reported that (n=37) 90.2% were never eating fish, (n=3) students were eating some day and only (n=1) students eating fish everyday 2.4% out of 273 students 208 students were reported for normal weight in that 190 students were never eating meat 91.3%, and (n=14) were eating Someday 6.7%, only(n=4) studentes were eating everyday. And same as follow 24 students also reported for overweight in that (n=19) students were never eating meat and 79.2 % (n=2) students were eating someday 8.3% , and (n=3) students were eating everyday 12.5%.
Table 11. Meat consumption frequency among respondent by body weight

<table>
<thead>
<tr>
<th>Meat Eating</th>
<th>Weight ratio</th>
<th></th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Underweight N</td>
<td>%</td>
<td>Normal weight N</td>
<td>%</td>
</tr>
<tr>
<td>Never</td>
<td>37</td>
<td>90.2</td>
<td>190</td>
<td>91.3</td>
</tr>
<tr>
<td>Someday</td>
<td>3</td>
<td>7.3</td>
<td>14</td>
<td>6.7</td>
</tr>
<tr>
<td>Everyday</td>
<td>1</td>
<td>2.4</td>
<td>4</td>
<td>1.9</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>100</td>
<td>208</td>
<td>100</td>
</tr>
</tbody>
</table>

$\chi^2=8.697, \ df=4, \ p=0.069$

9.4.2 Association between healthy and unhealthy food habit with body weight

![Chart showing distribution of respondents according to fast food habits](image)

Figure 14. Distribution of respondents according to fast food habits $\chi^2=12.960, \ df=4, \ p=0.011$
When analysis the association between nutrition intake and food habits here we compare the bad eating habits in relation with weight the findings were 46.3% students reported for underweight and they never eat fast food, 12.5% students were found over weight even though they never eat fast food. In relation with good food habits 39% students found underweight after they eats fresh fruit every day, 24.5% students were reported for overweight and 39.4% students were normal weight.

Figure 15. Distribution of respondents according to fruit eating habits $\chi^2=19.812$ df=4 P=<0.001

Figure 16. Distribution of respondents according to soft drinking ($\chi^2=8.163$ df=4 P=0.086)
When we analyze the relation between sugar contain drink and milk, they have not shown any statically significance.

![Figure 17. Distribution of respondents according to milk drinking ($\chi^2=8.071$ df=4 P=0.089)](image)

The odds to have body weight disorders (under and overweight) among schoolchildren is given in the Table 12. The method of step by step logistic regression analysis was used to evaluate it, including into the model independent variables as gender, schoolchildren age, school-grade level, some nutrition peculiarities. It was found that the possibility to have body weight disorders among higher grade pupils was an average about 2.8 times higher (OR=2.75, PI 1.30-5.83, p=0.008) than the among lower grade pupils. Estimated, that schoolchildren who permanently consumed fresh fruit had an average of 80.0% less possibility (OR=0.20, PI 0.07-0.59, p=0.002) have body weight disorders compared to those who did not use fresh fruit. According to the logistic regression analysis, detected that pupils who regularly consumed fast food averaged 3.8 times more (OR=3.83, PI 1.52-9.65, p=0.004) had a greater possibility of having body weight disorders compared to those who did not use fast-food products (Table 12).
Table 12. The odds to have body weight disorders (under and overweight) among schoolchildren dependent by school environmental and nutrition habits (multiple logistic regression analysis)

<table>
<thead>
<tr>
<th>Variables</th>
<th>B</th>
<th>Exp(B)</th>
<th>95% CI for Exp(B)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
<td>Upper</td>
</tr>
<tr>
<td>Schoolgrade2g</td>
<td>1.013</td>
<td>2.754</td>
<td>1.302</td>
<td>5.825</td>
</tr>
<tr>
<td>Fresh fruits (ref.=never)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Someday</td>
<td>.460</td>
<td>1.584</td>
<td>0.783</td>
<td>3.203</td>
</tr>
<tr>
<td>Every day</td>
<td>-1.605</td>
<td>0.201</td>
<td>0.071</td>
<td>0.588</td>
</tr>
<tr>
<td>Fast food (ref=never)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Someday</td>
<td>.480</td>
<td>1.616</td>
<td>0.637</td>
<td>4.097</td>
</tr>
<tr>
<td>Every day</td>
<td>1.344</td>
<td>3.834</td>
<td>1.523</td>
<td>9.648</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.961</td>
<td>.141</td>
<td></td>
<td>.000</td>
</tr>
</tbody>
</table>
10. Discussion

In this study we found that there is very high percentage of students who were not eating fish 91.2% and meat 90.1% although meat-based diet is linked not only to high protein content but also to high fat levels. The reason behind less consumption involves various mechanisms like animal suffers and are killed for meat, religious justification, health justification.

For the first objective Comparison of school children by the age group, sex, showed that the prevalence of underweight, overweight is high in the younger age group and Prevalence of underweight is higher in male students then compare to female student as compared with other studies many evidences suggested that boys were more underweight then girls. studies conducted in Africa showing that the underweight or malnutrition problem were higher in males then compare to female students in this study the prevalence of underweight is higher in male then compare to female, there are so many studies also from Tanzania and Ecuador also proven that male students were more affected from underweight then females (39).

Simple wheat flour biscuit is not proper food to fulfill dietary needs. Study in 2010 in south part of India found that 18 students had habit of biscuit in their diet on daily basis. Among them 22% children were with prevalence of overweight and 17 % with obese (46). On other hand, this study suggested that high risk of body weight risk can be develop in males according to analysis. More than 60% of respondents eating biscuit on daily basis.

A significantly higher prevalence of daily breakfast consumption was found among students who were younger, from urban schools, and academic high schools. More frequent vegetable and milk consumption, greater physical activity, and longer sleep duration were positively associated with daily breakfast consumption. The prevalence of irregular breakfast consumption was relatively high among Chinese adolescents in Zhejiang Province. Over half of the schoolchildren studied skipped breakfast frequently, the main reason being getting up late. Children who consumed breakfast had higher daily intakes of energy and protein than children who skipped breakfast (40). In this present study analysis of food preferences among students reveled that most of students in this study are vegetarian 70% of students were eating vegetables on daily basis only 10% of students were eating fresh fruit every day and only 5% of students were drinking the fresh juices everyday 22.3% students were drinking soft drink or sugar congaing drink once a week. 42.9% of students were drinking milk everyday this is probable the Indian parent’s percussion and the very important part of their daily diet.
intake. A same study conducted in Varanasi; India is showing that only 10% of girls consuming fresh fruit on daily basis.

The same study conducted in Malaysia among schoolchildren 31% consumed milk, and dairy produced on daily basic and same amount of fresh fruit consumed by students.

Breakfast is considered as a very important meal of the day there are so many studies that shown in school going children skipping breakfast are not likely to concentrate in class, and also affecting the school performances. In this study half of the responders were 65% consumes breakfast on daily basis when checking for who the great skipper between male are and female responder’s male are more skip breakfast then compare to female students. The reason behind skipping breakfast because lack of time or the other reason for poor socioeconomic status in home. In so many previous studies Skipping breakfast was found to be associated with abdominal obesity in primary school children (41).

School children aged 13 to 15 years in five Southeast Asian countries. Overall, 76.3% of the 13 to 15-year-olds had inadequate fruits and vegetables consumptions (42), and our study finding with a huge difference in these criteria with almost 70% respondents consume adequate vegetables.

The result of binary regression has shown that the children who consuming fresh fruit every day they have very less chances to devolved body weight disorder in present study higher school grade children were more at risk of developing weigh disorder compare to lower school grade children. a study conducted in Mangalore Karnataka has revealed negative correlation between body weight and eating habits (45), a study conducted in turkey also revealed negative correlation between correlation between food eating habits and body weight (43). In support a very similar study conducted in Bangalore India has revealed that there is positive correlation between body weight and eating habits (44).

Factor that persuading food habits need to develop for effective nutrition education among school children about a health nutrition needs to improve. The fact of this study revealed that school children has less knowledge about a good nutrition intake or the good food eating habits. To improve the good food habit or nutrition health care professional should aware the children about good eating and bad eating habits
11. Limitations of the study

The dietary information from participants was based on self-reported which may be the subject to error.

However, several other potential outcomes that may be linked to quality of life like, BMI, height, parent’s education status and socioeconomic status were not included in this study. The questionable approach for this study it could be sample size was not enough to get better findings.
12. Conclusion

1. Nutritional status of children has been recognized as an important of growth, development and health status among selected population. At conclusion we can conclude that meat and fish contains important nutrients. Major impact on this objective was most of the respondents reported as vegetarian. In the selected population the other sources for nutrition is vegetable, fruit, and milk which includes as a daily diet routine in most of students among all age group the consumption of vegetable is very high in female students compare to male students and the second highest consumption is fresh fruit in male compare to female.

2. Primary focus of this objective was to assess food habit among selected population. There were more number of females report about regular breakfast than male. In case age elder group was more likely to have regular breakfast than other group this was almost same in school grades. Food habits and food on regular time with proper nutrition is the key for good health. Here we can conclude that, respondents which were not having regular breakfast. There is a risk for development of some health issues in younger age. Fast-food consumption was noted higher in female than male respondents. Male were consuming more soft-drinks than female respondents.

3. Respondents, which are not consuming meat and fish they were find as an underweight category there were more male respondents found in underweight category with unproper nutrition. Age between 14-16 years were report more underweight. 7 to 8 school grade children were more report in underweight category. In all cases superior respondents reported in underweight category because they were more independent then all other groups so, they can choose their food according to their needs. Fast food is not an option for healthy food. In this objective we can conclude that food habits and consumption ratio can lead to body weight disorders. More fast food consumers were found at high risk to have body weight disorder compare to other group. Almost 90% of adolescents were not eating fish and meat with counted in underweight category. Prevalence of overweight was higher among those students who reported consuming soft drinks every day.

Overall, we can conclude that, type of food, food habits can lead to body weight disorder among adolescents. Finding were enough to fulfill the aim of the research with positive and negative outcomes.
13. Practical recommendation

For school administration

Healthy nutrition in adolescent age is very essential for healthy life for future perspective in adolescents. Considering health is wealth, School has to start some workshops for adolescents regarding healthy nutrition and healthy life.

For school children parents

Parenteral education plays a key role in nutrition of their children. Schools can start some nutrition seminars on child nutrition for good health. To avoid future consequences like obesity, risk of cardio-vascular problems, cholesterol related health issues.

For school children’s

Fast food is not an option for healthy nutrition it will lead to some serious health issues in later life. Study suggest to reduce consumption of fast food in daily life. Adolescents can adjust or prepare their nutrition according to proper nutrition program.

For public health specialist

Healthy and health problems free society will be the dream come true for future perspectives. Public health specialists can do campaigns of awareness regarding nutrition.

Adequate consumption of healthy food according to need in day to day life will lead to better healthy life. High sugar content cold drink and other beverages are not for healthy profile.
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15. References


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Over a typical or usual week, how often does your child have breakfast? Please tick one box.

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Some days (1-3 days)</th>
<th>Most days (4-6 days)</th>
<th>Every day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
</tr>
</tbody>
</table>

Over a typical or usual week, how often does your child eat or drink the following kinds of foods or beverages? Please tick one box for each line.

<table>
<thead>
<tr>
<th>Food/Beverage</th>
<th>Never</th>
<th>Less than once a week</th>
<th>Some days (1-3 days)</th>
<th>Most days (4-6 days)</th>
<th>Every day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh fruit</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
</tr>
<tr>
<td>Vegetables (excluding potatoes)</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
</tr>
<tr>
<td>100% Fruit juice</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
</tr>
<tr>
<td>Soft drinks containing sugar</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
</tr>
<tr>
<td>Flavored milk (containing sugar)</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
</tr>
<tr>
<td>Corn flakes</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
</tr>
<tr>
<td>Porridge</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
</tr>
<tr>
<td>Low fat/semi-skimmed milk</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
</tr>
<tr>
<td>Whole fat milk</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
</tr>
<tr>
<td>Cheese</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
</tr>
<tr>
<td>Yoghurt, milk pudding, cream cheese/quark or other dairy products</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
</tr>
<tr>
<td>Meat</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
</tr>
<tr>
<td>Fish</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
</tr>
<tr>
<td>Savory snacks like potato chips, corn chips, popcorn or peanuts</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
<td>![Box]</td>
</tr>
<tr>
<td></td>
<td>Never</td>
<td>Less than once a week</td>
<td>Some days (1-3 days)</td>
<td>Most days (4-6 days)</td>
<td>Every day</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------</td>
<td>-----------------------</td>
<td>----------------------</td>
<td>---------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Sweet treats like candy bar or chocolate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foods like biscuits, cake, doughnuts or pie</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foods like pizza, French fries, fried potatoes, hamburger, sausage or meat pies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**In your opinion, what is your weight?**

- [ ] Underweight
- [ ] Normal weight
- [ ] Little overweight
- [ ] Extremely overweight

**HOW TO CALCULATE BODY MASS INDEX**

\[
BMI = \frac{\text{Weight (kg)}}{[\text{Height (m)}]^2}
\]

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