NUTRITIONAL STATUS OF PRE-SCHOOL CHILDREN AMONG DIFFERENT SOCIO-ECONOMIC STATUS IN URBAN AREA OF DHAKA CITY

Master of Philosophy (MPhil) in Community Nutrition

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Session: 2011 – 2012

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DECLARATION

I do, hereby humbly declare that the thesis work entitled **'Nutritional Status of Pre-School Children among Different Socio-Economic Status in Urban Area of Dhaka City'**, a requirement for the degree of Master of Philosophy (MPhil) in Community Nutrition under Bangladesh Institute of Health Sciences, was carried out by me under the supervision of Prof. Dr. Md Asirul Hoque, Head of the Dept. of Community Nutrition, Bangladesh Institute of Health Sciences (BIHS).

No part of the work has been submitted elsewhere for any other purpose.

_____

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CERTIFICATE

This is to certify that **Rumana Sharmin** has completed her thesis work entitled **'Nutritional Status of Pre-School Children among Different Socio-Economic Status in Urban Area of Dhaka City'** in Bangladesh Institute of Health Sciences (BIHS), Dhaka, under my guidance and supervision as a partial fulfillment of the requirement for the degree of Master of Philosophy (MPhil) in Community Nutrition, Session: 2011 – 2012.

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ABBREVIATIONS

WHO	World Health Organization
MDG	Millennium Development Goal
SPSS	Statistical Package for Social Sciences
SD	Standard Division
WFP	World Food Programme
IPHN	Institute of Public Health Nutrition
BDHS	Bangladesh Demographic and Health Survey
DCI	Daily Calorie Intake
ICDS	Integrated Child Development Services
LBW	Low Birth Weight
IMR	Infant Mortality Rate
WAZ	Weight for age Z-score
HAZ	Height for age Z-score
WHZ	Weight for Height Z-score
LIFDC	Low Income Food Deficit Countries
UNICEF	United Nations Integrated Children's Fund
GNI	Gross National Income
MUAC	Middle Upper Arm Circumference
IDA	Iron Deficiency Aneamia
IDD	Iodine Deficiency disorders
RDA	Recommended Dietary Allowances
VAD	Vitamin A Deficiency

Abstract

Background:

Nutritional status is the result of complex interactions between food consumption, overall health status and care practices. At the individual level inadequate or inappropriate feeding patterns lead to malnutrition. The objective of the study is to assess the Nutritional status of pre-school children among different socio-economic status in urban area of Dhaka city.

Methodology

The study was a comparative cross sectional study. The study was a comparative cross sectional study. Pre-school children aged 3-5 years were selected by their socio economic status in different household and slum of Dhaka City by stratified cluster sampling. The anthropometric data (height, weight and MUAC) of pre-school child was taken individually. Data on food intake was collected; edited, entered and cleaned by using suitable data entry software (SPSS, version 17). Data on height, weight, dietary intake, personal hygiene were compared among four socio-economic groups. Continuous variables were assessed for normal distribution. Chi-squared test was performed for categorical variables. One way ANOVA was done to compare means.

Result:

In present study, among different socio-economic status in urban area of Dhaka city the average expenditure of upper SES, upper middle SES, lower middle SES and lower SES were BDT 64077±9354, BDT 31475±6298, BDT 4737±496 and BDT 13147±13673 respectively. About 5% of children from upper SES and 1% of children from upper middle SES were overweight. In upper SES 93% and 89% of children from upper middle SES were normal in weight whereas only 46% and 49% of children were mild underweight in lower middle and lower SES respectively. About 84%, 75%, 70% of children from upper SES, upper middle SES and lower middle SES respectively were normal in height. Significant association has been found in relation of mother's working status and children nutritional status. Moderate to severe underweight, stunting, wasting and thinness were 50%, 67%, 64% and 50% respectively among no working mother which was higher than working mother. According to multiple regression analysis, it was found that age, family income and housing status of the family were significantly associated with WAZ of study subjects (P=<0.001, P=<0.001, P=<0.001). Total energy (Kcal/day) among upper SES and upper middle SES were 800±215 and 770±184 respectively. Moreover, intake of total Protein (g/day) among lower middle SES and lower SES were 22±6.41 and 16±6.10 respectively.

Conclusion:

The study gives us the picture of the severity of malnutrition among the children of Dhaka city in different socio-economic group. Because of lack of awareness and inadequate food consumption their nutritional status was very poor and their average nutrient intake was also lower than reference value.

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1. INTRODUCTION

1.1 Background:

Malnutrition continues to be a growing problem in most developing countries[1]. Malnutrition arises from a complex of nutritional, social and biological deprivation and is manifested in various forms such as stunting (short stature), underweight, muscle wasting, growth retardation, diminished subcutaneous fat and ill health with high mortality rate[2]. The issue of child malnutrition is critical because its effects are not limited to the boundary of childhood but rather persist into adulthood. It silently destroys the future productivity of nations. Malnutrition increases the economic burden of a society because it leads to increased risk of death from infectious diseases, more severe infections, and higher case fatalities, creating an additional psychosocial burden. The most neglected form of human deprivation is malnutrition; particularly among preschool children[3]. Prevalence of stunting and underweight are high in South Asia where one in every two preschool children is stunted[**4**]. The rapid migration of rural poor to urban slums of Bangladesh in search of livelihoods has serious impacts on physical and socioeconomic conditions of the cities. Studies conducted in urban areas of developing countries have shown that malnutrition is associated with low income, employment status, household expenditure[**5-6**], low education, housing status[**7-8**] and birth order[**9**]. On the contrary, very few looked at the determinants for the good nutritional status, especially in slums.

Several countries are going through a period of epidemiological transition with reduced incidence of infectious diseases, child mortality and birth rates, associated with high prevalence of chronic diseases and increase in life expectancy at birth[10]. With respect to nutritional transition this situation also results in decreased prevalence of malnutrition in childhood and improved growth pattern of children, a fact that was also observed recently in Brazil[11-13]. In the last two decades in industrialized countries this trend has continued with a higher prevalence of obesity and its consequences, presenting in adults from higher socio-economic classes[14].In 2014 mal-nutritional scenarios in Bangladesh were 33% underweight, 36% stunted and 14% wasted. Child and Nutrition Health Survey in 2005 by UNICEF stated that 40% of children aged <5 years were underweight, 46% were stunted, 15% were wasted and 1.4% were overweight/obese. According to criteria of the

World Health Organization, the prevalence of underweight and stunting was "very high", and the prevalence of wasting indicated a "critical problem". Severe underweight, severe stunting, severe wasting and obesity were found in 11%, 19%, 3% and 0.3% of the population. This is the first time that data on child overweight/obesity have been determined for Bangladesh, and the data can provide a baseline against which to measure trends in the future [15]. Nutritional status is a sensitive indicator of community health and nutrition among preschool children, especially the prevalence of under nutrition that affects all dimensions of human development and leads to growth faltering in early life [16].

1.2 Age of Pre-school Child:

Preschool is an early childhood program in which children combine learning with play in a program run by professionally trained adults. Children are most commonly enrolled in preschool between the ages of three and five, though those as young as to attend some schools[17].

1.3 Socio-economic status:

The Socio-economic status (SES) is an important determinant of health and nutritional status as well as of mortality and morbidity. Socio-economic status also influences the accessibility, affordability, acceptability and actual utilization of various available health facilities.

The World Bank classifies economies as low-income, middle-income (subdivided into lower-middle and upper-middle), or high-income based on gross national income (GNI) per capita. Low- and middle-income economies are sometimes referred to as developing economies. The term does not imply that all economies in this group are experiencing similar development or that other economies have reached a preferred or final stage of development.

Social class or social stratification is defined by unequal access to desirable resources (such as money, goods, and services) or personal gratification (such as prestige or respect). The sociologist Max Weber argued that social class was a function of differential wealth, political power, and status. The various dimensions of social class have different influences on food consumption and its consequences. Income and wealth

provide access to food or constrain food purchases. Education provides knowledge, skills, and beliefs that shape food desires and place constraints on food choices by means of information acquisition and food preparation.

Lower-class people experience a wide array of health problems as a result of their economic status. They are unable to use health care as often, and when they do it is of lower quality, even though they generally tend to experience a much higher rate of health issues. Lower-class families have higher rates of infant mortality, cancer, cardiovascular disease, and disabling physical injuries. Additionally, poor people tend to work in much more hazardous conditions, yet generally have much less (if any) health insurance provided for them, as compared to middle and upper class workers[18].

Socioeconomic classifications:

According to the 2006 per capita Gross National Income (GNI) and according to World Bank (WB) calculations the groups were[19]:

- ✓ Low-income, US$ = 905 or Bangladeshi Taka; BDT =5360;
- ✓ Lower-middle-income, US$ (906–3595) or BDT (5361– 21270)
- ✓ Upper-middle-income, US$ (3596–11115) or BDT (21271–65761); and
- ✓ High-income, US$ =11116 or BDT =65762.

1.4 Nutrition:

Nutrition is the process of human organism that leads to and involves with the utilization of nutrients for growth, development, maintenance and activity[20]. Nutritional status is the state of the body produced by this procedure/process as a result of eating, digestion, absorption, transport, storage and metabolic efforts at the cellular level[21]. According to WHO, nutrition is an input to and foundation for health and development. Better nutrition implies stronger immune system, less illness and better health. Healthy children are better in education, stronger, more productive and more able to create opportunities to break the cycle of both poverty and hunger in sustainable way[22].

Malnutrition is defined as a pathological state due to deficient of essential nutrients at the cellular or basic level during a prolonged period and it manifests itself by physical, psychological and bio-chemical abnormalities. It is a general term often used for both "under" and "over" nutrition and specific nutrient deficiencies. It results from the inadequate intake of nutrients or from disease factor that affect digestion, absorption, transport and the utilization of nutrients[20]. In particular, infectious diseases affect both dietary intake and other processes. Malnutrition primarily affects the more vulnerable group of a household, specially children and women. Poor maternal nutrition results in low birth weight (LBW) infants who are at higher risk of growth retardation during childhood and adolescences and thus continues the cycle of malnutrition across the generation.

Malnutrition is one of the main causes of morbidity and morbidity and mortality among children under five years of age. It has impact on physical growth, cognitive development, reproduction, physical work capacity, and risks for several chronic diseases[21]. In developing countries malnutrition is an important root of infant and young child mortality and reduced life span United Nations Development Programme[23]. It is associated with more than half of all deaths of children worldwide. People who pass their childhood through the emerging malnutrition condition are less physically and intellectually productive and suffer from one or more chronic illness and disability in future. The costs to prevent it are enormous for a society. Moreover, individual who suffer from growth retardation as a result of poor diets and/or recurrent infections tend to have more frequent episodes of severe diarrhoea and are more susceptible to several infectious disease, such as meningitis and pneumonia[24].

Studies on maternal nutrition show a predictive inter-relationship between low pre-pregnancy weights (low weight gain by 5, 7 and 9 months of pregnancy) and low birth weight (LBW). Low pre-pregnancy weight represents the chronic deficiency of maternal nutrition, which commences in early childhood. On the other hand, low birth weight of infants, primarily due to intra-uterine growth retardation (IUGR) in developing countries, is a consequence of maternal malnutrition prior to and during pregnancy. These LBW infants are likely to become malnourished children and many of them remained

malnourished in childhood and adolescence. This is especially important in developing areas such as South Asia, where there is a very high prevalence of low birth weight and many children are fed inadequate diets, and children in the first two years of life are at particular risk. These effects are especially devastating in case of girls. During infancy and childhood, nutrition and health care of girls are neglected in many developing countries. As a result chronically malnourished girls are even more likely to remain malnourished during adolescence and adulthood, and when pregnant they become more likely to deliver low birth weight babies.

Thus nutrition plays a major role in the survival, growth and development of infant and young children. The effects of poor nutrition have impact upon the social economic and cultural development of societies and nations. It will be impossible to achieve many of the millennium development goals[25] including the goals on extreme poverty and hunger, primary education, child mortality and other diseases, if malnutrition cannot be reduced and prevented. This is now considered as a global problem for both children and mother specifically rural area.

1.5 Child Malnutrition: Types and Forms

Depending on the manifestation, malnutrition situation can be classified in to two broad categories

(i) Macronutrient Malnutrition and
(ii) Micronutrient Malnutrition.

1.5.1 Macronutrient Malnutrition:

Among the macronutrient malnutrition, protein energy malnutrition (PEM) is the most common form of malnutrition affecting millions of children in the under developed countries[26]. Due to protein energy malnutrition a child may be failed to grow, underweight, stunted and may look thin, severely wasted. The indicators to be use in monitoring malnutrition among children are:

(1) Stunting (low height-for-age)
(2) Wasting (low weight-for-height) and

(3) Underweight (low weight-for-age).

Stunting: Stunting is a sign of low height-for-age, a result of failure to achieve expected length as compared to healthy, well-nourished child of the same age. Stunting reflects failure to receive adequate nutrition over a long period of time and may also be caused by recurrent and chronic illness. It is an important public health problem in developing countries during childhood because of its association with poor functional outcomes such as impaired cognitive development[27]increased susceptibility to infection[28]and increased risk of mortality[29].

Long-term consequences of childhood stunting are poor work capacity, elevated risk of poor reproductive outcomes, and chronic diseases. Stunting is more prevalent during 2nd and 3rd year of life[26].

Wasting:

Wasting is the result of a weight falling significantly below the weight expected for a child with same length or height. Wasting indicates current or acute malnutrition[30] resulting from failure to gain weight or actual weight loss. Inadequate food intake, incorrect feeding practices, diseases and infection or more frequently a combination of these factors causes wasting. For children, wasting can change rapidly with changes in seasonal food availability or disease prevalence. The highest prevalence of wasting occurs during the 12-23 months of age[26]. Wasting may be used for screening purposes in emergency settings and sometimes for annual reporting[30].

Underweight:

Underweight is a composite measure of stunting and wasting and is recommended as the indicator to assess changes in the magnitude of malnutrition over time. It is well recognized that underweight is an important underlying causes of under-five child mortality. Despite the overall decline in the prevalence of malnutrition and child mortality in developing countries, both phenomena are still at unacceptable high and therefore remain big challenges in reaching the MDGs (reduce the under-five mortality rate by two-thirds between 1990 and 2015). Pelletier 2003, investigated that reduction of

underweight by 5 percent could reduce under five child mortality by 30 percent[31]. Moreover, one predictor to monitor the progress of the first MDG (to have the proportion of people who suffer from hunger between 1990 and 2015) is the proportion of children who were underweight[25].

1.5.2 Micronutrient Malnutrition

Iodine deficiency disorders, iron deficiency anemia and Vitamin-A deficiency disorders are reputably public health problems. In addition, Zinc, Vitamin C, Selenium and a couple of other micronutrient deficiency problems are also considered as emerging problem in the field of nutrition. The most Common and important micronutrient (vitamins and minerals) deficiencies for the child and women are:

a. Iodine Deficiency disorders (IDD)
b. Iron Deficiency Anemia (IDA) and
c. Vitamin-A Deficiency (VAD)

a. Iodine Deficiency Disorders (IDD)

Iodine deficiency results in insufficient thyroid hormone production, which can prevent normal growth in the brain and nervous system that lead to poor school performance, reduced intellectual ability and impaired work capacity. From the available estimation of iodized salt consumption during 1998-2004 for 97 countries, covering 35 percent of the developing world population lived at risk of IDD[32]. The most well knownaffects of IDD are visible goiter and cretinism, a condition characterized by severe brain damage occurring in very early life. The main strategy for the control of IDD is universal salt iodization, which is ensuring iodization of salt for all human consumption.

b. Iron Deficiency Anemia (IDA):

Anaemia is the most frequent and widely prevalent micronutrient malnutrition among all groups of population of the world. The magnitude and the extent of the problems of iron deficiency anaemia (IDA) are highest in the p0oorer section of population of the developing countries. Around two billion people worldwide suffer from anaemia[33] most commonly iron deficiency anaemia and a major cause of maternal deaths and of cognitive

deficits in young children. The consequences of iron deficiency anaemia include impaired motor development and coordination, impaired language development and educational achievement, psychological and behavioral effects and decreased physical activity. Among pregnant women, the effects of IDA increase the risk of maternal morbidity and mortality. Which tremendously increase the risk of low birth weight.

c. Vitamin A Deficiency (VAD):

Vitamin-A deficiency (VAD) disorder is one of the major nutritional problems in Bangladesh since independence. In the world about 100-140 million children are afflicted by this hidden hunger. Most of these children live in the least-developed areas of South-Asia and sub-Saharan Africa[32]. Recent estimates show that more than 43 million children in sub-Saharan Africa are at risk of Vitamin-A deficiency[34]. VAD is common for children, lactating mothers and pregnant women. Among the children with VAD, the risk of dying from diarrhea, measles and malaria is increased by 20-24 percent[22]. For women, vitamin-A deficiency may increase the risk of ill health and dying during pregnancy. Lactating mother having VAD produce breast milk with a low concentration of Vitamin-A, which is one of the major causes of VAD in young children is deficiency also causes skin infection, ear infection, urinary tract and respiratory tract infection and diarrhea.

1.6 Assessment of Nutritional Status

Nutritional status is the assessment of health condition of an individual or population as determined by the nutrients that the body receive and utilizes. The nutritional status can be accessed through direct and indirect methods.

1.6.1 Direct Assessment of Nutritional Status

Direct assessment includes a sequence of examinations ranging from tests for bio-chemical changes to visible abnormalities in the form of clinical signs, and/or anthropometric or biophysical changes. Methods available for thr direct assessment of nutritional status are[48]

(i) Clinical signs/Methods

(ii) Laboratory Tests/Methods

(iii) Bio-physical methods and

(iv) Anthropometric methods

(i) Clinical Methods:

Medical history and physical examinations are considered as clinical methods that are used to detect signs and symptoms associated with malnutrition. In clinical methods physical inspection of the eyes, skin, tissues, hair, etc. are considered to identify the nutritional status. Though it is very fast and inexpensive, it provides limited diagnostic certainty and has standardization problems.

(ii) Laboratory Methods/Tests:

The main laboratory tests of nutritional significance can be considered in three groups: Bio-chemical, Hematological and Parasitological[48].Among the three tests, bio-chemical test is used in most cases. Sample of blood, urine and stool are examined to identify the status of nutrition in this method. Laboratory tests, especially Bio-chemical test are usually costly and time consuming to carry out. There are several problems of collection, preservation, transportation and interpretation in all laboratory tests.

(iii) Biophysical Methods:

To measure functional ability of biological tissues (physical, Physiological, or cellular) or alternation of structures that are inaccessible through clinical examinations (specially the skeleton), biophysical methods are used. Thus these methods are only occasionally practicable with laboratory tests. Biophysical methods like radiography and X-ray are used to detect scurvy, rickets, fluorosis, osteomalacia, etc.

(iv) Anthropometric Methods:

As nutritional status indicator, measurements of the physical dimensions and gross composition of the body are used in anthropometric methods[48]. The measurements vary with age and degree of nutrition and therefore these methods are particularly used in circumstances when there are chronic imbalances of protein and energy. Anthropometric methods can be used to detect moderate as well as severe degree of malnutrition. These

are simple, safe, non-invasive procedure and easily applicable to large sample sizes which requires inexpensive, portable and durable equipment. Methods are precise and accurate if standardized techniques are used. Anthropometry is the most widely used method of nutritional status assessment as anthropometric measurements have advantages of providing information on past nutritional history, which cannot be obtained with equal confidence using other assessment techniques[35]. Anthropometry has an important advantage over other nutritional indicators: body measurements are sensitive over the full spectrum of malnutrition, whereas biochemical and clinical indicators are useful only at the extremes. However, anthropometric methods have some drawback such as it is relatively insensitive and cannot detect any change of nutritional status over short period of time.

Anthropometric Measurement:

Anthropometric method is widely used both in more and less developed regions of the world. It can be used for various purposes depending on the selected anthropometric indicators. Age, sex, height and weight are the four building blocks or measures used to construct anthropometric indices[30].These measures are described below:

Age:

Age is the most important variable among the anthropometry variables as two main anthropometric indices weight-for-age and height-for-age depend on age. Age must be collected appropriately as the growth standards are recorded on the basis of child age. The child's accurate age is required for sampling and deciding on whether the child is measured standing or lying down for height or length and for converting height and weight into the standard indices[30].

Sex:

The body structure of boys and girls different. The reference standards are constructed according to sex and age[26]. To make the indices it must be assured about the gender of child.

Weight:

The most commonly used anthropometric measurement for identification of Protein-Energy-Malnutrition (PEM) is weight. However, at one point of time a single weight measurement is a static estimate of the dynamic process of growth. PEM can be detected by serial measurements of weight. Interpretation of weight measurement obtained at a time should be made carefully and preferably in combination with other measurements, particularly height for the individual age. For children below 6 years, a Salter spring balance with the scale measuring up to a maximum of 25 Kg with increments of 100gm is recommended to use. With this type of balance the child hangs in a specially designed "bag". The balance will be sturdy, compact and easily transported[26,30].

Height:

Height is a more stable growth parameter than weight as reduced stature is a reflection of chronically inadequate nutrition. Height, once attained, cannot decrease with current malnutrition and so short stature indicates that growth is retarded due to chronic malnutrition may be attributed for long term food deficit. The measurement of height needs special care, particularly for long term food deficit. The measurement of height needs special care, particularly for infants and children under 2 years of age. For infants and children under 2 years of age, recumbent length has to be measured, since the measurement of standing height is either impossible or may be inaccurate. For these reasons length/height measuring boards should be designed to measure children under 2 years of age lying down (recumbent) and older children standing up. The board should measure up to 120 cm (1.2 meters) and be readable to 0.1cm, for older children – 2b years and above – a vertical measuring rod can be employed. Several measuring boards recommended by UNICEF are used for this purpose[30,36].

Mid-Upper Arm Circumference (MUAC) :

MUAC is the circumference of the left upper arm, measured at the mid-point between the tip of the shoulder and the tip of the elbow (olecranon process and the acromium). In children, MUAC is useful for the assessment of nutritional status. It is good at predicting mortality and in some studies, MUAC alone or MUAC for age, predicted death in

children better than any other anthropometric indicator. This advantage of MUAC was greatest when the period of follow-up was short.

Measuring MUAC

To measure MUAC, a flexible measuring tape is wrapped around the mid-upper arm (between the shoulder and elbow). With the left arm bent, it is recommended to use a string to find the midpoint of the arm between the shoulder and the tip of the elbow. MUAC should then be measured on the left upper arm while the arm is hanging down the side of the body and relaxed.

A range of Mid-Upper Arm Circumference (MUAC) Measuring Tapes are available through UNICEF Supply Division. MUAC tapes are predominately used to measure the upper arm circumference of children but also that of pregnant women, helping identify malnutrition.

There are different types of MUAC tape available. All are graduated in millimeters and some are colour coded (red, yellow and green) to indicate the nutritional status of a child or adult. The colour codes and gradations vary depending on the tape type.
In May 2009, the World Health Organization (WHO) and UNICEF issued a joint statement on WHO child growth standards and the identification of severe acute malnutrition in infants and children. To reflect this, a new standard MUAC tape was made available.

1.6.1.1 Definition of Indices of Child Nutritional Measurement:

The nutritional status of children in the survey population is compared with the World Health Organization (WHO) Child Growth Standards, which are based on an international sample of ethnically, culturally, and genetically diverse healthy children living under optimum conditions that are conducive to achieving a child's full genetic growth potential[49]. The WHO Child Growth Standards identify breastfed children as the normative model for growth and development and document how children should grow under optimum conditions and with optimum infant feeding and child health practices. Use of the WHO Child Growth Standards is based on the finding that well-nourished children of all population groups for which data exist follow very similar growth patterns

before puberty. These standards can therefore be used to assess the nutritional status of children all over the world, regardless of ethnicity, social and economic influences, and feeding practices.

Three standard indices of physical growth that describe the nutritional status of children are:

- Height-for-age (stunting)
- Weight-for-height (wasting)
- Weight-for-age (underweight)

Each of these indices provides different information about growth and body composition that can be used to assess nutritional status.

Height-for-age (stunting)

Height-for-age measures linear growth. A child who is more than two standard deviations below the median (-2 SD) of the WHO reference population in terms of height-for-age is considered short for his or her age, or moderately stunted. This condition reflects the cumulative effect of chronic malnutrition. If a child is below three standard deviations (-3 SD) from the reference median, then he or she is considered to be severely stunted. Stunting reflects a failure to receive adequate nutrition over a long period of time and is worsened by recurrent and chronic illness.

Weight-for-height (wasting)

Weight-for-height describes current nutritional status. A child who is more than two Standard Deviations below (-2 SD) the reference median for weight-for-height is considered to be too thin for his or her height, or wasted or Moderate Acute Malnutrition (MAM). This condition reflects acute or recent nutritional deficit. As with Stunting, wasting is considered severe if the child is more than three standard deviations below the reference median. Severe wasting or Sever Acute Malnutrition (SAM) is closely linked to mortality risk.

Weight-for-age (underweight)

Weight-for-age is a composite index of weight-for-height and height-for-age. Thus, it does not distinguish between acute malnutrition (wasting) and chronic malnutrition (stunting). A child can be underweight for his age because he or she is stunted, because he or she is wasted, or both. Children whose weight-for-age is below two standard

deviations (-2 SD) from the median of the reference population are classified as moderately underweight. Children whose weight-for-age is below three standard deviations (-3 SD) form the median for the reference population are considered severely underweight. Weight-for-age is an overall indicator of a population's nutritional health.

Z-score:

Z-score means are also calculated as summary statistics representing the nutritional status of children in a population. These mean scores describe the nutritional status of the entire population without the use of cut off. A mean Z-score of less than O (i. e. a negative mean value for stunting. Wasting or underweight) suggests that the distribution of an index has shifted downward and that most if not all children in the population suffer from under nutrition relative to the reference population.

Table:1: Classification of nutritional status using Z-score

Anthropometric Indicators	Cut of values	Terms of status
Weight for Age Z-score	<-3.00 WAZ	Severe underweight
	-3.00 to <-2.00 WAZ	Moderate underweight
	-2.00 to <-1.00 WAZ	Mild underweight
	-1.00 to <+2.00 WAZ	Normal
Height for Age Z-score	< -3.00 HAZ	Severe stunting
	-3.00 to <-2.00 HAZ	Moderate stunting
	-2.00 to <-1.00 HAZ	Mild stunting
	-1.00 to <+2.00 HAZ	Normal
Weight for height Z-score	< -3.00 WHZ	Severe wasting (Sever Acute Malnutrition-SAM)
	-3.00 to <-2.00 WHZ	Moderate wasting (Moderate Acute Malnutrition-MAM)
	>-2.00 WHZ	Normal

Ref: Institute of Public Health Nutrition (IPHN), Ministry of Health and Family Planning.

1.6.2 Indirect Assessment of Nutritional Status

A variety of vital and health statistics are considered as indirect indicators of the nutritional status of the community. According to Jelliffe and Jelliffe (1989) four categories of information are considered as indirect indicators: (i) age-specific mortality rate; (ii) cause-specific morbidity and mortality rates; (iii) health services statistics, and (iv) nutritionally relevant infection rate. These indirect assessments have several practical problems such as collection or accurate data, necessity to ascertain not only their availability but also the probable degree of reliability, problems of interpretation and so on[48]. Some information related to nutritional status of groups or communities are also used as indirect indication such as agricultural data, socio-economic data, food consumption pattern, and special studies on foods[37].

1.6.2.1 Dietary Survey

Dietary Surveys:

Dietary surveys are a practical way to assess the energy intakes of groups of a population. It is very difficult to obtain accurate information about what people actually eat. In most food surveys, the subjects tend to under-report their consumption levels. Dietary assessment is a blanket term for any method used in dietary diet surveys.

Methods of Dietary Survey

Methods used for measuring individual food consumption can be classified into 2 major groups-

- Direct methods
- Indirect methods

Direct method is classified into two ways. First group is quantitative daily consumption method & the second group of methods includes the dietary history and the food frequency questionnaire.

Quantitative Daily Food Consumption Methods:

This method consists of recalls and records, designed to measure the quantity of the estimates of actual recent intakes of individuals. Assessment of actual intake is particularly critical when relationship between diet and biological parameters are assessed.

Recall method

It's also called 24 hour recall method. In this method the subject is asked to recall his/her exact food intake during the previous 24 hour period or preceding day. Quantities of foods are usually estimated in household measures and entered into the data sheet.

The interviewer must be trained and have a good idea about questions type. Food models of various types can be used as memory aid and to assist the respondent in assessing the portion size of food. The interview protocol must be standardized and protested prior to the study adherence to the interview protocol.

Repeated 24 hour recalls

24 hour recalls be repeated during different seasons of the year to estimate the average food intake individuals over a longer period. The number of 24 hour recalls required to

estimate the usual reorient intake of individuals depends on the degree of precision needed the nutrient under study and the population group.

1.7 Child Growth Standards

Growth charts are widely used as a clinical and research tool to assess the nutritional status and general health condition and wellbeing of infants, children and adolescents. Over the past 30 years, reference growth charts have proven to be important tools in aiding such assessments. A reference growth chart is a tool that provides a common basis for purposes of comparisons. Anthropometric reference data may be derived from two largely dissimilar sources; local and international. Local reference data should be compiled from measurements on well-nourished, healthy individuals, selected from a local elite group; the group should be ethnically and genetically representative of the population to be investigated. Such data may be predominating where it is felt that international reference data are unrealistic. In 1975 a working group was formed to advise World Health Organization (WHO) on the use of anthropometric indicators of nutritional status in surveys and for nutritional surveillance. The working group produced detailed recommendations on the use of children's height and weight data[38], which included the use of a reference population for international comparison. The WHO has recommended the National Center for Health Statistics (NCHS) reference growth data as an international standard for comparisons of health and nutritional status of children across all the countries of the world. The NCHS data were selected because they met most of the criteria suggested by the International Union of Nutritional Sciences for ideal reference data. Furthermore, the sample was large and representative, including at least 200 well nourished individuals in each age and sex group.

1.8Childhood mortality and Child nutritional status of Bangladesh

Bangladesh is one of the poorest countries of the world with the highest population density but then the country has achieved many health indicators for last few years; In spite of remarkable advances in public health during recent decades, many people throughout the developing world remain vulnerable to food insecurity, under-nutrition, and ill health[39]. Childhood mortality, particularly in the first 5 years of life, is a major

global concern and the target of Millennium Development Goal 4. Although the majority of childhood deaths occur in Africa and Asia, it is also very much concerning one of the issues of the whole world[40]. Maternal malnutrition and poor gestational weight gain are the most important causes of low birth weight and high rates of newborn mortality[41]. Bangladesh has one of the world's highest rates of low birth weight along with prevalent traditional care practices that leave newborns highly vulnerable to hypothermia, infection, and early death[42]. Bangladesh is similar to many other developing countries where under-nutrition is one of the leading causes of childhood morbidity and mortality. Under-nutrition among children is often caused by the combined effects of improper or insufficient food intake, repeated episodes of infections, and inadequate care during sickness[31]. Moreover, Low birth weight (LBW) is a major child health problem in Bangladesh and continuing to great threat to child health and child survival in Bangladesh. LBW is a silent emergency but crisis is real and its persistence has profound and frightening impact on neonatal mortality[43]. The improvements in nutrition status in Bangladesh, particularly child nutrition outcomes, have been relatively slow, despite remarkable improvements in the country's food situation as well as in the health sector. At present more than 40% of children under-5 years of age are stunted[44].

Malnutrition remains one of the most common causes of morbidity and mortality among children throughout the World[26]. It has been responsible, directly or indirectly, for 60% of the 10.9 million deaths annually among children. Well over two third of these deaths, which are often associated with inappropriate feeding practices, occur during the first year of life[22].

Under-five mortality rate is the number of deaths among children under 5 years of age per 1,000 live births in a given year. The data from Bangladesh Demographic and Health Survey (BDHS) 2014 show that there has been a remarkable decline (46 per 1,000 live births) in the under-five mortality rate since 1990. As a consequence of this rapid rate of decline, Bangladesh has already achieved the MDG 4 target for under 5 mortality (target of 48 per 1,000 live-births) by the year 2015[45].

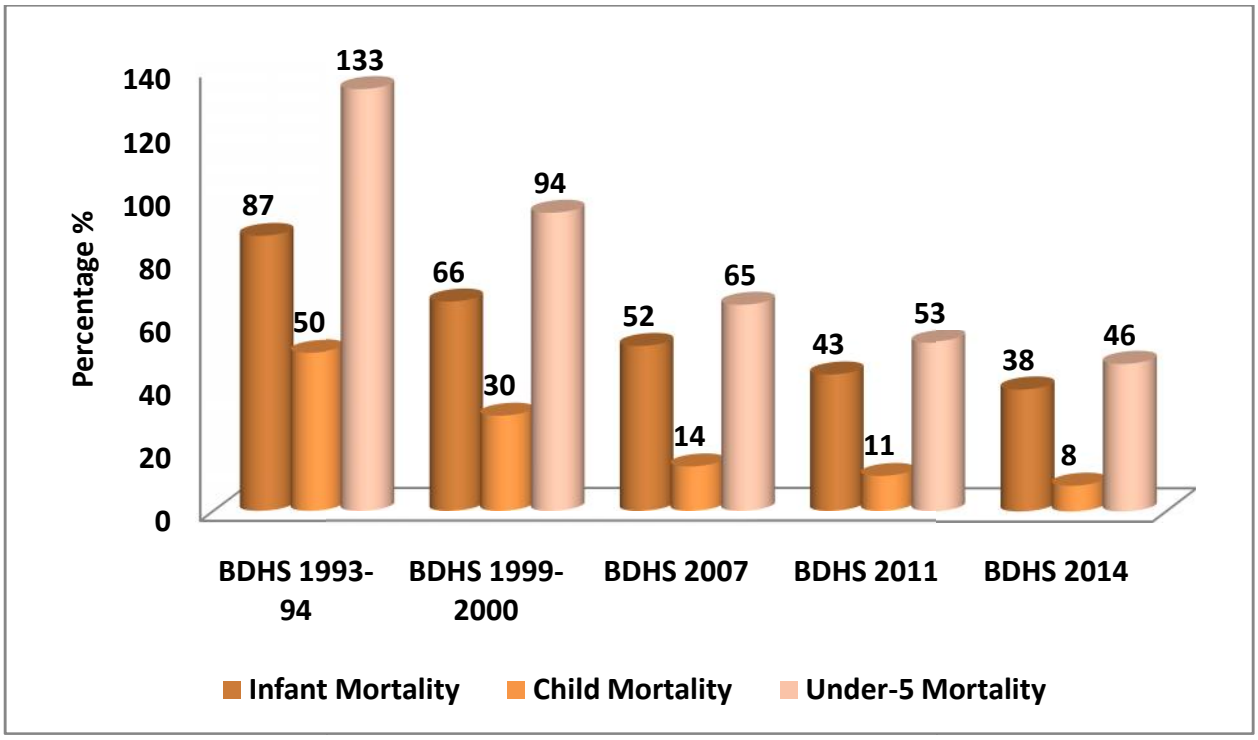


Figure 1: Trends in infant, child and under-5 mortality rates, 1993-2014

[Data Source: BDHS 1993-94, 1999-2000, 2007, 2011 and 2014]

Figure 1 presents the infant, child and under-5 mortality rates per 1000 live births from 1993-2014 where the observation pointed that infant mortality rate was 87 deaths per 1000 live births in 1993-94 and the number declined by 66 in 1999-2000, 52 in 2007, 43 in 2011 and 38 in 2014. Child mortality rates were also declining trends from 1993-2014; 50 deaths were in 1993-94, 30 in 1999-2000, 14 in 2007, 11 in 2011 and 8 in 2014 per 1000 live births. Under-5 mortality rates, on the other hand, were 133deaths per 1000 live births in 1993-94 but the number declined and reached at 94 in 1999-2000, 65 in 2007, 53 in 2011 and even 46 in 2014.

The four common micronutrient deficiencies include those of iron, iodine, vitamin A, and zinc. All these conditions are responsible directly or indirectly for more than 50% of all under-5 deaths globally[46].

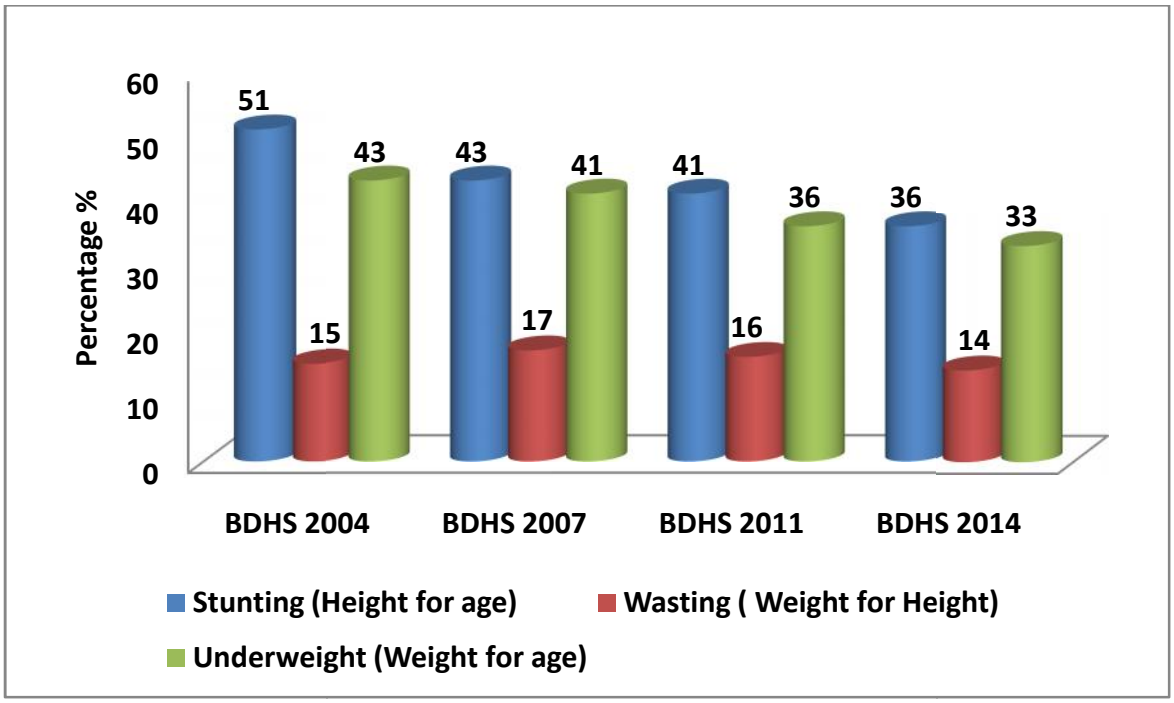


Figure 2: Trends in nutritional status of child under age 5, 2004-2014

[Data Source: BDHS 2004, 2007, 2011 and 2014]

Figure 2 shows the information of the nutritional status of child under-5 from 2004 to 2014, there has been some improvement in child nutritional status over the past decade in Bangladesh than other developing countries of the world. The level of stunting among children under-5 has declined from 51% in 2004 to 36% in 2014. In the last three years it declined by 5% points. Wasting increased to 17% in 2007 from 15% in 2004. It has then gradually declined to 16 percent in 2011 and 14% in 2014. The level of underweight has declined from 43% in 2004 to 33% in 2014 and also it has declined gradually to 41% in 2007 and 36% in 2011.

Under Millennium Development Goal 1 Bangladesh has set a target to halve the rate of underweight children between 1990 and 2015. Using the WHO standard, the MDG1 target is 31 percent, whereas using the NCHS reference, the target is 33 percent. Using the WHO reference, the 2014 BDHS data show that Bangladesh is 2 percentage points short of reaching MDG1 target for underweight. One in five children less than 6 months is underweight. At 6-8 months, 16 percent of children are underweight. The rate of underweight continues to increase with age, peaking at 38 percent at age 48-59 months.

Patterns of differentials by other background characteristics are similar to those for stunting and wasting[50].

According to the State of the World's Children (SOWC) report 2008, issued by the UNICEF, eight million or 48 percent of all children under five are underweight malnutrition contributes to about that of all Child deaths. One out of four children, roughly 146 million in developing countries is underweight. 10.9 million Children under- 5 die in developing countries each year[32]. More than 70% of the World's 146 million under age 5 years live in just 10 countries and more than 50% located in South Asia alone[32].

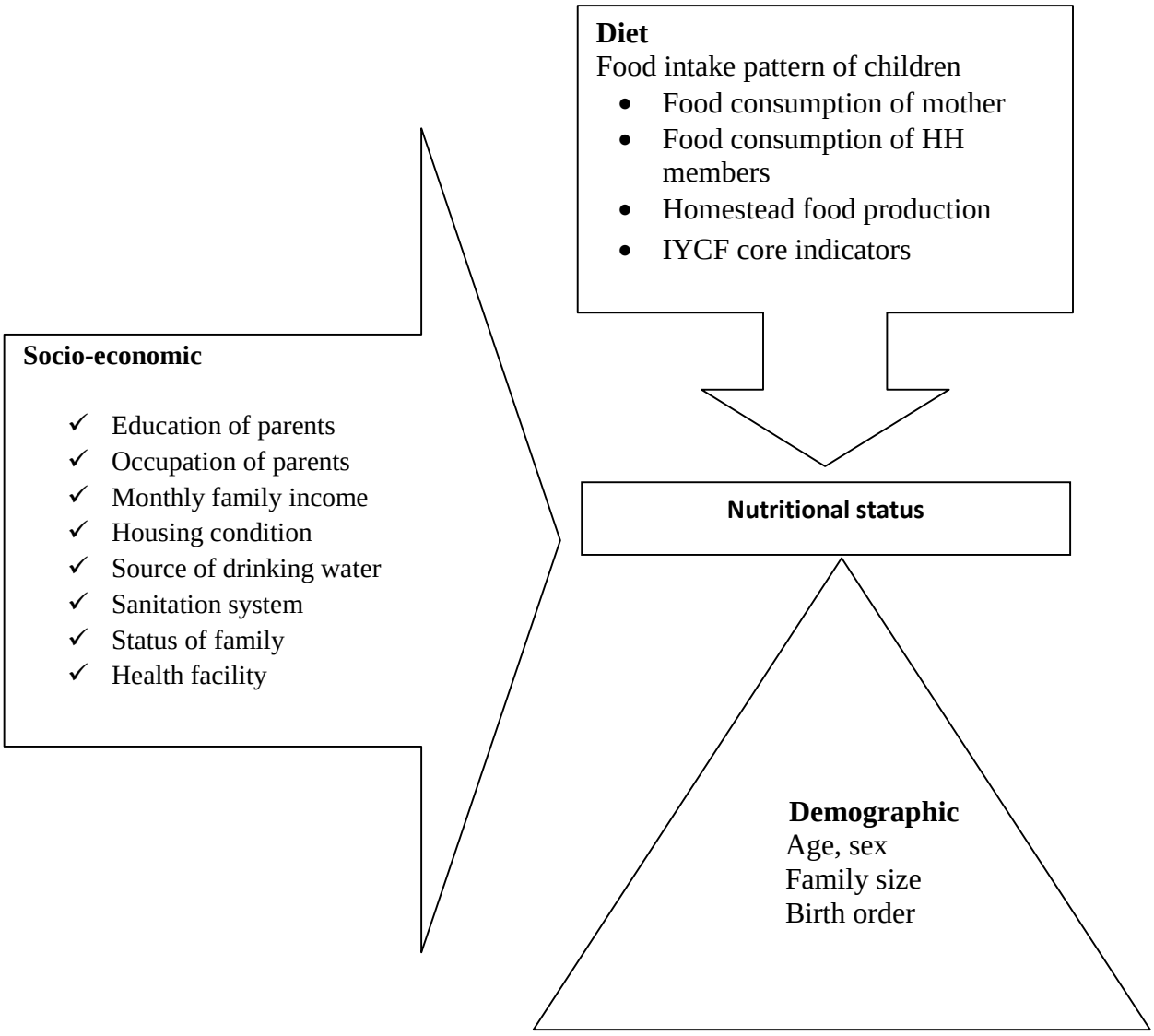
The scenario of Bangladesh is much frightening as it poses a major bulk of the malnourished children of the developing countries through the situation is slowly improving here from nineties[47]. Bangladesh is one of the three countries in South Asia region that accounts for half the world's malnourished children[32].

1.9 **Justification of the study:**

The assessment of the nutritional status of a community is one of the first steps for the formulation of any public health strategy to combat malnutrition. In this case this study will be done various techniques like- anthropometric, biochemical. Assessment of nutritional status is considered as a measure of health and it is necessary for planners to understand the food and nutrition situation among different socio-economic status in urban area of Dhaka city population for upliftment of these vulnerable people. Poor nutrition during childhood is one important factor impeding the physical and mental development of children, which ultimately propagates the vicious cycle of intergenerational malnutrition. The issue of child malnutrition is critical because its effects are not limited to the boundary of childhood but rather persist into adulthood. It silently destroys the future productivity of nations. Malnutrition increases the economic burden of a society because it leads to increased risk of death from infectious psychosocial burden. Studying stunting is important because it reflects the cumulative effects of socioeconomic, health and nutritional problems. Stunting is also a predictor of risk because it reflects the overall level of development characterized by poverty, low socioeconomic status, and the prevalence of chronic diseases. It is an important public-health problem in Bangladesh[19]. Over weight is more prevalent in relatively higher socio-

economic groups[20].Children's spent 3-4 hours daily at school and therefore, school environment can influence the food intake of the children. If school environment is obsesogenic it can contribute to the prevalence of childhood overweight and obesity. The present study aims to assess the prevalence of and factors associated with chronic malnutrition among preschool children in the urban setting of Dhaka city, Bangladesh. The results of the study may facilitate further development of the existing child health program in Bangladesh in a sustainable way through ownership of family and community.

1.10 Conceptual frame work:



1.11 Operational definition:

The definition of different information of this study was used by the researcher for the benefit of research work and to realize the main or exact theme of objective. Some of the terms was in this study are given below to prevent confusion.

Nutritional status: It was determined by measuring height, weight, mid arm circumference and Z- scores (HAZ, WAZ, and WHZ). Here cut off point for Z score was taken as -2SD and those was find below this level was taken as stunted, underweight and wasted accordingly.

Anthropometric assessment: Measurement of the physical dimension and the gross composition of the body.

Z-score: The Z-score or standard deviation unit (SD) was defined as the difference between the value for an individual and the median value of the reference population for the same age or height, divided by the standard deviation of the reference population. e.g.

Weight for age= observed weight- median weight of reference of given age and sex/ standard deviation of reference population of same age and sex group.

Socio-economic status:

Socioeconomic classifications in this study were made according to the 2006 per capita Gross National Income (GNI) and according to World Bank (WB) calculations[19].

Low-income, US$ = 905 or Bangladeshi Taka; BDT =5360;

Lower-middle-income, US$ (906–3595) or BDT (5361– 21270)

Upper-middle-income, US$ (3596–11115) or BDT (21271–65761); and

High-income, US$ =11116 or BDT =65762.

Occupation: The main source of earning money.

Total monthly income: It was include pay and allowances drawn by parents of respondent plus any income from other family member in absence of father.

Food intake of respondent: The type and varieties of food items that was taken by the respondents as their daily diet in different times of a day.

Dietary diversity: Variety of food items consumed in the last 3 days from a list of 7 food groups. It was measured by calculating the mean number of food types consumed over the 3 days. Household respondents were asked to recall the variety of items consumed over the last 3 days.

Diarrheal diseases: History of diarrhea last 7 days.

2.1 RESEARCH QUESTIONS:

- What are the socio-economic statuses of their parents?
- What are the food intake patterns of the study population?
- What is the nutritional status of the study population
- What is the association of the socio-economic status of their parents and nutritional status among the study population?
- What is the association of food intake pattern and nutritional status among the study population?

OBJECTIVES:

2.2 General objective:

To assess the Nutritional status of pre-school children among different socio-economic status in urban area of Dhaka city

2.3 Specific objectives:

1. To assess the socio-economic status of their parents
2. To find out food intake pattern of the study population
3. To assess the nutritional status of the study population
4. To determine the association of the socio-economic status of their parents and nutritional status among the study population
5. To determine the association of food intake pattern and nutritional status among the study population

3. METHODOLOGY

3.1 Study design:

The study was a comparative cross sectional study.

3.2 Study population:

Different socio-demographic statuses of pre-school children's (age 3 to 5 yrs) are widely populated different house hold in Dhaka city. A socioeconomic classification in this study was made according to the 2006 per capita Gross National Income (GNI) and according to World Bank (WB) calculations[19].

3.3 Inclusion criteria:

- Preschool children of both gender
- Age 3-5 years
- Live in the urban area of Dhaka city
- All mothers/caregivers with children aged less than five
- Giving voluntary consent to participate

3.4 Exclusion criteria*:*

- <3 years and >5 years Children
- Children of age 3-5 who are severely ill within one month
- Those who refused to participate in study
- Severely ill mothers and children.

3.5 Study area:

The study was conducted at Karail slum; Mohakhali zone; ward no. 20, Shattala slum; Mohakhali, Rampura, Bonsree and Badda in Gulshan Zone of Dhaka city. These areas were stratified cluster randomly selected for data collection and to get adequate sample of study population.

3.6 Sampling technique:

Sample was selected through stratified cluster sampling considering the inclusion and exclusion criteria.

3.7 Determination of Sample size:

During the period of this study, there was no available published article on nutritional status of urban children based on different socio-economic status. In this regard, we had used 200 (each group) data for pre-test and analyzed them. We had get prevalence of stunting, wasting and underweight and had used the lowest prevalence rate (4%) as reference data for calculation of sample size of this study.

Sample was taken by using this formula

$$n = \frac{Z^2 * pq}{d^2}$$

$$\text{So, } n = \frac{(1.96)^2 * 4 * 96}{(1.6)^2} = 576$$

Where,

n=sample size

Z= 1.96 (value of 95% CI)

P= prevalence of outcome (4%)

q= 1- p

d= standard error (1.6%)

Therefore, n= 576

Initial sample size=576

Adjusting for cluster effect of 1.5,

n=576*1.5 =864

Adjusting for 10% non-response

n=864/0.9

Sample Size, n =960≈ 1013

3.8 Data collection procedure:

Quantitative data collection:

Information was collected from the mother of the children included in the study. A data collection team were directly involved in the process of data collection. They had selected caregiver and children from the study area randomly. Every interview took 1 to 1.5 hour. To determine nutritional status and food amount, each team carried Height scale, weight machine, MUAC tap and food measuring cups. Data was crossed checked at the spot by cross verification with another team leader involved in the study. Four types of quantitative data were collected in the study through structured questionnaire.

Tools use for data collection:

- **Data on socio-economic status**

Data of socio demographic information were collected by structural questionnaire.

- **Anthropometrics measurement (weight, height and MUAC)**

i. Weight was taken using weighing scale.
ii. Height was taken using locally made height scale.
iii. MUAC was taken using MUAC tap.

- **Data on Dietary intake**

  To know the pre-school children's nutritional status I have collected data on dietary intake using3 day recall method.

- **Data on personal hygiene practice:**

Data of personal hygiene were collected by structural questionnaire.

Consent was taken from the mothers to fulfilling the eligibility criteria and agreeing to participate as indicated by signing on an informed consent form. Information on current nutritional status, food intake and socio economic status of the pre-school children were collected.

3.9 Data collection Technique:

Interview using structured questionnaires and face to face interview. Socio-demographic data was collected by questionnaire. Three day recall method was used for

dietary history. Weight, height, MUAC was measured for preschool children aged 3 to 5 years by using standard technique.

3.10 List of Variables:

Dependent variable:

- Nutritional status

Independent variables:

- Age of children
- Sex of children
- Birth order
- Birth history
- Family size or number of house hold members
- Education of parents
- Occupation of parents
- Income of family/month
- Housing condition
- Source of drinking water
- Sanitation system
- Food consumption of children
- Dietary pattern and Food habit

3.11 Data collection instrument

Quantitative data: Questionnaire, consent form, measuring tape, height scale, MUAC tape, weight machine, food measuring cup, pen, pencil, eraser etc.

3.12 Quality control method:

Data quality was controlled through tools verification (compare to standard tools) questionnaire, check editing, data entry, entry and minimizing response errors through prove question. Here, I used the data collected from dependable sources. Supervisor had checked the field work for quality.

3.13 Data coding, editing & entry to the computer:

As soon as the data was collected, I had started data entry by sung suitable data entry software. After collecting data, it had been entered using suitable data entry software (SPSS- 17).

3.14 Data analysis

After completion of the data collection, editing, coding and entry data was analyzed using standard software (SPSS-17).

3.14. Analysis of quantitative data:

Both univariate and bivariate analysis were done for this study. Frequency distributions for all variables were checked to see overall pattern of respondent's characteristics. Chi-square test and t-test were done to see bivariate relationship. Chi-square values were calculated to see the relationship between four categorical variables. One way ANOVA was done to compare four measures. For tables, charts and graphical representation Microsoft word and Microsoft excel was used.

3.15 Ethical Consideration:

- Ethical permission was obtained from Diabetic Association of Bangladesh.
- Informed consent
- Voluntary participation
- Maintain confidentially
- Participant was allowed to withdraw themselves at any stage of study

3. RESULT

4.1 Background characteristics of the respondents:

a. Socio economic characteristics regarding parents of children

Table 1 showed that according to monthly income 29% children were in Upper SES, 23% children were in Upper Middle SES, 23% children were in Lower Middle SES and 24% children were in Lower SES. According to mothers education 11% mothers were no schooling and 26% mothers were completed their graduation. The table also showed that 69% of mothers were homemaker; on the other hand 21% mothers had small business and others. Different types of occupation were done by 39% fathers and 27% were in non-govt. job. In this study 70% mothers were respondents and 82% lives on rented house. The source of water of the study subjects were 100% of tap water.

Table1: Socio economic characteristics regarding parents of children (n=1013)

Characteristics	Number	Percentage (%)
Monthly Income		
Upper SES (BDT ≥ 65762)	298	29.42
Upper Middle SES (BDT 21271-65761)	236	23.30
Lower Middle SES (BDT 5361-21270)	232	22.90
Lower SES (BDT≤5360)	247	24.38
Education of Mother		
No schooling	110	10.86
Primary	231	22.80
Secondary	190	18.76
Higher Secondary	215	21.22
Graduation	267	26.36
Education of Father		
No schooling	72	7.11
Primary	207	20.43
Secondary	138	13.62
Higher Secondary	82	8.09
Graduation	514	50.74
Occupation of the mother		
Homemaker	703	69.40
Small business & others	217	21.42
Teacher	14	1.38
Non-Govt. job	39	3.85
Govt. job	40	3.95
Occupation of the father		
Business	225	22.21
Teacher	5	0.49
Non-Govt. job	272	26.85
Govt. job	116	11.45
Others	395	38.99
Types of respondents		
Mother	707	69.79
Father	219	21.62
Grandmother	48	4.74
Sibling	37	3.65
Other	2	0.20
Housing status		
Own	112	11.06
Govt. house	72	7.11
Rent	829	81.84
Sources of drinking water		
Tap	1013	100

b. Socio demographic characteristics of study subjects

Table 2 showed that a total of 1013 preschool children aged of (M±SD) 51.51±6.03 month were studied. The average height (M±SD), weight (M±SD) and MUAC (M±SD) of the study subjects were 101.74±6.91 cm, 15.68±2.34 kg and 14.96±2.07 cm respectively. In terms of age group 27% and 73% children were 36 to 48 months and 49 to 60 months respectively. In this study 52% children were boys and 48% children were girls. Around 56% children's birth weight were <2.5 kg. This table also showed that 46% children's birth interval was 2 to 2.9 years. Birth order of the study children 1 to 2 were 90%.

Table 2: Socio demographic characteristics of study subjects (n=1013)

Characteristics	**Number**	**Percentage (%)**
Age in month (M±SD)	51.51±6.03	
Weight in kg (M±SD)	15.68±2.34	
Height in cm (M±SD)	101.74±6.91	
MUAC in cm (M±SD)	14.96±2.07	
Age group of children		
36-48m	273	26.95
49-60m	740	73.05
Sex of children		
Boys	523	51.63
Girls	490	48.37
Birth weight of children		
<2.5 kg	570	56.27
2.5-2.9 kg	330	32.58
>3 kg	113	11.15
Birth interval of children		
>1 year	258	25.47
1-1.9 year	44	4.34
2-2.9 year	464	45.80
>3 year	247	24.38
Birth order of children		
1 -2	911	89.93
3 -4	100	9.87
5 and more	2	0.20

c. Socio demographic characteristics of mother of children

Table 3 showed that mother's age at marriage was classified in three categories. Among them 53% mother were form 18 to 25 years and 47% were less than 18 years. About 80% of mothers had their first baby during 18 to 25 years and 17% had at below 18 years. More than 65% of mothers had normal delivery whereas 35% had caesarian. Delivery attended by doctor was 49% and by midwife was 36%.About 63% of delivery was done in hospital and 37% was done at home.

Table 3: Socio demographic characteristics of mother of children (n=1013)

Characteristics	Number	Percentage (%)
Mother's age at marriage		
<18 year	474	46.79
18-25 year	537	53.01
>25 year	2	0.20
Mother's age at 1st baby		
<18 year	173	17.08
18-25 year	806	79.57
25-30 year	34	3.36
Types of delivery		
Normal	663	65.45
Caesarian	350	34.55
Delivery attended by		
Doctor	492	48.57
Nurse	144	14.22
Midwife	366	36.13
Others	11	1.09
Place of delivery		
Hospital	639	63.08
Home	373	36.82
Others	1	0.10

4.2 Nutritional characteristics of the respondents:

a. Nutritional status of children according to weight (WAZ)

The table 4 showed that 68.81% of children were normal in weight according to age and 25% children were in mild underweight. Overweight children were 1.68% whereas moderate and severe underweight were 3.65% and 0.5% respectively.

Table 4: Nutritional status of children according to weight (WAZ)

Nutritional Status	Frequency	Percentage
Over weight	17	1.68
Normal Weight	697	68.81
Mild Underweight	257	25.37
Moderate Underweight	37	3.65
Sever Underweight	5	0.49
Total	1013	100

b. Relationship between nutritional status (WAZ) of the children and their family income

The table 5 showed that 93% of children from upper SES and 89% of children from upper middle SES were normal in weight. On the other hand only 47% of children were normal in weight and 49% of children were mild underweight in lower SES.

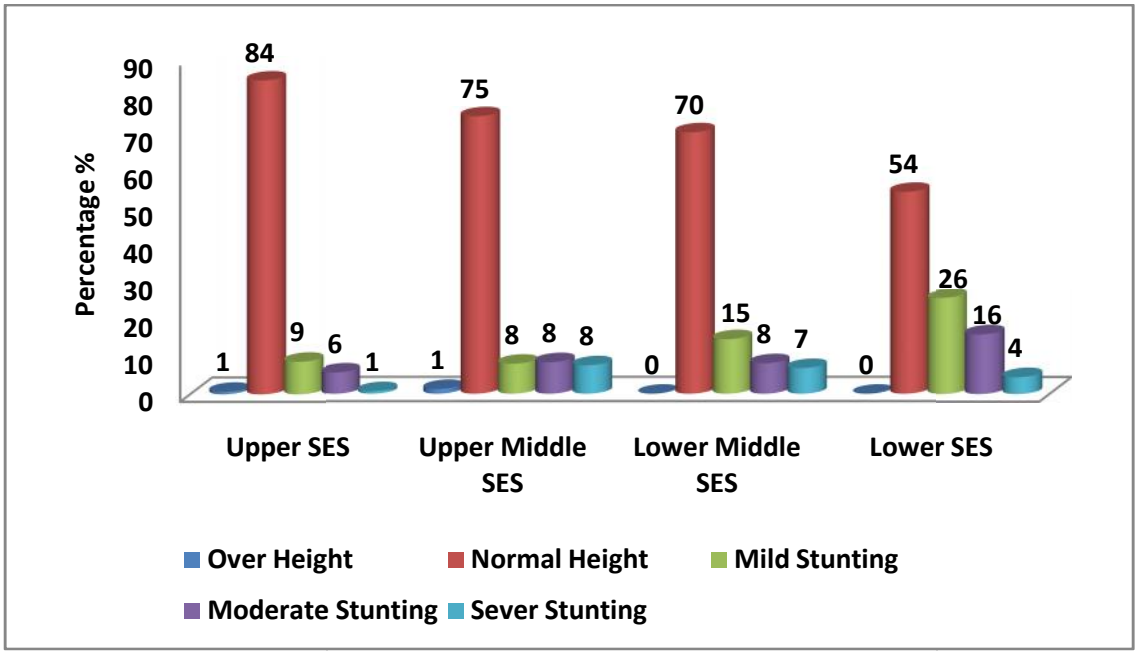
Table 5: Relationship between nutritional status (WAZ) of the children and their family income

Nutritional Status	Upper SES n(%)	Upper Middle SES n(%)	Lower Middle SES n(%)	Lower SES n(%)
Over weight	5	1	0	0
Normal Weight	93	89	47	42
Mild Underweight	2	10	46	49
Moderate Underweight	0	0	7	8
Sever Underweight	0	0	1	1

SES= Socio Economic Status, n% indicates total percentage of the subjects in a group. P<0.001, Chi-square test

c. **Relationship between Nutritional Status (HAZ) of the children and their family income**

The figure 1 showed that 84% of children from upper SES and 75% of children from upper middle SES were normal in height. On the other hand only 54% of children were normal in height and 26% of children were in mild stunting in lower SES.



SES= Socio Economic Status P<0.001, Chi-square test

Fig 1: Relationship between Nutritional Status (HAZ) of the children and their family income

d. Relationship between Nutritional Status (WHZ) of the children and their family income

The table 6 showed that 98% of children from upper SES and 98% of children from upper middle SES were normal in weight according to their height. On the other hand about 7% of children were MAM and 3.24% of children were SAM in lower SES respectively.

Table 6: Relationship between Nutritional Status (WHZ) of children and their family income

Nutritional Status	Upper SES n(%)	Upper Middle SES n(%)	Lower Middle SES n(%)	Lower SES n(%)
Normal weight	97.99	98.31	89.22	89.47
MAM	1.68	1.27	7.76	7.29
SAM	0.34	0.42	3.02	3.24

SES= Socio Economic Status, MAM= Moderate Acute Malnutrition, SAM= Sever Acute Malnutrition, n% indicates total percentage of the subjects in a group. P<0.001, Chi-square test (Source: WHO 2006[56])

e. Relationship between nutritional status (MUAC) of the children and their family income

The table 7 showed that 100% of children from upper SES and 99% of children from upper middle SES were in good nutritional status according to MUAC. On the other hand 3% of children were SAM and 5.3% of children were SAM in lower middle and lower SES respectively.

Table 7: Relationship between nutritional status (MUAC) of the children and their family income

Nutritional Status (MUAC)	Upper SES n (%)	Upper Middle SES n (%)	Lower Middle SES n (%)	Lower SES n (%)
Normal	100.0	98.7	88.4	80.2
MAM	0.0	1.3	8.6	14.6
SAM	0.0	0.0	3.0	5.3

SES= Socio Economic Status, MUAC= Mid Upper Aram Circumference, MAM= Moderate Acute Malnutrition, SAM= Sever Acute Malnutrition, N% indicates total percentage of the subjects in a group.P<0.001, Chi-square test(Source: WHO 2006[56])

4.3 Relationship between Nutritional status of children and Socio Economic Status of their Parents

The table 8 showed moderate to severe underweight, stunting and wasting were 55%, 35% and 43% among lower SES. Significant association has been found in relation of family Socio Economic Status (SES) and child nutritional status.

Table 8: Relationship between Nutritional status of children and Socio Economic Status of their Parents

Nutritional status	Socio economic status				*P*-value
	Lower SES n(%)	Lower Middle SES n(%)	Upper Middle SES n(%)	Upper SES n(%)	
Underweight (WAZ<-2SD)	23 (54.8)	18 (42.9)	1 (2.4)	0 (0.0)	<0.001
Stunting (HAZ<-2SD)	50 (35.2)	35 (24.6)	38 (26.8)	19 (13.4)	<0.001
Wasting (WHZ<-2SD)	26 (42.6)	25 (41.0)	4 (6.6)	6 (9.8)	<0.001

SES= Socio Economic Status,

4.4 Relationship between Mother's education and Nutritional status of children

The table 9 showed moderate to severe underweight, stunting and wasting were 48%, 26%, and 38% among primary educated mother. Significant association has been found in relation of mother's educational status and child nutritional status.

Table 9: Relationship between Mothers education and Nutritional status of children

Nutritional status	Mothers educational status					*P*-value
	No schooling n(%)	Primary n(%)	Secondary n(%)	Higher secondary n(%)	Graduation and above n(%)	
Underweight (WAZ<-2SD)	11 (26.2)	20 (47.6)	10 (23.8)	1 (2.4)	0 (0.0)	<0.001
Stunting (HAZ<-2SD)	20 (14.1)	37 (26.1)	38 (26.8)	20 (14.1)	27 (19.0)	<0.001
Wasting (WHZ<-2SD)	12 (19.7)	23 (37.7)	20 (32.8)	01 (0.6)	05 (8.2)	<0.001

4.5 Relationship between Nutritional status of children and working status of mother

The table 10 showed moderate to severe underweight, stunting and wasting were 50%, 67% and 64% among no working mother. Significant association has been found in relation of mother's working status and child nutritional status.

Table 10: Relationship between Nutritional status of children and working status of their mother

Nutritional status	Working mothers		*P*-value
	Yes	No	
Underweight (WAZ<-2SD	21 (50)	21 (50)	<0.001
Stunting (HAZ<-2SD)	47 (33.1)	95 (66.9)	0.010
Wasting (WHZ<-2SD)	22 (36.1)	39 (63.9)	0.002

4.6 Relationship between father's education and Nutritional status of children

The table 11 showed moderate to severe underweight, stunting and wasting were 45%, 30%and 20% among primary educated father. Significant association has been found in relation of father's educational status and child nutritional status.

Table 11: Relationship between father's education and Nutritional status of children

Nutritional status	Mothers educational status					*P*- value
	No schooling n (%)	Primary n (%)	Secondary n (%)	Higher secondary n (%)	Graduation and above n (%)	
Underweight (WAZ<-2SD	9 (21.4)	19 (45.2)	5 (11.9)	8 (19.0)	1 (2.4)	<0.001
Stunting (HAZ<-2SD)	18 (12.7)	30 (21.1)	23 (16.2)	21 (14.8)	50 (35.2)	<0.001
Wasting (WHZ<-2SD)	6 (9.8)	20 (32.8)	15 (24.6)	10 (16.4)	10 (16.4)	<0.001

4.7 Relationship between father's occupation and Nutritional status of children

The table 12 showed moderate to severe underweight, stunting and wasting were 14%, 31%and 14% among primary educated father. Significant association has been found in relation of father's occupation and child nutritional status.

Table 12: Relationship between father's occupation and Nutritional status of children

Nutritional status	Mothers educational status					*P*- value
	Business n (%)	Teacher n (%)	Non-Govt. job n (%)	Govt. job n (%)	Others n (%)	
Underweight (WAZ<-2SD	1 (2.4)	0 (0.0)	6 (14.3)	2 (4.8)	33 (78.6)	<0.001
Stunting (HAZ<-2SD)	21 (14.8)	1 (0.7)	31 (21.8)	18 (12.7)	71 (50.0)	<0.001
Wasting (WHZ<-2SD)	4 (6.6)	0 (0.0)	14 (23.0)	1 (1.6)	42 (68.9)	<0.001

4.8Multiple regression analysis of nutritional status (HAZ) with socioeconomic factor of study subject (Table13)

Multiple regression analysis was tested HAZ as dependent variable and others as independent variables. Table revealed that age, sex and family income of the family were significantly associated with HAZ of study subjects (*P*=<0.001, *P*=<0.001, *P*=<0.001) and rest of the variables such as education of mother, education of father, occupation of mother, occupation of father and housing status were not significantly associated with HAZ of study subjects.

Table 13: Multiple regression analysis of nutritional status (HAZ) with socioeconomic factor of study subject (n=1013)

Variables	Standardized coefficient (β)	*P* value
Age (month)	.438	<0.001
Sex	-.126	<0.001
Education of mother	.027	.738
Education of father	-.025	.763
Occupation of mother	.070	.021
Occupation of father	-.054	.282
Family income	-.259	<0.001
Housing status	.017	.588

Multiple regression analysis was performed with HAZ as dependent Variable

4.9Multiple regression analysis of nutritional status (WAZ) with socioeconomic factor of study subject (Table 14)

Multiple regression analysis was tested with WAZ as dependent variable and others as independent variables. Table revealed that age, family income and housing status of the family were significantly associated with WAZ of study subjects (*P*=<0.001, *P*=<0.001, *P*=<0.001) and rest of the variables such as sex, education of mother, education of father, occupation of mother and occupation of father were not significantly associated with WAZ of study subjects.

Table 14: Multiple regression analysis of nutritional status (WAZ) with socioeconomic factor of study subject (n=1013)

Variables	Standardized coefficient (β)	*P* value
Age (month)	0.103	<0.001
Sex	0.055	0.025
Education of mother	0.168	0.024
Education of father	-0.027	0.733
Occupation of mother	0.060	0.034
Occupation of father	0.012	0.799
Family income	-.440	<0.001
Housing status	-.124	<0.001

Multiple regression analysis was performed with WAZ as dependent Variable

4.10 Multiple regression analysis of nutritional status (WHZ) with socioeconomic factor of study subject (Table 15)

Multiple regression analysis was tested with WHZ as dependent variable and others as independent variables. Table revealed that age, sex, family income and housing status of the family were significantly associated with WHZ of study subjects (*P*=<0.001, *P*=<0.001, *P*=<0.001,*P*=<0.001) and rest of the variables such as education of mother, education of father, occupation of mother and occupation of father were not significantly associated with WHZ of study subjects.

Table 15: Multiple regression analysis of nutritional status (WHZ) with socioeconomic factor of study subject (n=1013)

Variables	Standardized coefficient (β)	*P* value
Age (month)	-0.223	<0.001
Sex	0.169	<0.001
Education of mother	0.161	0.048
Education of father	-0.008	0.926
Occupation of mother	0.007	0.817
Occupation of father	0.056	0.270
Family income	-0.275	<0.001
Housing status	-0.150	<0.001

Multiple regression analysis was performed with WHZ as dependent Variable

4.11 Multiple regression analysis of nutritional status (MUAC) with socioeconomic factor of study subject (Table 16)

Multiple regression analysis was tested with MUACZ as dependent variable and others as independent variables. Table revealed that age, family income and housing status of the family were significantly associated with WHZ of study subjects (*P*=<0.001, *P*=<0.001,*P*=0.001) and rest of the variables such as sex, education of mother, education of father, occupation of mother and occupation of father were not significantly associated with MUAC of study subjects.

Table 16: Multiple regression analysis of nutritional status (MUAC) with socioeconomic factor of study subject (n=1013)

Variables	Standardized coefficient (β)	*P* value
Age (month)	0.335	<0.001
Sex	-0.019	0.376
Education of mother	0.141	0.026
Education of father	0.098	0.145
Occupation of mother	0.028	0.256
Occupation of father	0.021	0.604
Family income	-0.414	<0.001
Housing status	-0.085	0.001

Multiple regression analysis was performed with MUAC as dependent Variable

4.12Food intake pattern of respondents:

a. Intake of total energy (Kcal/day) among different socio economic status

The table 17 showed that intake of total energy (Kcal/day) among upper SES and upper middle SES were 800±215 and 770±184 respectively. On the other hand intake of total energy (Kcal/day) among lower middle SES and lower SES were 727±108 and 484±128 respectively.

Table 17: Intake of total energy (Kcal/day) among different socio economic status

Socio-economic group	N	Mean (Kcal/day)	Std. Deviation
Upper SES	298	800	±215
Upper Middle SES	236	770	±184
Lower Middle SES	232	727	±108
Lower SES	247	484	±128

SES= Socio Economic Status, Kcal= Kilo Calorie, N indicates Number of the subjects in a group. P<0.001, One-way-ANOVA test.

b. Intake of Carbohydrate (g/day) among different socio economic status

The table 18showed that intake of total Carbohydrate (g/day) among upper SES and upper middle SES were 127±27and 123±26 respectively. On the other hand intake of total Carbohydrate (g/day) among lower middle SES and lower SES were 143±54 and92±24 respectively.

Table 18: Intake of Carbohydrate (g/day) among different socio economic status

Socio-economic group	N	Mean (g/day)	Std. Deviation
Upper SES	298	127	±27
Upper Middle SES	236	123	±26
Lower Middle SES	232	143	±54
Lower SES	247	92	±24

SES= Socio Economic Status, g= Gram, N indicates Number of the subjects in a group. P<0.001, One-way-ANOVA test

c. Intake of total protein (g/day) among different socio economic status

The table 19 showed that intake of total Protein (g/day) among upper SES and upper middle SES were 33.79±13.6and 31.79±13.23 respectively. On the other hand intake of total Protein (g/day) among lower middle SES and lower SES were 22±6.41 and16±6.10respectively.

Table 19: Intake of total protein (g/day) among different socio economic status

Socio-economic group	N	Mean (g/day)	Std. Deviation
Upper SES	298	33.79	±13.6
Upper Middle SES	236	31.79	±13.23
Lower Middle SES	232	22	±6.41
Lower SES	247	16	±6.10

SES= Socio Economic Status, g= Gram, N indicates Number of the subjects in a group. P<0.001, One-way-ANOVA test

d. Intake of total fat (g/day) among different socio economic status

The table 20 showed that intake of total Fat (g/day) among upper SES and upper middle SES were 16.30±9.45 and 16.77±10.51 respectively. On the other hand intake of total Fat (g/day) among lower middle SES and lower SES were 6.84±3.47and 4.58±3.01 respectively.

Table 20: Intake of total fat (g/day) among different socio economic status

Socio-economic group	N	Mean (g/day)	Std. Deviation
Upper SES	298	16.30	±9.45
Upper Middle SES	236	16.77	±10.51
Lower Middle SES	232	6.84	±3.47
Lower SES	247	4.58	±3.01

SES= Socio Economic Status, g= Gram, N indicates Number of the subjects in a group. P<0.001, One-way-ANOVA test

e. Correlation between nutritional status and dietary intake of study subjects (n=1013)

Table 21showed energy intake was significantly associated with WHZ, HAZ, WAZ and MUACZ (*P*=<0.001, *P*=<0.001, *P*=<0.001 and *P*=<0.001) of the study subjects and similar findings were seen in case of carbohydrate intake, protein intake and fat intake of the study subjects.

Table 21: Correlation between nutritional status and dietary intake of study subjects (n=1013)

Variable	Nutritional status of study subjects (Anthropometric indicators)	r	*P*
Energy	WHZ	0.224	<0.001
	HAZ	0.200	<0.001
	WAZ	0.344	<0.001
	MUACZ	0.365	<0.001
Carbohydrate	WHZ	0.107	0.001
	HAZ	0.153	<0.001
	WAZ	0.204	<0.001
	MUACZ	0.193	<0.001
Protein	WHZ	0.267	<0.001
	HAZ	0.195	<0.001
	WAZ	0.381	<0.001
	MUACZ	0.421	<0.001
Fat	WHZ	0.255	<0.001
	HAZ	0.181	<0.001
	WAZ	0.359	<0.001
	MUACZ	0.401	<0.001

Pearson's correlation coefficient are performed for the analysis; p<0.001 are considered as statistically more significant; WAZ= Weight for Age, HAZ= Height for Age, WHZ= Weight for Height, MUACZ= Mid Upper Arm Circumference.

4.13: Correlation between nutritional status and total Energy intake of study subjects

Figure 2 showed that Energy intake had strongly positively associated with children's WAZ and *p* value was <0.0001.

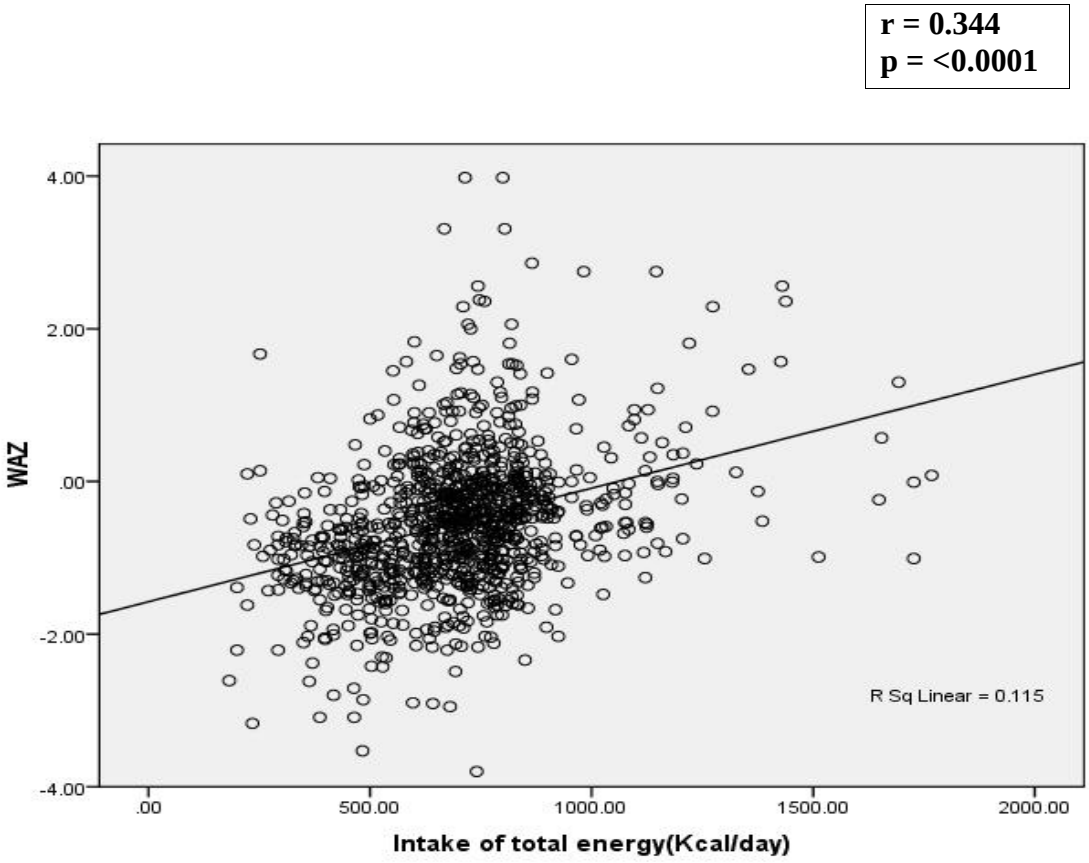


Figure2: Correlation between nutritional status (WAZ) and total Energy intake of study subjects.

5. DISCUSSION

Bangladesh has alarming rates of chronic and acute under nutrition, including the highest prevalence of underweight children in South Asia. The study showed that nutritional status as well as food intake pattern of pre-school children depends on different socio-economic status of their parents in urban area of Dhaka city. The study was intended to equally cover children of all the Socio Economic Status (SES) but a few more of the children were from upper SES compared to children of other SES.

Poverty, low literacy rate, large families, food insecurity, food safety, women's education appears to be the important underlying factors responsible for poor health status of children from low socioeconomic class. It requires economic, political and social changes as well as changes for personal advancement mainly through educational opportunities to improve the nutritional status of the children[54]. The study illustrated that about half of the mother of lower SES were working outside of home for more than four hour whereas only one fifth of mother of upper SES were working mother.

By this study, Carbohydrate, protein and fat intake were increased along with age going. - Total intake of Carbohydrate (g/day) among upper SES and upper middle SES were normal in quantity whereas intake of total Carbohydrate (g/day) among lower middle SES were high and in lower SES were quite low. Total intake of Protein and Fat (g/day) among upper SES and upper middle SES were good in amount compared to other two SE groups. This study result showed that, energy intake was significantly associated with WHZ, HAZ, WAZ and MUACZ of the study subjects and similar findings were seen in case of carbohydrate intake, protein intake and fat intake of the study subjects.

Mushtaq et al. reported that relatively low prevalence of stunting and thinness depicted an improvement in the nutritional status of school-aged children in Pakistan. However, the inequities between the poorest and the richest population groups were marked with significantly higher prevalence of stunting and thinness among the rural and the urban poor, the least educated, the residents of low-income neighborhoods and those having crowded houses. An increasing trend with age was observed in prevalence of stunting and thinness[53]. By this study it was found that, a few but alarming number of children from upper SES and upper middle SES were overweight. Childhood obesity can affect children's health for the rest of their lives; it is directly associated with adult obesity, itself associated with many health problems[52]. Most of the children from upper SES and upper middle SES were normal in weight. On the other hand half of the children were mild underweight in lower middle and lower SES.

According to Ethiop. J. family/household income was significantly associated with nutritional status of the under five children. Children belonging to the low-income group

were at a higher risk of being wasted, underweight and stunted than children of better income families. Although the economic differentials seem to be silent in rural society it appears to be an important predictor of childhood nutritional status. Low income levels of developing nation limits the kinds and the amounts of food available for consumption. Low income also increases the likelihood of infection through such mechanisms as inadequate personal and environmental hygiene. This study mainly indicated family income as an important predictor of malnutrition even in the seemingly uniformly poor society[55].In this study, one fifth of children from upper SES and two third of children from upper middle SES and lower middle SES were normal in height. On the other hand, in lower SES only half of the children were normal in height and one fourth of children were mild stunting. Very few by alarmingly, children were affected by Moderate Acute Malnutrition (MAM) in all SES and this prevalence is four times higher in lower SES.

This study result showed that, significant association has been found in relation of mother's educational status and child nutritional status. Moderate to severe underweight, stunting, wasting and thinness were found among primary educated mother which was higher than higher educated mother. Significant association has been also found in relation of mother's working status and child nutritional status. It was also found by this study that, there was significant association between relation of father's educational status and child nutritional status. Moderate to severe underweight, stunting, wasting and thinness were found among primary educated father which was higher than higher educated fathers. Significant association has been also found in relation of father's occupation and child nutritional status on severe underweight, stunting, wasting and thinness.

About multiple regression analysis, it was revealed that age, sex and family income of the family were significantly associated with HAZ of study subjects and rest of the variables such as education of mother, education of father, occupation of mother, occupation of father and housing status were not significantly associated with HAZ of study subjects.

6.1 CONCLUSION

The study gives us the picture of the severity of malnutrition among the children of Dhaka city in different socio-economic group. Because of lack of awareness and inadequate food consumption their nutritional status was very poor and their average nutrient intake was also lower than reference value. This study also focuses on some other contributing factors which may adversely affect child nutrition like maternal education, knowledge on nutrition, low income, sanitation etc. Most of these parameters are deviant in this population. The high prevalence of malnutrition in the early years of life justifies targeting the children of different socio-economic group at an early age for effective improvement in their nutritional status including their socio-economic condition.

6.2 RECOMMENDATIONS

- Child malnutrition may be reduced by improving mother's education, mother's nutrition status and health service. There is no alternative to educate parents about the importance of a healthy and nourished baby.
- For improving overall childhood health and nutrition, it is necessary to increase awareness regarding balanced diet among parents of all socio-economic status.
- Height and weight of children should be measured every month after birth to monitor the growth of child for the first five years of life since in this period children are easily affected by malnutrition.

6.3 LIMITATIONS

At the time of conducting the study several minor problems were experienced. The limitations of the study are given below:

- The study population was selected only in Dhaka City. So, it does not represent the situation in the other parts of Bangladesh.
- Some respondents were not aware about the monthly income of their families exactly. In that case the approximate income was taken into account based on subsequent secondary questions.
- Lack of fund and short duration of time was also barrier of this study.

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Annexure-1

Bangladesh Institute of Health Sciences (BIHS)

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Title: Nutritional status of pre-school children among different socio-economic status in urban area of Dhaka city

Informed Consent Paper

I am RUMANA SHARMIN student of M.Phil in Community Nutrition (CN), BIHS under the faculty of Biology Department, Dhaka University; wish to study on "Nutritional status of pre-school children among different socio-economic status in urban area of Dhaka city." I hopefully expect necessary information from you to fulfill the questionnaire. I also like to assure you that, this data will be used for the study purpose and will be kept fully confidential. Therefore please feel free to response to the questions asked and help the research aimed for the save of suffering humanity.

Thank you for your kind co-operation.

……. ……..

Signature & Name of Respondents Signature of interviewers

Date……

Place……..

Contact no……

Annexure-2

Nutritional status of pre-school children among different socio-economic status in urban area of Dhaka city

Interview Questionnaire Form

ID No: ……

Relationship to the Child: ……..

Date: …….

Present Address: ……

Permanent address: ……..

Phone No: ……..

1.0 General Information:

1.1 Name of the child ……

1.2 Date of birth …….

1.3 Birth weight…

1.4 Place of birth…..

1.5 Age in months …….

1.6 No. of siblings……

1.7 Birth Interval……..

1.8 Sex: ☐ Male ☐ Female

2.0 Household Information:

2.1 Housing status:

Own house ☐ Government house ☐ Rented house ☐ Non-rented house ☐

Others, specify ☐

2.2 Number of children ……..

2.3 Birth order of children ……

2.4 Year of schooling of mother……

2.5 Mother age at birth of first child……

2.6 Birth interval….first ☐ second ☐ Third ☐ Child if any ☐

2.7 Year of schooling of father…….

2.8 Occupation of the father (please write code only) ☐

Business man=1, Teacher =2, Non Govt Service holder =3, Govt Service holder =4, others=5

2.9 Occupation of the mother (please write code only) ☐

Business man=1, Teacher =2, Non Govt Service holder =3, Govt Service holder =4, others=5

3.0 Socio-economic information

3.1 Monthly family income of the parents: ☐

3.2 Age of marriage of mother……

3.3 Place of delivery……..Hospital ☐ Home ☐ Others, ☐ Specify…..

3.4 Delivery attained by …..Doctor ☐ Nurse ☐ Midwife ☐ Others ☐ Specify…..

3.5 Delivery: Normal ☐ Caesarian section ☐ other ☐

3.6 Household Expenditure…….

3.7 Source of drinking water:

1=tube well 2=tap 3=pond 4=lake 5=others, specify…..☐

3.8 No. of acres of cultivable land in your home district or here……

3.9 EPI Status BCG ☐ DPT ☐ Hepa-B ☐ measles ☐ Others ☐

3.10 Did you receive Vitamin A during campaign? Yes ☐ No ☐

3.11 Did you provide de-worming tablet to your child after four month?

Yes ☐ No ☐

3.12 Are you a working mother? Yes ☐ No ☐

3.13 If yes how long she is present outside residence ……

3.14 If yes, how many times? ……

3.15 If yes who is caring during office time of mother?

1=Grandmother ☐ 2= Caregiver ☐ 3=Others ☐

4.0 Anthropometric measurement:

Wt in Kg …….

Height in cm …….

MUAC in cm ……

5. **Information on hygiene practice:**

5.1 Before feeding do you wash your hands? Yes ☐ No ☐

5.2 Before feeding do you wash your utensils properly? Yes No ☐ ☐

5.3 What is the source of water to prepare food?

1=tube well 2=tap 3=pond 4=lake 5=others, specify ☐

5.4 Do you feed your child after reheating the meal before serving it? Yes ☐ No ☐

5.5 Does the caregiver wash her hand after toileting? Yes ☐ No ☐

5.6 If yes, how? ☐ Soap ☐ Ash ☐ Nothing ☐ Others, specify ……

5.7 After preparing the food, do you keep those covered? ☐ Yes ☐ No

5.8 Does your child wash hands before taking food? ☐ Yes ☐ No

5.9 If yes, how? ☐ Soap ☐ Ash ☐ Nothing ☐ Others, specify……..

5.10 Have your children suffered any diarrheal diseases in last month? Yes ☐ No ☐

5.11 If yes, how many times? ……

5.11 Have your children treated with ORS, Zinc and continued feeding during diarrheal diseases in last month? Yes ☐ No ☐

5.12 Have your children suffered any ARI in last month? Yes ☐ No ☐

5.13 Have your children treated with Antibiotic during ARI in last month?

Yes ☐ No ☐

THANK YOU FOR YOUR CO-OPERATION

……

Investigator signature

10.1. 3 days recall method

Time	Food Item	Descriptions of foods	Cooking method	Unit (household measurement)	Weight (gm)
Breakfast					
Mid morning					
Lunch					

Time	**Food Item**	**Descriptions of foods**	**Cooking method**	**Unit (household measurement**	**Weight (gm)**
Afternoon snacks					
Dinner					
Bed time					
Oil/ Month (Family)					
Salt/Month (Family)					

…….

Interviewer Signature