

**A study on selected micronutrient intake (Zinc) of 2-4  
years old children of lower socio economic status (SES) .**

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# **A study on Selected Micronutrient Intake (Zinc) of 2-4 Years Old Children of Lower Socio Economic Status (SES)**



**A Thesis paper submitted to the Department of Pharmacy, East West  
University in conformity with the requirements for the Degree of  
Bachelor of Pharmacy**



# **East West University**

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# CERTIFICATE

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This is to certify that, the thesis “Study on Selected Micronutrient Intake (Zinc) of 2-4 years Old Children of Lower Socio Economic Status (SES)” submitted to the Department of Pharmacy, East West University, Mohakhali, Dhaka, in partial fulfillment of the requirements for the degree of Bachelor of Pharmacy (B. Pharm) was carried out by Abida Sultana Liza (ID# 2005-2-70-007) under our guidance and supervision and that no part of the thesis has been submitted for any other degree. We further certify that all the sources of information availed of in this connection is duly acknowledged.

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## ABSTRACT

The survey study was conducted among the families having 2-4 years children in covered by the urban areas of Dhaka city which include different muhallahs of Mirpur, Mohakhali and Mugdha(Sobujbag Thana) . The total sample size was 46 where 58.7% male and 41.3% female were children.The general objective was to determine the selected micronutrient(Zinc) intake level of 2-4 years old children of lower socio economic status (SES). I have asked the different types of questions based on major and minor variable including anthropometric measurement of children, feeding behavior, hygienic practice, sanitation, parental role, health care, immunization and proper treatment. After data analysis I have found that 80.4% having income level of 1,000-5,000 taka, 17.4% having 5,001-10,000taka and 2.2% having 10,001-15,000 taka based on there socio-economic status. The study shows that the intake amount of micronutrient "Zinc" was 60.9 % in children which means this percentage of children were taken Zinc at an amount of less than 4 mg/day whereas the Recommended Dietary Allowance of Zinc for this particular aged was 7-10.This indicated that 60.9 % children were not getting the adequate amount of Zinc and the other 32.6 % were taken Zinc as 4-8mg/day and only this group of children were getting proper amount of Zinc. My study indicates that among the aged of 2-4 years old of 46 children there were 26.1% children was 2-2.5years old ,21.7% children was 2.5-3years old,41.3% children was 3-3.5years old and 10.9% children was 3.5-4years old. Among the 46 children there 97.8% mother was breastfeeded her child and 2.2% was not breastfeeded. 82.6% mother was feeded colostrum to her child and 17.4% mother was not feeded colostrum to her child. Among the 46 children there 80.4% mother of children was cooking by Iodized salt and 19.6% mother of children was cooking by Un-Iodized salt . Among the all children 23.9 % children brushes teeth regularly and 76.1 % children were not brushes teeth regularly . 52.2 % mother cut their child's nail regularly where 47.8% were not.76.1% care giver maintain hygiene and 23.9% caregiver were not maintain hygiene .

Children routine immunization status is one of the most important factor of improving nutritional status , In that cases 89.1% had taken the first six vaccine and 10.9% children had not taken the first six vaccine . 100 % children had taken the polio vaccine . The

result shows that there were a significant difference in Nutritional status of lower socio economic status (SES).According to UNICEF it is evident that food security, caring practice and disease control can bring a remarkable change in children's nutritional status.



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# Chapter-1

## Introduction



### **Introduction:**

Global progress in social and economic development is occurring, although slowly, in the most needy parts of the nonindustrialized world, where nutritional deficiencies, including micronutrients <sup>[1]</sup>. Infants in developing countries are particularly vulnerable to illnesses such as pneumonia and diarrhea, but researchers have found that taking a zinc supplement each week could significantly lower their risk of dying from these diseases. According to the charity Save the Children, more than 10 million children worldwide under the age of five die every year. In the overwhelming majority the cause of death is a preventable or treatable disease like diarrhea (2 million deaths a year) or pneumonia (1.9 million deaths)<sup>[1]</sup>.

Zinc deficiency is common in children in developing countries because of low food intake, particularly from animal sources, limited zinc bioavailability from local diets, and losses of zinc during recurrent diarrhoeal illnesses. Zinc deficiency leads to impairment in immunological and other defenses that increases rates of serious infections. Trials of zinc supplements are a reliable method of assessing the health consequences of zinc deficiency. In developing countries a significantly lower incidence and prevalence of diarrhea has consistently been observed in children given zinc supplements.

Lower respiratory tract infections are a common cause of death in childhood. The effect of zinc supplementation on such infections is still unclear. Two of the published trials that found no significant effect were small. Another relatively larger trial reported a 45% reduction in the incidence of pneumonia, but the criteria for its diagnosis included high fever, a sign that is not diagnostic for pneumonia nor an established indicator of its severity <sup>[2]</sup>. Zinc, a component of a large number of enzymes has protean and essential functions in all biological systems, including immune function. Due to the low zinc content of commonly consumed diets, poor bioavailability, and large losses due to diarrhea, subclinical zinc deficiency is believed to be widely prevalent among developing country children <sup>[3]</sup>. The general health situation of the people in this country is not good compared with international standards. The situation of malnutrition of children (under 6) is alarming in this country. About 59.7% of all the children aged 6-71 months are malnourished in terms of deficient height-for-age or weight or both (BBS'95-96). Around 35-50% of newly born babies is of low birth weight (weight less than 2500gm). Therefore it is very important to know that the children aged specially below five are getting the proper or adequate amount of Zinc or not. In this study I have tried to determine the selected micronutrient intake (which is Zinc) level of the children aged 2-4 years of the lower socio economic status (SES). Micronutrients are of much importance in social and individual health. Micronutrients include variants vitamins and minerals such as vitamin A, vitamin B, vitamin D, iron, iodine, Zinc and selenium. Because if our daily diet do not contain adequate amount of these necessary micronutrients then there will be various types of health problems such as night blindness, diarrhea, anemia, rickets etc. Young children, women of childbearing age, those recovering from an illness are most at risk of developing micronutrients deficiencies. Micronutrient deficiencies are so important to public health outcomes, particularly in the developing countries like

Bangladesh. Lack of knowledge about the dietary intake, caring practices for the children, less opportunity for disease control etc. are the main reasons of micronutrient deficiency especially in children/ infant of Bangladesh. The hypothesis of my project was to focus on the selected micronutrients intake of 2-4 years old children of lower socio-economic status (SES). Selected micronutrient (Zinc) intake information in 2-4 years old children of lower socio economic status (SES) was collected from the children's mother or other family members and followed by the 24 hour dietary recall method. The collecting data including both the qualitative and quantitative data which was analyzed to achieve the research objectives. The main objective of this research was to find out the present selected micronutrient (Zinc) intake level of that particular aged group of children and compared the present level with the standard / Recommended Dietary Allowance (RDA) of Zinc. As the result of this comparison I could able to find out that the micronutrients intake in 2-4 years old children is satisfying their daily requirement or not. The result was analyzed to determine the present selected micronutrient (Zinc) status into 2-4 years old children of the lower socio-economic status with the standard daily requirement of the selected micronutrient (Zinc).

## **Description of the Research Project**

### **Hypothesis to be tested:**

I hypothesized that the present micronutrient (Zinc) intake of 2-4 years old children into lower socio economic status (SES) is 40% less than the recommended dietary allowance (RDA).

### **OBJECTIVES:**

#### **General Objective:**

To determine the selected micronutrient (Zinc) intake level of 2-4 years old children of lower socio economic status (SES).

#### **Specific objectives:**

1. To find the present selected micronutrient (Zinc) intake of 2-4 years old children.
2. To find the 24-hour food intake of that particular aged children group.
3. To find the socio-economic status and profession of the parents.
4. To find the level of family care of the children in health issues to determine their daily dietary food intake.

## **Background of the Project including Preliminary Observations:**

### **Micronutrients**

They are called micronutrients because they are needed only in small amounts (<100mg/day), these substances are the "magic wands" that enable the body to produce enzymes, hormones and other substances essential for proper growth and development. As tiny as the amounts are, however, the consequences of their absence are severe. Zinc, vitamin A and iron are most important in global public health terms; their lack represents a major threat to the health and development of populations the world over, particularly children and pregnant women in low-income countries including Bangladesh<sup>[4]</sup>. Foods

contain micronutrients that provide benefits via more subtle interactions with the body's chemistry. Micronutrients are active and potent in relatively tiny quantities, measured in milligrams or even micrograms<sup>[5]</sup>. Generally Micronutrients are vitamins and minerals that boost the nutritional value of food<sup>[6]</sup>.

#### **Vitamins:**

The first micronutrients that scientists studied were vitamins: A (retinenes), B complex (thiamine, niacin, pyridoxine, folic acid, pantothenic acid, and B12), C (ascorbic acid), D, and K<sup>[5]</sup>. Vitamin A,D,E,K are fat soluble and vitamin B and C are water soluble. Although there are still debates as to optimal doses of these vitamins for various age groups and for men versus women, there is no question that these compounds are essential components of a healthy diet<sup>[5]</sup>.

#### **Minerals:**

We know a great about why we need minerals and how they work. We need calcium (a major component of bone) and iron (needed for hemoglobin in blood) in relatively large quantities. Iodine is needed in modest amounts to make thyroid hormone .We require other minerals such as zinc, magnesium, and cobalt, in much smaller quantities, but they are still essential, mainly as enzyme components. A healthy diet with a reasonable balance of meat, leafy vegetables, and fruit generally supplies the trace elements we need and many people also take mineral supplements, often in combination with vitamins.

### **Role of Micronutrients in health:**

Micronutrients are vitamins and minerals that all humans need to maintain strong bodies and mental sharpness, fight off disease, and bear healthy children .Micronutrient deficiency is caused by inadequate access to micronutrient-rich food, high burden of infection and parasites, and detrimental feeding and dietary practices. Micronutrient deficiency adversely affects the health and function of individuals and the economic and social development of communities and nations .Vitamin A, iron, iodine, zinc, and folate among others profoundly affect child survival, women's health, educational achievement, adult productivity, and overall resistance to illness<sup>[6]</sup>.The role of certain micronutrients on the human health are given below:

#### **Vitamin A**

Vitamin A is essential for optimal health, growth, and development .Vitamin A deficiency is a major underlying determinant of child mortality and blindness in the developing world. It causes xerophthalmia , a serious eye disorder that can lead to blindness if untreated. In children, vitamin A deficiency compromises the immune system, increasing the risk of severe illness and death from diarrheal diseases and other infections, such as measles<sup>[6]</sup> .

#### **Thiamin:**

Thiamin (also spelled thiamine) is a water-soluble B vitamin, previously known as vitamin B1 or aneurine. Thiamin occurs in the human body as free thiamin and as various phosphorylated forms: thiamin monophosphate (TMP), thiamin triphosphate (TTP), and thiamin pyrophosphate (TPP), which is also known as thiamin diphosphate. Thiamin deficiency affects the cardiovascular, nervous, muscular, and gastrointestinal systems<sup>[5]</sup>. Beriberi has been termed dry, wet, or cerebral, depending on the systems affected by

severe thiamin deficiency. Whole grain cereals, legumes (e.g., beans and lentils), nuts, lean pork, and yeast are rich sources of thiamin<sup>[59]</sup>.

#### **Vitamin B6:**

Vitamin B6 is a water-soluble vitamin. There are three traditionally considered forms of vitamin B6: pyridoxal (PL), pyridoxine (PN), pyridoxamine (PM). Severe deficiency of vitamin B6 is uncommon. Alcoholics are thought to be most at risk of vitamin B6 deficiency due to low dietary intakes and impaired metabolism of the vitamin. Other neurologic symptoms noted in severe vitamin B6 deficiency include irritability, depression, and confusion; additional symptoms include inflammation of the tongue, sores or ulcers of the mouth, and ulcers of the skin at the corners of the mouth<sup>[60]</sup>.

#### **Biotin:**

Biotin is a water-soluble vitamin that is generally classified as a B-complex vitamin. Biotin is required by all organisms but can be synthesized only by bacteria, yeasts, molds, algae, and some plant species. Although biotin deficiency is very rare. Although hair loss is a symptom of severe biotin deficiency. Egg yolk, liver, and yeast are rich sources of biotin<sup>[61]</sup>.

#### **Folic Acid:**

The terms folic acid and folate are often used interchangeably for this water-soluble B-complex vitamin. Folic is specially essential in pregnancy and its deficiency in human body leads to various cancers including Colorectal cancer, Breast cancer<sup>[62]</sup>.

#### **Niacin:**

Niacin is a water-soluble vitamin, which is also known as nicotinic acid or vitamin B3. Niacin deficiency or pellagra may result from inadequate dietary intake of niacin and/or tryptophan. For instance, patients with Hartnup's disease, a hereditary disorder resulting in defective tryptophan absorption, have developed pellagra. Carcinoid syndrome, a condition of increased secretion of serotonin and other catecholamines by carcinoid tumors, may also result in pellagra due to increased utilization of dietary tryptophan for serotonin rather than niacin synthesis. Further, prolonged treatment with the anti-tuberculosis drug, Isoniazid, has resulted in niacin deficiency. Good sources of niacin include yeast, meat, poultry, red fishes (e.g., tuna, salmon), cereals (especially fortified cereals), legumes, and seeds. Milk, green leafy vegetables, coffee, and tea also provide some niacin<sup>[63]</sup>.

#### **Vitamin B12:**

Vitamin B12 has the largest and most complex chemical structure of all the vitamins. It is unique among vitamins in that it contains a metal ion, cobalt. Vitamin B12 deficiency in human body leads to Megaloblastic anemia, Neurologic symptoms, Gastrointestinal symptoms. Only bacteria can synthesize vitamin B12. Vitamin B12 is present in animal products such as meat, poultry, fish (including shellfish), and to a lesser extent milk, but it is not generally present in plant products or yeast<sup>[64]</sup>.

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from plants or indirectly from animal sources. Minerals may also be present in the water we drink, but this varies with geographic locale. Minerals from plant sources may also vary from place to place, because soil mineral content varies geographically.

The Minerals are given below:

- Calcium
- Chromium
- Copper
- Fluoride
- Iodine
- Iron
- Magnesium
- Manganese
- Molybdenum
- Phosphorus.
- Selenium
- Sodium chloride
- Zinc

#### **Calcium:**

Calcium is the most common mineral in the human body. About 99% of the calcium in the body is found in bones and teeth, while the other 1% is found in the blood and soft tissue<sup>[70]</sup>.

#### **Chromium:**

Although trivalent chromium is recognized as a nutritionally essential mineral, scientists are not yet certain exactly how it functions in the body. The two most common forms of chromium are trivalent chromium (III) and hexavalent chromium (VI)<sup>[70]</sup>.

#### **Copper:**

Copper (Cu) is an essential trace element for humans and animals. In the body, copper shifts between the cuprous (Cu<sup>1+</sup>) and cupric (Cu<sup>2+</sup>) forms, though the majority of the body's copper is in the Cu<sup>2+</sup> form. Copper is found in a wide variety of foods and is most plentiful in organ meats, shellfish, nuts, and seeds. Wheat bran cereals and whole grain products are also good sources of copper<sup>[70]</sup>.

#### **Fluoride:**

Fluorine occurs naturally as the negatively charged ion, fluoride (F<sup>-</sup>). Fluoride is considered a trace element because only small amounts are present in the body (about 2.6 grams in adults), and because the daily requirement for maintaining dental health is only a few milligrams a day. About 95% of the total body fluoride is found in bones and teeth<sup>[70]</sup>.

#### **Iodine:**

Iodine, a non-metallic trace element, is required by humans for the synthesis of thyroid hormones. Iodine deficiency is an important health problem throughout much of the world. Most of the earth's iodine is found in oceans, and iodine content in the soil varies



with region. Iodine is an essential component of the thyroid hormones, triiodothyronine (T3) and thyroxine (T4), and is therefore essential for normal thyroid function. Iodine deficiency is now accepted as the most common cause of preventable brain damage in the world<sup>[70]</sup>.

#### **Magnesium:**

Magnesium plays important roles in the structure and the function of the human body. The adult human body contains about 25 grams of magnesium. Over 60% of all the magnesium in the body is found in the skeleton, about 27% is found in muscle, 6% to 7% is found in other cells, and less than 1% is found outside of cells<sup>[70]</sup>.

#### **Manganese:**

Manganese is a mineral element that is both nutritionally essential and potentially toxic. The derivation of its name from the Greek word for magic remains appropriate because scientists are still working to understand the diverse effects of manganese deficiency and manganese toxicity in living organisms. Rich sources of manganese include whole grains, nuts, leafy vegetables, and teas. Foods high in phytic acid, such as beans, seeds, nuts, whole grains, and soy products, or foods high in oxalic acid, such as cabbage, spinach, and sweet potatoes, may slightly inhibit manganese absorption. Although teas are rich sources of manganese<sup>[70]</sup>.

#### **Molybdenum:**

Molybdenum is an essential trace element for virtually all life forms. It functions as a cofactor for a number of enzymes that catalyze important chemical transformations in the global carbon, nitrogen, and sulfur cycles<sup>[70]</sup>.

#### **Phosphorus:**

Phosphorus is an essential mineral that is required by every cell in the body for normal function. The majority of the phosphorus in the body is found as phosphate (PO<sub>4</sub>). Approximately 85% of the body's phosphorus is found in bone. Inadequate phosphorus intake results in abnormally low serum phosphate levels (hypophosphatemia). The effects of hypophosphatemia may include loss of appetite, anemia, muscle weakness, bone pain, rickets (in children), osteomalacia (in adults), increased susceptibility to infection, numbness and tingling of the extremities, and difficulty walking. Severe hypophosphatemia may result in death. Dairy products, meat, and fish are particularly rich sources of phosphorus. The phosphorus in all plant seeds (beans, peas, cereals, and nuts) is present in a storage form of phosphate called phytic acid or phytate. Only about 50% of the phosphorus from phytate is available to humans<sup>[70]</sup>.

#### **Potassium:**

Potassium is an essential dietary mineral and electrolyte. An abnormally low plasma potassium concentration is referred to as hypokalemia. Hypokalemia is most commonly a result of excessive loss of potassium, e.g., from prolonged vomiting, the use of some diuretics, some forms of kidney disease, or metabolic disturbances. The symptoms of hypokalemia are related to alterations in membrane potential and cellular metabolism. They include fatigue, muscle weakness and cramps, and intestinal paralysis, which may

lead to bloating, constipation, and abdominal pain. Severe hypokalemia may result in muscular paralysis or abnormal heart rhythms (cardiac arrhythmias) that can be fatal.

The richest sources of potassium are fruits and vegetables such as Banana, Potato, Orange, Spinach, Almonds, Molasses<sup>[70]</sup>.

#### **Selenium:**

Selenium is a trace element that is essential in small amounts, but like all essential elements, it is toxic at high levels<sup>[70]</sup>.

#### **Sodium (Chloride):**

Salt (sodium chloride) is essential for life. The tight regulation of the body's sodium and chloride concentrations is so important that multiple mechanisms work in concert to control them. Sodium (and chloride) deficiency does not generally result from inadequate dietary intake, even in those on very low-salt diets<sup>[70]</sup>.

#### **Iron**

Iron is essential for good health and mental and physical well-being. Iron deficiency anemia occurs when the body's iron supply cannot support the production of hemoglobin in adequate amounts to carry enough oxygen from the lungs to the muscles, brain, and other tissues. This causes weakness, fatigue, and reduced physical ability to work. Iron deficiency in children slows intellectual and motor development. The main causes of iron deficiency are low consumption of meat, fish, or poultry or the presence of inhibitors in the diet that prevent iron from being absorbed. In resource-poor areas, anemia is commonly caused by infectious diseases such as malaria, hookworm, and HIV/AIDS<sup>[6]</sup>.

#### **Zinc**

Zinc is an essential element that promotes healthy immune system functioning and protects against infectious diseases. Adequate zinc nutrition is necessary for optimal child health and survival, physical growth, and for a normal pregnancy. Zinc deficiency in children results in increased risk of diarrhea, pneumonia, and malaria. Zinc is important in the treatment of diarrhea in children. Limited access to zinc-rich foods, such as animal products and shellfish, and inadequate absorption of zinc cause zinc deficiency<sup>[6]</sup>.

#### **Micronutrients Deficiency:**

When a daily diet does not contain adequate levels of micronutrients, the outcome can have dramatic consequences: children do not reach their full intellectual capacity, growth can be stunted, and even blindness can occur. In the worst case, a lack of essential nutrients can result in death. More than two billion people worldwide lack minute quantities of essential nutrients to keep them healthy. Unfortunately, the poor—especially women and children in developing countries—are the most vulnerable. For example, from data supplied by the Micronutrient Initiative:

- 2 million children may die unnecessarily each year because they lack vitamin A, zinc, or other nutrients.
- 19 million infants are born with impaired mental capacity every year due to iodine deficiency.
- 100,000 babies are born each year with preventable physical defects. Iron deficiency undermines the health and energy of 40 percent of women in the developing world. Severe anemia kills more than 60,000 women each year, especially during childbirth.
- Vitamin and mineral deficiencies account for 10 percent of the global health burden<sup>[6]</sup>.

### **Zinc and its deficiency diseases:**

The pervasive role of zinc in the metabolic function of the body results from its function as a cofactor of a multitude of enzymes. Zinc is found in every tissue in the body, and because zinc metalloenzymes are found in every known class of enzymes, the metal has a function in every conceivable type of biochemical pathway. Symptoms resulting from zinc deficiency are as diverse as the enzymes with which the metal is associated<sup>[7]</sup>. If chronic, severe, and untreated, zinc deficiency can be fatal. Less drastic symptoms include infections, hypogonadism, weight loss, emotional disturbance, dermatitis, alopecia, impaired taste acuity, night blindness, poor appetite, delayed wound healing, and elevated blood ammonia levels<sup>[7]</sup>. Many symptoms of zinc deficiency result from poor diet consumption, but often the most severe symptoms result from other factors including excessive alcohol use, liver diseases, malabsorption syndromes, renal disease, enteral or parenteral alimentation, administration of sulfhydryl-containing drugs, and sickle cell disease. The most severe symptoms of zinc deficiency occur in young children affected with the autosomal-recessive trait, acrodermatitis enteropathica<sup>[7]</sup>. This disease results in decreased synthesis of picolinic acid which causes an impaired ability to utilize zinc from common food. Because simple laboratory analyses are often not reliable in determining zinc nutriture of a patient, those symptoms caused by suspected zinc deficiency are best verified by the oral administration of zinc dipicolinate. This zinc compound is efficacious and safe and would provide an accurate means of identifying symptoms that do result from zinc deficiency<sup>[7]</sup>.

### ***Present nutritional situation in Bangladesh***

#### ***Dietary pattern***

Cereals, largely rice, are the main food in Bangladesh. Nearly two-thirds of the daily diet consists of rice, some vegetables, a little amount of pulses and small quantities of fish if and when available. Milk, milk products and meat are consumed only occasionally and in very small amounts. Fruit consumption is seasonal and includes mainly papaya and banana which are cultivated round the year. The dietary intake of cooking oil and fat is meager. The typical rural diet in Bangladesh is, reportedly, not well balanced<sup>[10]</sup>. While food habits vary at regional and even individual household levels, in general, food preparation methods result in significant nutrient loss. Minerals and vitamins, especially B-complex vitamins are lost (40 percent of thiamine and niacin) even during the washing

of rice before cooking. Boiling rice and then discarding the water results in even more nutrient losses. Household food consumption studies show that cereals make up the largest share (62 percent) of the diet, followed by non-leafy vegetables, roots and tubers, which together comprise more than four-fifths of the rural people's total diet. Rural consumption of leafy and non-leafy vegetables has remained more or less the same over the past two decades after increasing over the preceding 30 years<sup>[11]</sup>. Fruit consumption has declined in rural areas after more than doubling in the 1970s. With an average national per capita consumption of 23 g of leafy vegetables, 89 g of non-leafy vegetables and 14 g of fruit, the average Bangladeshi eats a total of 126 g of fruit and vegetables daily. This is far below the minimum daily consumption of 400 g of vegetables and fruit recommended by FAO and the World Health Organization (WHO)<sup>[12]</sup>.

### ***Nutritional status***

Nutritional status: Data from BDHS 2004 show that 43% of Bangladeshi children under-five are short for their age or stunted, while 17% are severely stunted. The prevalence of stunting increases with age from 10% of children under six months of age, to 51% of children aged 48-59 months. Additionally, 13% of the Bangladeshi children are seriously underweight for their height, or wasted, and 1% are severely wasted. The wasting peaks at age of 12-23 months with around 24% of under-fives in that age group diagnosed as suffering from wasting. The proportion of young child with wasting decreases after 23 months of age, and is 10% for children aged 48-59 months. Forty eight per cent of children are considered under weight (low weight for age), and 13% are classified as severely underweight (BDHS 2004).

### **The underlying causes include the common reasons of micronutrients deficiency in Bangladesh:**

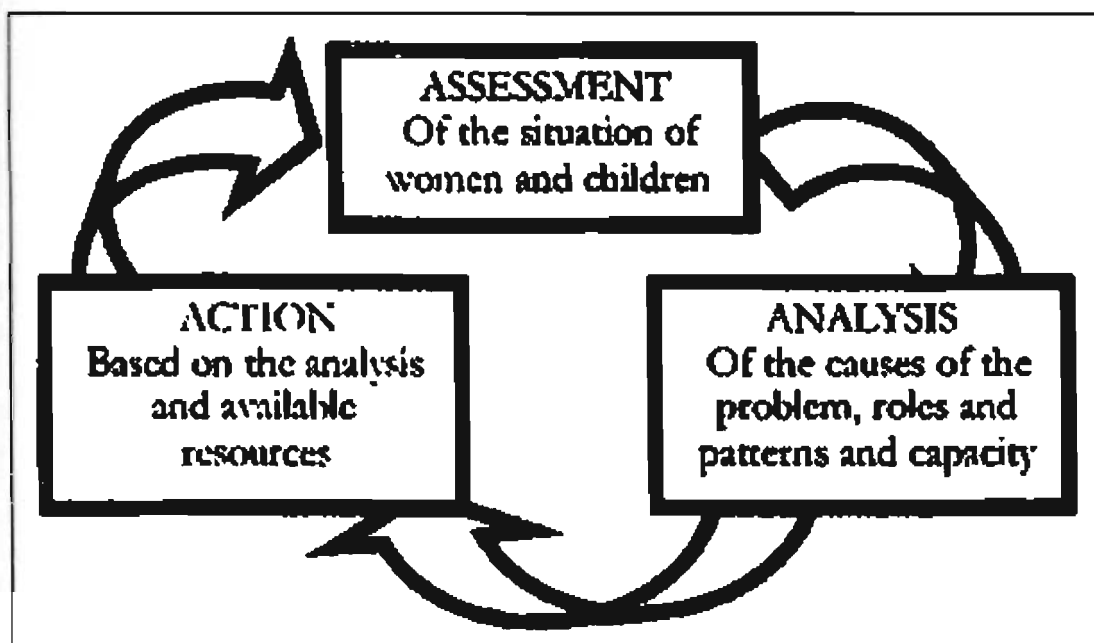
- (i) household food insecurity resulting from inability to grow or purchase a nutritionally adequate amount and variety of food;
- (ii) lack of dietary diversity;
- (iii) inadequate maternal and child care due to inappropriate hygiene, health and nutrition;
- (iv) low rates of exclusive breast feeding;
- (v) inadequate access to quality health services;
- (vi) Poor environmental hygiene and sanitation along with low levels of income and maternal formal education. Malnutrition early in life has long-lasting and negative effects on overall growth, morbidity, cognitive development, educational attainment and adult productivity<sup>[13]</sup>.

Because of this, the nutritional status of children, particularly below five years of age, is seen as one of the most sensitive indicators of a country's vulnerability to food insecurity and overall socio-economic development. Therefore in this research I focused on all the above reasons and on that basis I have tried to find out the selected micronutrient (Zinc) level into children aged 2-4 years old of lower socio economic status (SES).

### **Rational of the research:**

Micronutrient - deficiency is a major health problem in Bangladesh. In Bangladesh, lack of nutritional and health knowledge is one of the most important causes of high prevalence of Micronutrient – deficiency especially in the children. Most of the micronutrient deficiency is caused by the combination of causes that includes inadequate dietary intake, not having access to enough nutritious foods or foods with lack of required micronutrients, inappropriate caring provided by the family members and feeding practices and these all factors lead to the assessment of my research . Analyzing all these factors and there by find out the major reasons which are responsible for adequate or inadequate intake of the selected micronutrient (Zinc ) intake into the children aged 2-4 years of the lower socio economic status (SES).

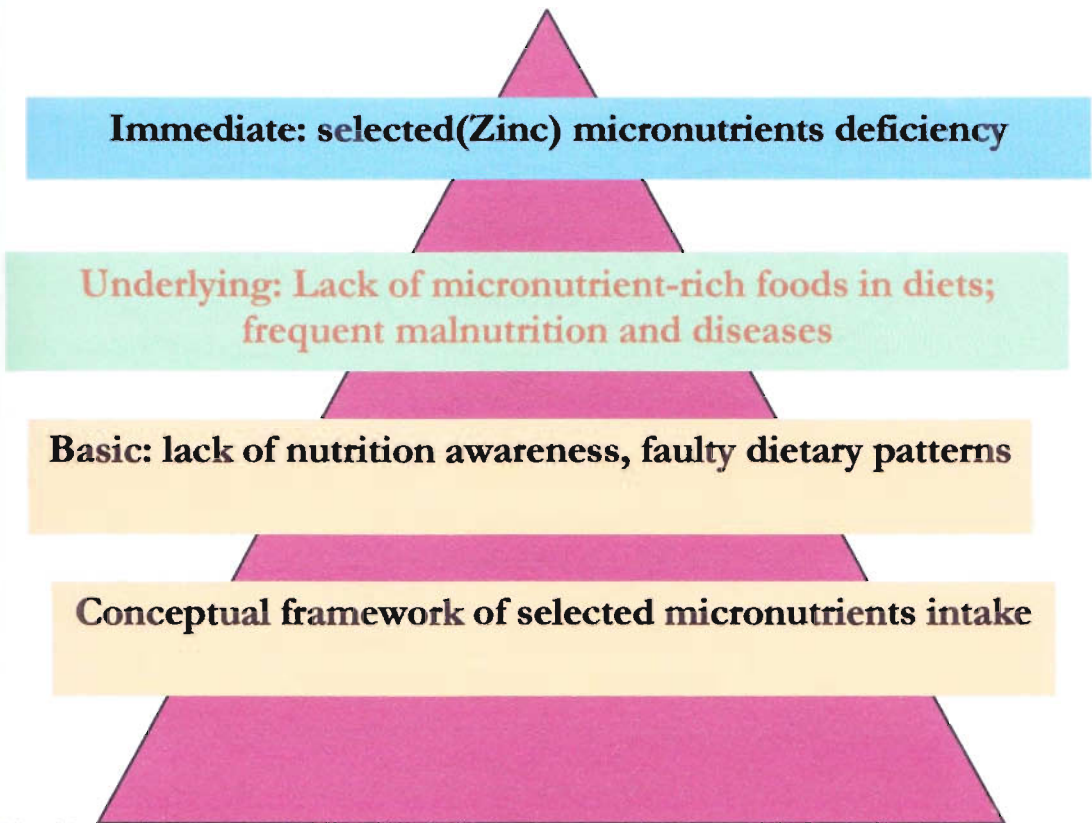
In my study I have found the present selected micronutrient (Zinc) intake level of the population Group (children aged 2-4 years) into the lower Socio Economic Status (SES) by using the 24-hour dietary recall method . By using the 24-hour dietary recall method which was accomplished by asking questions to the 2-4 years old children’s mother or other family members. Thus I have completed the triple ‘A’ process.



**FIGURE 1: The “Triple A” Process**

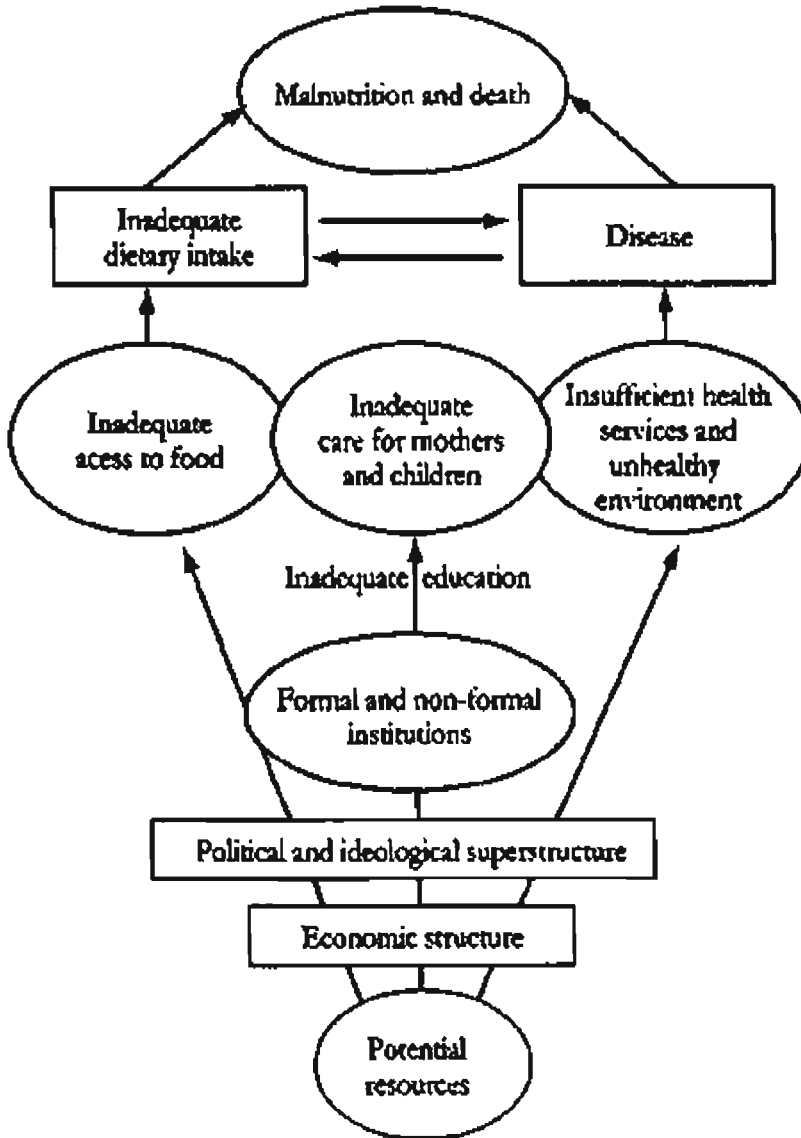
**Conceptual Framework:**

From the results and acquired knowledge from this survey, identify the present micronutrients intake level of 2-4 years old children of the lower socio economic status (SES).



Food health, and care are all necessary for healthy survival, growth, and development, according to the UNICEF conceptual framework (1990). All three elements must be satisfactory for good nutrition. Even when poverty causes food insecurity and limited health care, enhanced care giving can optimize the use of existing resources to promote good health and nutrition in women and children. Breastfeeding is an example of a practice that provides food, health, and care simultaneously.

**CARE AND NUTRITION OF YOUNG CHILD:**

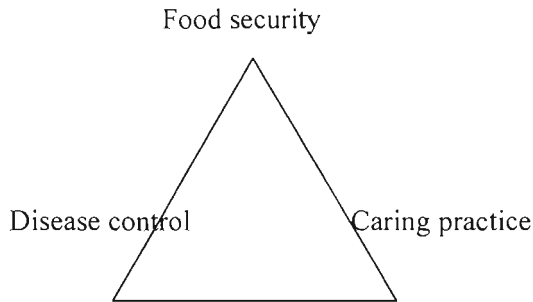


**Figure03 CARE AND NUTRITION OF YOUNG CHILD**

Source: UNICEF (1990) Strategy for Improved Nutrition of Children and Women in Developing Countries. New York: UNICEF.

### **Nutrition triangle:**

UNICEF nutrition triangle strategy defines the necessary ingredients to promote good nutrition as – food security, care of women and children and disease control.



Nutritional status of infant and young children is closely related with food security, disease control and caring practices. Most form of malnutrition result from a combination of causes that include inadequate dietary intake and frequent illnesses. Major causes include not having access to enough nutritious foods; inadequate health services and poor environmental sanitation and inappropriate caring and feeding practices <sup>[14]</sup>.

### **Selection of Micronutrients:**

There are a large number of micronutrients, which means vitamins and minerals present in our dietary foods. Therefore in my research I emphasized to determine only Zinc (selected micronutrient) that was taken by the 2-4 years old children of lower socio economic status (SES).

### **Description of selected micronutrient (Zinc):**

Description of the above micronutrient (Zinc) and its deficiency disorders, Recommended Dietary Allowance (RDA) and present situation in Bangladesh are given below:

#### **Zinc**

Zinc is an essential element that promotes healthy immune system functioning and protects against infectious diseases. Adequate zinc nutrition is necessary for optimal child health and survival, physical growth, and for a normal pregnancy. Zinc deficiency in children results in increased risk of diarrhea, pneumonia, and malaria. Zinc is important in the treatment of diarrhea in children. Limited access to zinc-rich foods, such as animal products and shellfish, and inadequate absorption of zinc cause zinc deficiency <sup>[6]</sup>.

It is an essential mineral that is naturally present in some foods, added to others, and available as a dietary supplement. Zinc is also found in many cold lozenges and some over-the-counter drugs sold as cold remedies.



**Table 01: Recommended Dietary Allowances (RDAs) for Zinc <sup>[71]</sup>**

Age	Male	Female
1 to 3 years	10 mg	10 mg
4 to 6 years	10 mg	10 mg

\* Adequate Intake (AI)

### **Zinc Deficiency**

Zinc deficiency is characterized by growth retardation, loss of appetite, and impaired immune function. In more severe cases, zinc deficiency causes hair loss, diarrhea, delayed sexual maturation, impotence, hypogonadism in males, and eye and skin lesions <sup>[15,16,17,18]</sup>. Weight loss, delayed healing of wounds, taste abnormalities, and mental lethargy can also occur <sup>[19,16, 20-24]</sup>. Many of these symptoms are non-specific and often associated with other health conditions; therefore, a medical examination is necessary to ascertain whether a zinc deficiency is present.

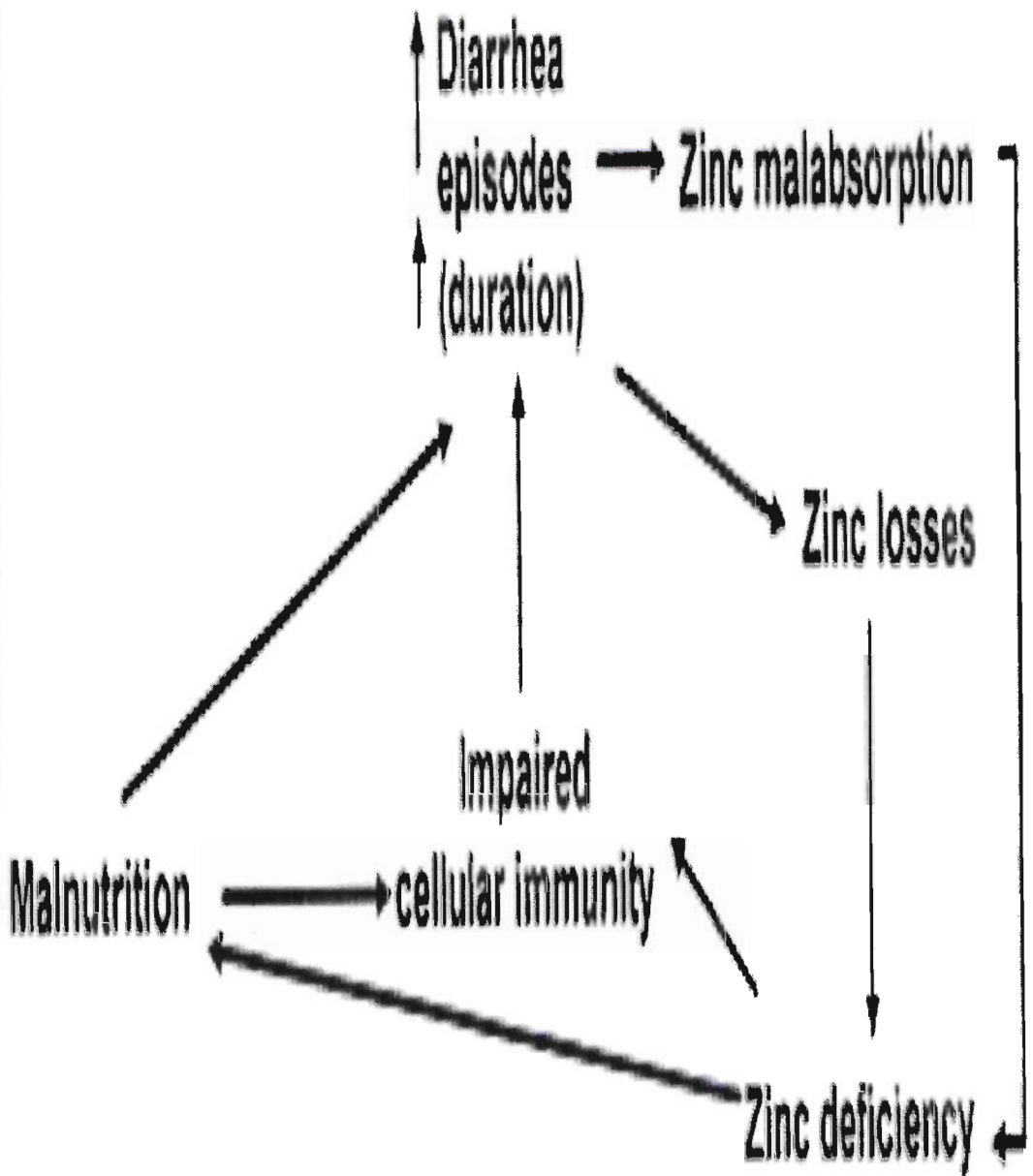
### **Zinc deficiency in Bangladesh in present situation :**

There is now overwhelming evidence that zinc deficiency commonly limits weight gain. However, the details remain unclear. The effect of a zinc supplement on a patient or a population is still relatively unpredictable. This is in part due to the lack of an easy test of zinc status or a test sensitive or specific to change in zinc status. It is also due to the numerous other factors which affect growth. These are both dietary and host factors, many of which interact with zinc <sup>[25]</sup>. Zinc itself has effects on key functions other than growth. Several recent papers would suggest that its major role in public health is in diminishing the effects of infections. Its role in improving growth is seen as secondary to this. Finally, in spite of tight homeostatic control of zinc within body compartments, there is some evidence of deleterious effects of too much zinc <sup>[25]</sup>. That said, failure to thrive, or weight faltering, in early childhood is still a major global problem. It is usually associated with poverty. The more severe, the higher the short term morbidity and mortality. For those who survive, complete catch up in height is unusual and the subsequent short heights are associated with impaired physical and mental capacities. In circumstances in which poverty is followed by affluence, a further twist is emerging <sup>[25]</sup>: failure to thrive in early childhood is associated with chronic disease in adulthood leading to premature death. Clearly, there is an urgent need to delineate the role of zinc in treatment and prevention of failure to thrive in early childhood. The questions above need to be answered so that clinicians and public health programmer's are sufficiently informed to know when to prescribe zinc, how much to prescribe and whether it needs to be part of a nutrient package as recommended, for example, for the treatment of severe malnutrition <sup>[25]</sup>.

Zinc deficiency has been found to be widespread among children in developing countries. Clinical and field studies have consistently observed an association between zinc deficiency and higher rates of infectious diseases, including skin infections, diarrhea,

respiratory infections, malaria, and delayed wound healing. Based upon the impact of zinc deficiency on diarrheal disease alone, it is estimated correction of this deficiency could save 450,000 under-five deaths annually<sup>[25]</sup>.

The close relationship between diarrheal disease and malnutrition has not escaped the attention of the medical community (Gracey 1996 ).The morbidity and mortality rates due to diarrheal disease are particularly severe in young children. In 1993 there were approximately 12 million deaths of infants and children less than 5 years old, of which one fourth were related to diarrhea.The vast majority occurred in developing countries <sup>[25]</sup> .Fifty-eight percent, or 1.74 million, of the approximately 3 million premature deaths due to diarrheal diseases have been associated with malnutrition (Fuchs 1998). These statistics suffice to convey the seriousness of the world public health problem. In contrast, since 1968 the United States has experienced a 75% decline in diarrheal disease deaths in children less than 5 years old, which now number approximately 300 years (Kilgore et al. 1995 ). The interaction of factors linking diarrheal episodes, malnutrition and zinc depletion is diagrammatically presented in Figure 04 . Here I do address immunologic factors associated with zinc deficiency, which is an area that has been extensively reviewed (Shankar and Prasad 1998)



**Figure:04** . Interactions among events related to zinc deficiency, malnutrition and diarrheal disease.

Zinc deficiency is prevalent in many developing countries. Bangladesh has been classified as having a high risk of zinc deficiency <sup>[26]</sup>. Zinc deficiency is associated with poor growth, immune function and increased diarrhoea and pneumonia resulting higher mortality among children. The immediate causes of Zn deficiency are inadequate intake and/or poor bioavailability of dietary zinc due to plant-based diets and low intakes of animal source foods, but also repeated infections may play a role. Serum zinc are widely used biochemical indicators of zinc status to identify populations at risk of zinc

deficiency. However, the acute phase response (APR) occur in infections has been shown to be associated with depressed serum zinc in some studies <sup>[26]</sup>. As subclinical infections are common in populations at risk of zinc deficiency, the interpretation of serum zinc may be hampered and the prevalence of low serum zinc may be overestimated, since the proposed cut-off does not take this into account. The acute phase proteins may be used to control for the confounding effect of APR and when assessing the prevalence of low serum zinc, by correcting individual serum zinc values and identifying the healthy subgroup <sup>[26]</sup>. To our knowledge, no studies in apparently healthy children (3-7years) have looked at the effect of serum concentrations of CRP, ACT or other APPs on serum zinc nor attempted to quantify the fall in serum zinc due to the APR. Better identification of populations at risk of low serum zinc as well as predictors which may have a positive or negative effect on serum zinc is important for designing targeted interventions aimed at improving zinc status in children <sup>[26]</sup>.

### Why treatment?

Zinc is a micronutrient found in foods rich in protein such as red meat, poultry, nuts and dairy products and is essential for human growth and protection against illness and disease. Many people living in developing nations, such as Bangladesh, do not have access to sufficient amounts of zinc-rich foods. This results in zinc deficiency that can lead to growth failure and increased susceptibility to illness and death, especially among young children.

In an ideal world, diets would contain adequate quantities of zinc and micronutrients. This remains an important goal to attain, but in the short term supplementation strategies are needed. Zinc treatment of a diarrhoeal illness would appear to be the most feasible strategy at this point in time. Millions of families are simply too poor to provide a healthy diet. Many are too poor to buy any food. We are focusing on children under five because they are the most vulnerable and this is where the best evidence of benefit exists. Studies conducted at the Centre, from basic to applied research, have helped to build an evidence base for integrating zinc treatment into current child health practice and policies. This is supported by the revised, joint WHO/UNICEF recommendations to include zinc in the management of all acute or persistent cases of diarrhoea in children under five years of age <sup>[72]</sup>.

The human body cannot synthesize vitamins and minerals. They must be provided by the diet. The amounts needed are small - micrograms or milligrams a day - so they are called "micro" nutrients. They are necessary for the regulatory systems in the body, for efficient energy metabolism and for other functions (cognition, immune system, reproduction). Vitamin A, iron, Zinc and iodine even though there are many more micronutrients including some that are suspected of being deficient in some developing countries .Deficiencies of these nutrients cause illness, death, learning disabilities, and impaired work capacity <sup>[73]</sup>. There are many research are establish about this micronutrients, here include Some research on Zinc or combination with Zinc:

1: SUZY - Scaling Up Zinc treatment for Young children with diarrhea in Bangladesh : Diarrhoea remains a leading cause of morbidity and mortality in developing countries, killing nearly 2 million children every year. Research has shown that zinc provides a very

effective treatment for diarrhoea among children under five years of age. Zinc treatment reduces the severity and duration of diarrhoea as well as the likelihood of future episodes of diarrhoea and the need for hospitalisation. Zinc treatment can save a child's life, both as a treatment for diarrhoeal illness and by preventing future infectious illnesses. In addition, early studies suggest zinc treatment may have a positive impact on childhood pneumonia, which is the leading cause of death among under-five children living in developing nations. Therefore, zinc treatment holds tremendous potential as a global public health intervention and can play a significant role in attaining the Millennium Development Goal #4 of a two-thirds reduction in under-five mortality by 2015. This is why ICDDR,B and its partners are engaged in this innovative project. The SUZY project has been, for the first time, providing zinc treatment for diarrhoea on a large scale, targeting the entire under-five-year-old population of Bangladesh. It has been estimated that zinc treatment could save the lives of 30,000 to 75,000 children per year in Bangladesh alone. On a global scale, the addition of zinc treatment to the management of childhood diarrhoea could save the lives of almost 400,000 children each year<sup>[72]</sup>.

#### 2: Zinc for growth and immunity. ICDDR,B hosts regional symposium:

Zinc is an essential micronutrient for human growth and immunity. Zinc deficiency can result in growth failure and impaired immune function. Such deficiency is more prevalent in developing countries due to inadequate dietary intake and the intake of foods with low zinc bioavailability, foods commonly eaten by young children and women in South Asia. The ICDDR,B: Center for Health and Population Research conducted a Regional Zinc Symposium during May 15-16, 1997, on zinc and health in South Asia. The main agenda was to critically review experiences in the region and implications of available studies in defining the role of zinc in preventing growth retardation, the treatment of acute and persistent diarrheas, and in reducing morbidity resulting from infectious disease. Future research areas were identified on the second day of the workshop, with a view to programmatic implications based upon current knowledge. The symposium was sponsored jointly by the UN Children's Fund (UNICEF), University of Alabama at Birmingham's Sparkman Center, and the ICDDR,B. 160 participants attended, including micronutrient specialists and health policymakers from the South Asian countries and internationally recognized scientists from the US, the UK, UNICEF, and the World Health Organization<sup>[74]</sup>.

#### 3. Zinc supplementation in the management of shigellosis in malnourished children in Bangladesh:

Zinc supplementation significantly shortens the duration of acute shigellosis, promotes better weight gain during recovery and reduces diarrhoeal morbidity during the subsequent 6 months<sup>[75]</sup>.

#### 4. Efficacy of Zinc in the Treatment of Outpatient Pneumonia in an Urban Slum Among Children Less Than 2 Years Old<sup>[76]</sup>.

5. Zinc supplementation significantly shortens the duration of acute shigellosis, promotes better weight gain during recovery and reduces diarrhoeal morbidity during the subsequent 6 months<sup>[77]</sup>.

## 6. Zinc treatment to under-five children: applications to improve child survival and reduce burden of disease.

Zinc is an essential micronutrient associated with over 300 biological functions. Marginal zinc deficiency states are common among children living in poverty and exposed to diets either low in zinc or high in phytates that compromise zinc uptake. These children are at increased risk of morbidity due to infectious diseases, including diarrhoea and respiratory infection. Children aged less than five years (under-five children) and those exposed to zinc-deficient diets will benefit from either daily supplementation of zinc or a 10 to 14-day course of zinc treatment for an episode of acute diarrhoea. This includes less severe illness and a reduced likelihood of repeat episodes of diarrhoea. Given these findings, the World Health Organization/ United Nations Children's Fund now recommend that all children with an acute diarrhoeal illness be treated with zinc, regardless of aetiology. ICDDR,B scientists have led the way in identifying the benefits of zinc. Now, in partnership with the Ministry of Health and Family Welfare, Government of Bangladesh and the private sector, the first national scaling up of zinc treatment has been carried out. Important challenges remain in terms of reaching the poorest families and those living in remote areas of Bangladesh<sup>[78]</sup>.

## 7. Zinc Therapy Accelerates Recovery From Pneumonia.

*ScienceDaily (May 21, 2004)* — Treating young children with zinc in addition to standard antibiotics greatly reduces the duration of severe pneumonia, according to a study by researchers from the Johns Hopkins Bloomberg School of Public Health and the International Centre for Diarrhoeal Disease Research, Bangladesh, Centre for Health and Population Research (ICDDR, B). Pneumonia is a leading cause of illness and death among children under age 5, particularly in the developing world. The researchers believe zinc therapy could help reduce antimicrobial resistance by decreasing the exposure to multiple antibiotics and lessen the health complications and deaths worldwide caused by severe pneumonia. The study appears in the May 22, 2004, edition of *The Lancet*<sup>[79]</sup>.

## 8. Zinc for diarrhea in children

According to the National Institutes of Health's (NIH) Office of Dietary Supplements, zinc is essential to our physical makeup. Found in our cells, zinc is necessary for immunity and healing, and to maintain our senses of taste and smell. More important, zinc is critical to fetal development, childhood and adolescent growth, and deoxyribonucleic (DNA) synthesis. The frequent stools produced by diarrhea rapidly deplete the body's supply of zinc; in children, this loss of zinc can be debilitating to the cells of their undeveloped bodies<sup>[80]</sup>.

Much research focused on zinc as a treatment for diarrhea has been done in developing countries, where diarrhea is a major cause of illness and death in the young. According to the U.S. Agency for International Development (USAID), diarrhea is one of the leading causes of death for children younger than 5; more than 2 million children die every year from diarrhea and dehydration.<sup>[80]</sup> Often these deaths are related to poverty, the preventable lack of resources, unsafe drinking water, and inadequate sanitation and hygiene.

Very recent data from studies done by researchers from Johns Hopkins University's School of Public Health and the International Centre for Diarrheal Diseases Research shows that administering zinc supplements to diarrheal children in India was effective in helping them to maintain sufficient levels of the mineral<sup>[81]</sup>.

Twenty years of research analyzed by USAID points to zinc's effectiveness in reducing both short- and long-term diarrhea in kids. The data cited also shows that zinc supplements reduced the severity of diarrhea in children and provided them with greater resistance to future episodes of diarrhea and other infections for up to three months following treatment.

According to the NIH, an insufficient level of zinc in the body has negative consequences for the immune system, even if the deficiency is moderate. The medical community has expanded its look at this prevalent condition to other at-risk populations: a 2005 study conducted by researchers in South Africa suggests that zinc supplementation is both effective and safe in treating diarrhea in HIV-positive children<sup>[82]</sup>.

9. Zinc supplementation as adjunct therapy in children with measles accompanied by pneumonia: a double-blind, randomized controlled trial<sup>[83]</sup>.

10. Metalloregulation of the tumor suppressor protein p53: zinc mediates the renaturation of p53 after exposure to metal chelators *in vitro* and in intact cells<sup>[84]</sup>.

11. Combined zinc and vitamin A synergistically reduced the prevalence of persistent diarrhoea and dysentery. Zinc was associated with a significant increase in acute lower respiratory infection, but this adverse effect was reduced by the interaction between zinc and vitamin A<sup>[75]</sup>..



## Chapter-2 Methodology

### ***Research Design and Methods:***

#### **Study Design:**

This was a descriptive and quantitative research with cross-sectional design.

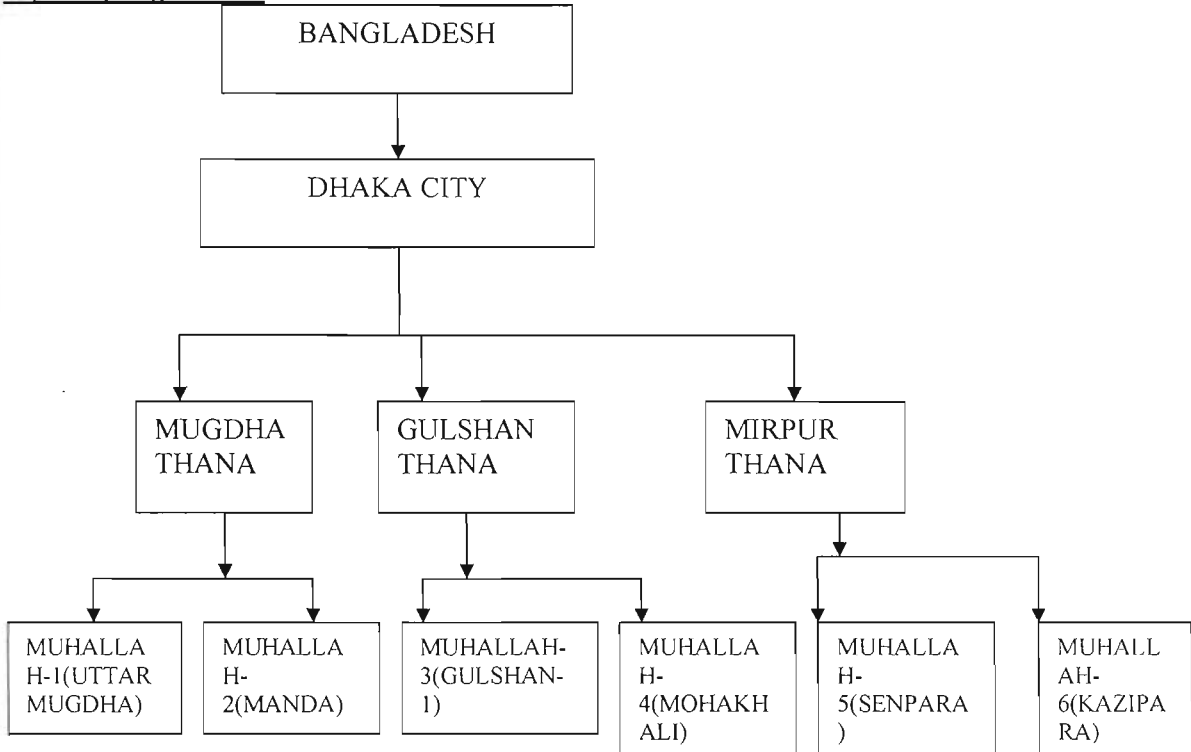
#### **a) Study population:**

The children of both sex aged 24 to 48 months (2-4 years aged children) were include in this study .

#### **b) Study site:**

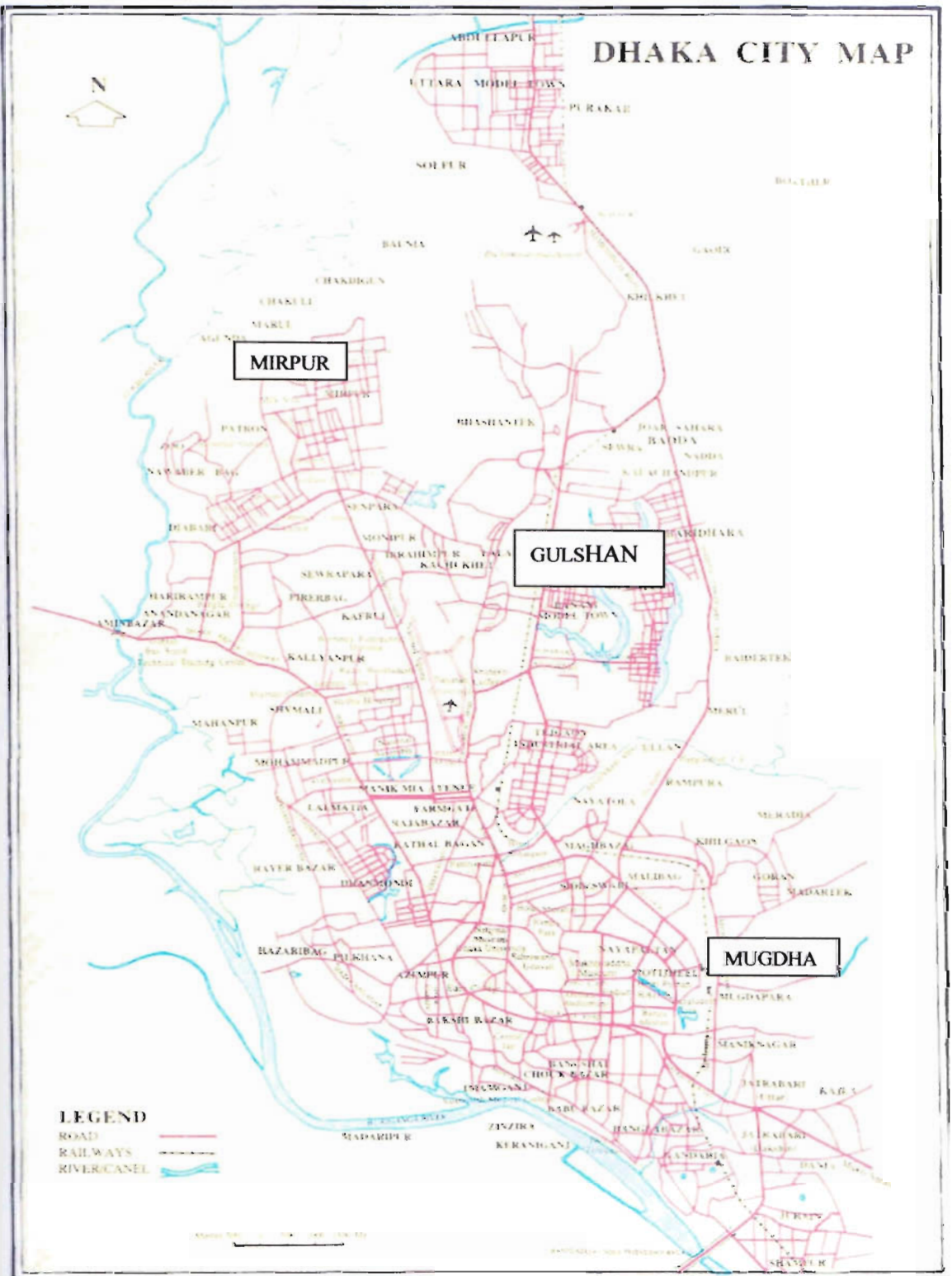
The survey was conducted in selected urban locations of Bangladesh at Dhaka city, which include several mullahs of Mirpur, Mohakhali and Sobujbag Thana (Mughda).

#### **C) Sampling Frame:**



**Figure 05 : Sampling Frame**





**Fig06: Different study site of the research**

### ***Randomization procedure:***

Study populations were children of 2-4 years old age. They were selected by individual randomization. The subject was taken randomly from the urban areas of Dhaka city which include different muhallahs of Mirpur, Mohakhali and Mugdha Thana. Two muhallahs were selected randomly from each Thana and samples (Total sample size is 46) was collected from each muhallah.

### **d) Baseline Data Collection:**

Socioeconomic status, family size, and nutritional practices, past health history, illness of the last month were collected by pre-structured questionnaire and all these information were collected from the mothers of the children included in the study. To determine nutritional status, each team was carried height scale, weight scale and MUAC (Mid upper arm circumference) Tape. Data was cross checked at the spot by verification with another researcher who was involved in this study. Information of food intake can be collected by different methods. The description of different method are given below:

### **24 hour dietary recall method:-**

In the 24 hour dietary recall, the respondent is asked to remember and report all foods and beverages consumed in the preceding day. The recall typically is conducted by personal interview or, more recently, by telephone<sup>[27, 28]</sup> either computer assisted<sup>[29]</sup> or using a paper and pencil form. A quality control system to minimize error and increase reliability of interviewing and 24 hour recalls is essential<sup>[28,30,31-34]</sup>. Direct coding of the foods reported during the interview is now possible with computerized software systems. The potential benefits of automated software include substantial cost reductions for processing dietary data, and greater standardization of interview<sup>[35]</sup>.

The main weakness of the 24 hours recall approach is that individuals may not report their food consumption accurately for various reasons related to memory and the interview situation. Because most individual diets vary greatly from day to day, it is not appropriate to use data from a single 24 hour recall to characterize an individual's usual diet. Neither should a single day's intake, be it a recall or food records, be used to estimate the proportion of the population that has adequate or inadequate diets (e.g; the proportion of individuals with less than 30% of energy from fat or who are deficient in vitamin C intake)<sup>[36]</sup>. This is variation not only between people in usual diet, but also from day-to-day for each person. The principle use of a single 24 hours recall is to describe the average dietary intake of a group because the means are robust and unaffected by within-person variation. Multiple days of recalls or records can better assess the individual's usual intake and population distributions, but require special statistical procedures designed for that purpose<sup>[36,37]</sup>.

The validity of the 24-hour dietary recall has been studied by comparing respondents reported of intake either with intakes unobtrusively recorded /weighed by trained observers or with biological markers. In general group mean nutrient estimates from 24-hour recalls have been found to be similar to observed intakes<sup>[38]</sup>, although respondents with lower observed intakes have tended to over report and those with higher observed intakes have tended to underreport their intakes<sup>[38]</sup>. Similar to finding for food records, biological markers such as doubly labeled water and urinary nitrogen

show a tendency toward underreporting of energy and protein in the range of 13-24% for 24 hours dietary recalls [39]. One study, however, found over reporting of BMI [40]. In national dietary surveys, data suggest that underreporting may affect up to 15% of all 24hour recall [41]. Under reporters tend to report fewer numbers of foods, fewer mentions of food consumed and smaller portion sizes across a wide range of food groups and tend to report more frequent intakes of low fat /diet foods and less frequent intakes of fat added to foods [15]. Factors such as obesity, gender, social desirability, restrained eating, education, literacy, perceived health status and race/ethnicity have been shown in various studies to be related to underreporting in recalls [15-17].

### **Food frequency method:**

The Food frequency approach asks respondents to report their usual frequency of consumption of each food from a list of foods for a specific period (17-19). Information is collected on frequency and sometimes portion size, but little detail is collected on their characteristics of the foods eaten, such as the methods of cooking or the combination of food in the meals. To estimate relative or absolute nutrient intake, many food frequency questionnaires (FFQs), also incorporate portion size questions. Overall nutrient intake estimates are derived by summing, overall foods, the products of the reported frequency of each food by the amount of nutrient in a specified (or assumed) serving of that food. There are many FFQ instruments, and many continue to be adopted and developed for different populations and different purposes. Among those validated and commonly used for U.S. adults are the health habit and history Questionnaire (HHHQ) or Block Questionnaire [20-25,42,43], the Fred Hutchinson Cancer Research center food frequency Questionnaire (a revised HHHQ) [44], and the Harvard university F. Fre. Qu. Or Willetl qu [45-49]. Comparisons between the widely used Block and Willetl instruments have been conducted indicating differences in estimates for some nutrients [50-52]. A new instrument, the diet history Questionnaire, developed and in use at the National Cancer Institute was designed with an emphasis on cognitive ease for respondents [53-55]. Other instruments have been developed for specific populations.

**In this study the information of food intake of 2-4 years old children were collected by 24 hours dietary recall method.**

### **Qualitative data collection:**

Qualitative data was collected through focus group discussion (FDG) and in depth interview. After collection of baseline information, Focus Groups Discussion (FGD) was conducted to understand the perception and knowledge gap on:

- Child nutrition and growth
- Dietary intake of children
- Micronutrients rich food for children
- Ways of improvement of child nutrition

### **Quantitative data collection:**

Two types of quantitative data were collected in the study:

1. **Anthropometry:** Weight was determined using weighing scale (sensitivity 100g), height was measured by height scale with precision of 1 cm, and MUAC was collected using TALC (Teaching Aid at Low Cost) tape with precision of 1 mm. Anthropometry data was collected on children nutritional status.
2. **Structured questionnaire:** Personal hygiene, health seeking behavior and morbidity data was collected by administration of structured questionnaire.

### **e) Questionnaire development:**

Before preparation of questionnaire secondary documents after first field been reviewed and the questionnaire has been finalized. Later on after field test it has been finalized. A questionnaire, for the study was used, that consists of-

- Identification of children aged 2-4 years.
- Socio-economic factors.
- Feeding practice of child.
- Caring practice of child.
- Disease controls of child

### **f) Field Test:**

Field test was conducted after designing the questionnaire. During the field test, each investigator was conducted adequate samples.

### **g) Quality Control:**

Project supervisor was supervising the systematic data collection in 5% random cases. All collected data was standardized monthly by the supervisor. Each subject of the study was recorded in file of events and kept with confidentiality.

### **h) Data editing, coding, entry:**

As soon as the data was collected then edited by the study investigators, coding rightly and entered into the SPSS software.

### **i) Data Analysis:**

Data was analyzed by using SPSS version 11.5. Nutritional status was calculated by WHO Anthro software. Height-for-age, weight-for-age, and weight-for-height z-scores was obtained by this program. The SPSS version 11.5 software is used for different types of statistical analysis such as;

1. Descriptive statistics that used for variable of interest.
2. T-test that used to compare group member where distribution of variable is normal .Correlation that tested for relationship between micronutrient intake and nutritional status.

3. Multiple regressions done for finding the determination of micronutrient intake and nutritional status.

In this study I have used the multiple regression statistical analysis because of my study include only 24 hours recall dietary survey method. Statistical significance was accepted as at 5% level.

**j) Thesis Preparation:**

Based on findings of date, the thesis was prepared and submitted accordingly.

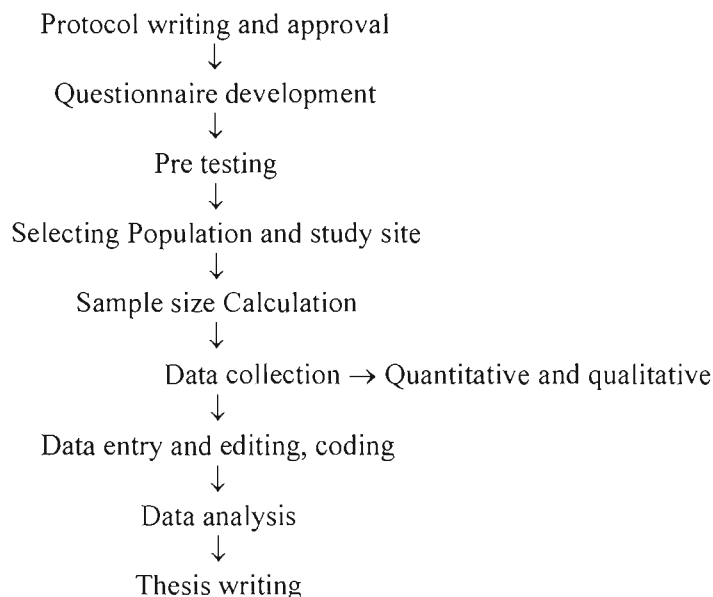
**Inclusion Criteria:**

1. Children aged 2 to 4 years and mothers of the children who were willing to participate in the study.

**Exclusion Criteria:**

1. Children who was out of the specified age groups.
2. Caregivers who was disagreed.
3. Parents who were absent in the house.
4. Children who were suffer from illness more than 2 weeks.

**Study Procedure:**



### **Collection of information:**

Consent was taken from the mothers fulfilling the eligibility criteria and agreeing to participate as indicated by signing on an informed consent form. Information on current dietary pattern, nutritional status, food intake of the children was collected. Information on socio-economic status, years of formal education of the mother and her spouse, history of illness in last one month, type of housing, land ownership of the family, water source, sanitation arrangement and waste disposal was also collected from the mother at enrolment through a structured and pre-tested questionnaire. Information of food intake of children was collected by 24 hours dietary recall method.

In-depth interview was conducted with the mother to understand their perceptions and knowledge gaps on:

1. The perceptions about food security of children, feeding practice and pattern.
2. Perceptions on advantages of complementary feeding.
3. Frequency and quality of diet, micronutrient level in food and its important.
4. Perception on personal hygiene and sanitation.
5. Perception on causes and consequences of malnutrition of children.

### **Quality control measures:**

Project investigators was supervised systematic data collection in randomly selected 25% of the participants. Anthropometric data was standardized (WHO growth chart) by trained nutritionist. The principle investigator was checked the data collection and check records of every file. In the event any discrepancy in identification, the respective health worker was informed and assisted by supervisor to correct relevant data. For each participant of the study a separate file was maintained at the project office for recording events of interest. Data was checked by statistical software (SPSS software) after collection and before analysis.

### Sample size calculation:

Assumption: 2-4 years old children were 60% of RDA (i.e. - 40% less) of Zinc intake, then the formula that was used as <sup>[69]</sup> -

$$n = \frac{\{u \sqrt{[\pi (1 - \pi)]} + v \sqrt{[\pi_0 (1 - \pi_0)]}\}^2}{(\pi - \pi_0)^2}$$

Here,

$u = 1.28$  (If power 90%)

$v = 1.96$  (Significance level 5%)

$\pi_0 = 60\% = 0.6$

$\pi = 40\% = 0.4$

$$\therefore n = \frac{\{1.28\sqrt{[0.4(1-0.4)]} + 1.96\sqrt{[0.6(1-0.6)]}\}^2}{(0.6 - 0.4)^2}$$

= 125.46  $\approx$  126

Design effect 1.5

Sample size = 126 x 1.5 = 189

### Variable List:

1. Child feeding time, quantity and quality
2. Child caring practice
3. Food intake
4. Water source
5. Mother/Care taker's perception
6. Socio economic status of the family
7. Educational status of the mother and father
8. Height of the child
9. Weight of the child.
10. Measurement of the MUAC (Mid upper arm circumference)

### Description of the variables:

#### 1. Feeding time of the children:

I had found out that the children were having their food timely or not. Feeding time for the children aged 2-4 years may be thrice a day or more.

#### 2. Food intake:

It means that what type of foods were usually taken by the children and also to find out that foods were richer with micronutrients or not.

### 3. Water source:

I also considered the source of water that was taken by the children. Because if the water was not pure enough then it may create so many diseases in children.

### 4. Socio economic status of the family:

The socio-economic status was estimated from four types of proxy indicators such as roof materials, possession of electrical and mechanical items and last month's total household expenditure. The conditions set for constructing three types of socio-economic status (SES) are as follows:

High SES includes:

1. Pucca or tin/CI sheet roof with at least 10 ft. height + at least one of motor cycle/sewing machine/water pump + at least one of radio/watch/clock; or
2. Monthly expenditure more than Tk. 10000.00

Medium SES includes:

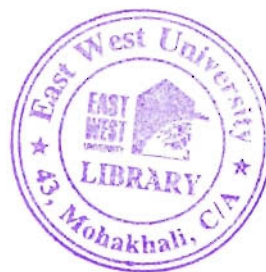
1. Tin/CI sheet roof with at least 8 ft. height = at least one of radio/watch/clock; or,
2. Tin/CI sheet roof with at least 8 ft. height + at least one of motor cycle/sewing machine/water pump; or,
3. Monthly expenditure more than Tk. 5,000.00.

Low SES includes:

1. Bamboo/straw roof; or,
2. Tin/CI sheet roof with less than 8 ft. height + no mechanical/electrical goods; or,
3. Monthly expenditure equal or less than Tk. 2500.00.

### 5. Educational status of the mother:

I took information about the children's mother educational status because an educated mother can take care of her children more properly. For example, an educated mother has the knowledge about the micronutrients containing foods and that's why she can provide the micronutrients containing foods to her children.



### 6. CLASSIFICATION OF NUTRITIONAL STATUS:

Standard deviation score (SD score or Z-score):

For conducting 1995-96 anthropometric measurements I have followed the standard deviation score or Z-score classification. Z-score is multiple of standard deviation. It is estimated by taking median value of the reference population, divided by the standard deviation for the reference population<sup>[70]</sup>.



$$\text{Z-score or SD score} = \frac{\text{Observed value} - \text{median reference value}}{\text{Standard deviation of reference population}}$$

Earlier experts in this area used to treat those whose weight for height were within 80 percent of median and those whose height for age were within 90 percent of the median of the reference population as being normal in terms of their physical development . Those whose weight for height was more than 80 percent and those whose height for age was more than 90 percent of the median were treated as being abnormal . Classification of population of determining malnourishments in the above manner was known as water low classification . According to WHO (1995) “The main disadvantage of this system is the lack of exact correspondence with a fixed point of distribution across age or height status”. For example , depending on the child’s age ,80 percent of the median weight-for-age might be above or below 2Z-score in terms of health this would results in different classification to risk<sup>[70]</sup> .

Another method was adopted earlier to estimate the extent of underweight known as GOMEZ method .This was not satisfactory method for classifying the incidence of underweight among children . Since Z-score classification can be used for all type of anthropometric measurements for obtaining accurate data on under nourishment , experts now use Z-score instead of the other methods for determination stunting, underweight and wasting<sup>[70]</sup>.

Children whose scores according to anthropometric indices were found to be less than 2SD or below the reference, have been classified as being physically retarded<sup>[71]</sup>. The scores for severe and moderate ,stunting ,wasting and underweight are given below :-

Height for age:-

Stunting or chronic malnutrition: -2SD or below.  
 Moderate : -2SD to -2.99 SD.  
 Severe : -3SD or below.

Weight for height:

Wasting or acute malnutrition : -2SD or below.  
 Moderate : -2SD to -2.99 SD.  
 Severe : -3SD or below.

Weight for age:

As well as acute malnutrition : -2SD or below.  
 Moderate : -2SD to -2.99 SD.  
 Severe : -3SD or below.

Mid upper Arm Circumference (MUAC):

Mid upper Arm Circumference is used as a measure for identifying children with protein-energy-malnutrition (PEM).The MUAC in well nourished group of children does not differ appreciably among 12-59 months old children<sup>[70]</sup> .

Body mass index:

BMI indicator was calculating by dividing weight in kilogram by the square of height in meters. In adults it was used with age to define over-weight or thinness. It has also been used for older children and adolescents but not widely used for children because of its variation with age. Classification of nutritional status by Body Mass Index as shown below was done according to WHO, 1995.

**Recommended cut off values for BMI:**

Indicator	Cut off values
Thinness or low BMI for age	<5 th percentile
At high risk of over weight or high BMI for age.	>85 th percentile

Height and weight for children:

In this section I was dealing with the nutritional of surveyed population of 2-4 years aged groups.

***Facilities Available:***

- a) Anthropometric equipments (Weighing scale, stadiometer, MUAC tape).
- b) Office space available.
- c) Computer support available.
- d) Skilled expertise available (nutritionist, immunologist, technicians, computer, programmer, data analyst).
- e) Library available.
- f) Internet service available.

**Data Safety:**

Data was kept confidential and not available to anybody except the investigators. Data collecting personnel was advised and motivated to keep the information confidential, and

data may be shared only with respective respondent or participating parents/ primary caregivers' if requested. Data was not carried the name of the participants and instead codes and then entered onto the computer.

### ***Data Analysis:***

Data was analyzed by using SPSS version 11.5. Nutritional status was calculated by using WHO Anthrop software. Height-for-age, weight-for-age, and weight-for-height z-scores were obtained by the program. Statistical significance was accepted at 5% level.

### ***Ethical Assurance for Protection of Human Rights:***

There was no ethical problem to enroll selected micronutrient. Consent was taken from each of the mothers having a baby aged 2-4 years after informing them the objective of the study, the methods, the risks and benefits, confidential handling of personal information, and the voluntary nature of participation and the rights to withdraw from the study. The study was received normal care and advice provided by the facility concerned.

### **Limitation:**

- There was a great limitation in my fund. Because of this I can't able to work with large sample size.
- Short time was a great problem & for this I can't work properly.
- There was some wrong style of asking question and for this some results was not significant.
- Computer service was in problem & it was a great limitation.
- Due to short-time i can't work with our proposal sample size.

# Chapter-3

## Results

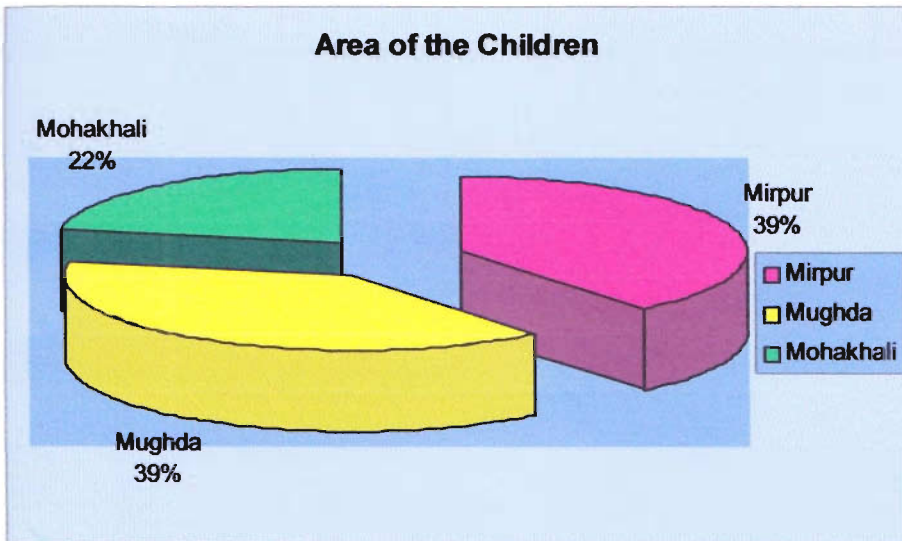
### Background information

**Table 02: Distribution of child in Thana**

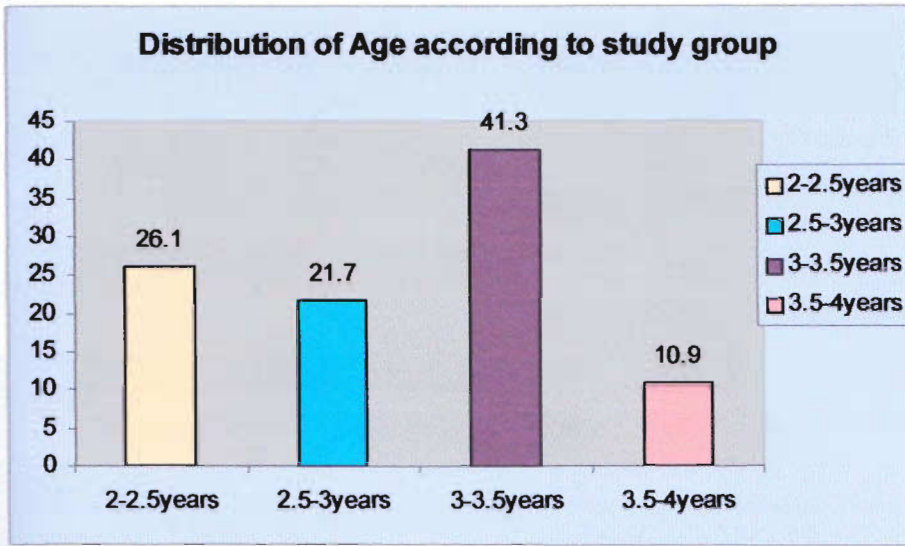
Name of Thana	N	Percentage
Mirpur	18	39.13
Mugdha	18	39.13
Mohakhali	10	21.74
Total	46	100

The table shows that the number of child in Mirpur thana was 18 & the percentage was 39.13%, in Mugdha thana the number of child was 18 & the percentage was 39.13% & in Mohakhali thana the number of child was 10 & the percentage was 21.74%.

**Figure 07: Area of the child**



**Figure 08: Distribution of children Age according to the study group**



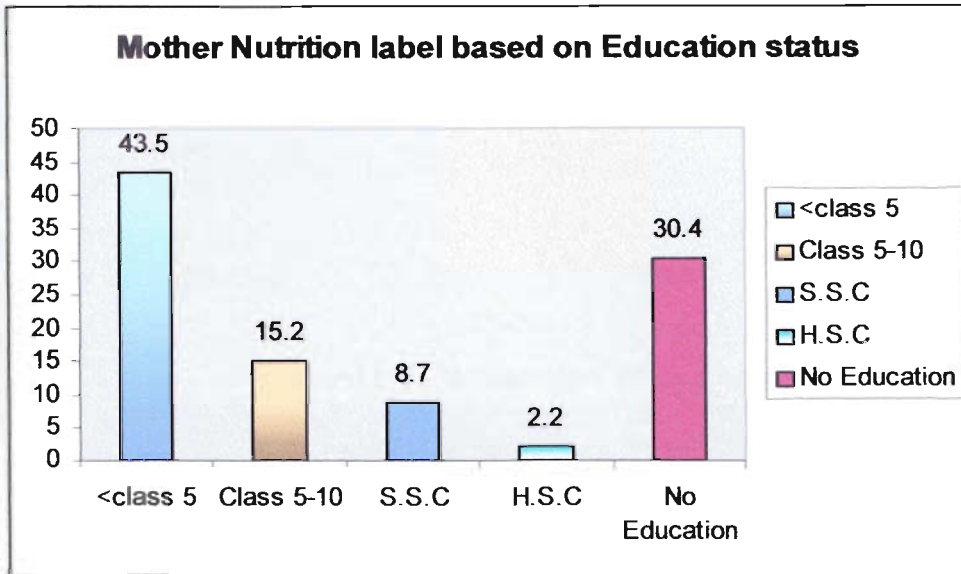
The figure shows that the children of the study were divided into four categories. Among them 26.1% was in 2-5-2.5years, 21.7% was in 2.5-3years, 41.3% was in 3-3.5years, 10.9% was in 3.5-4 years of old.

**Table 03: Distribution of child according to sex:**

Sex of the child	N	Percentage
Male	27	58.7
Female	19	41.3
Total	46	100

The table shows that among the children frequency of male & female was 27& 19 and the percentage was 58.7 & 41.3.

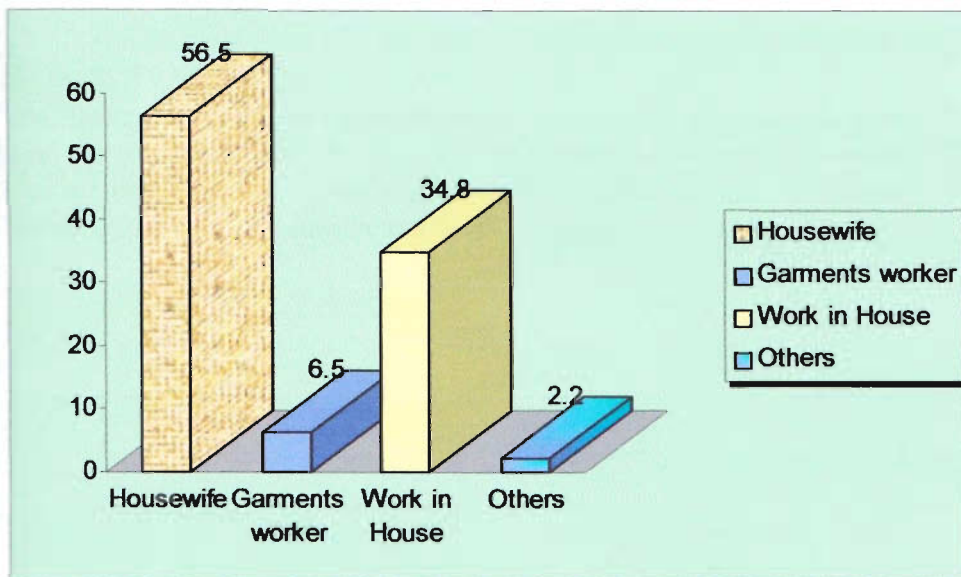
Figure-09: Mothers education level based on Nutritional status



Mean±SD = 3.83± 3.530

Educational attainment of the mother's was represented in figure. For convenience, the academic qualification was divided into 5 categories namely under class 5, class 5-10, S.S.C, H.S.C and no education. The results shows that the educational level in below class 5 was 43.5%, 15.2% in class 5-10, 8.7% in S.S.C, 2.2% in H.S.C and 30.4% in no education.

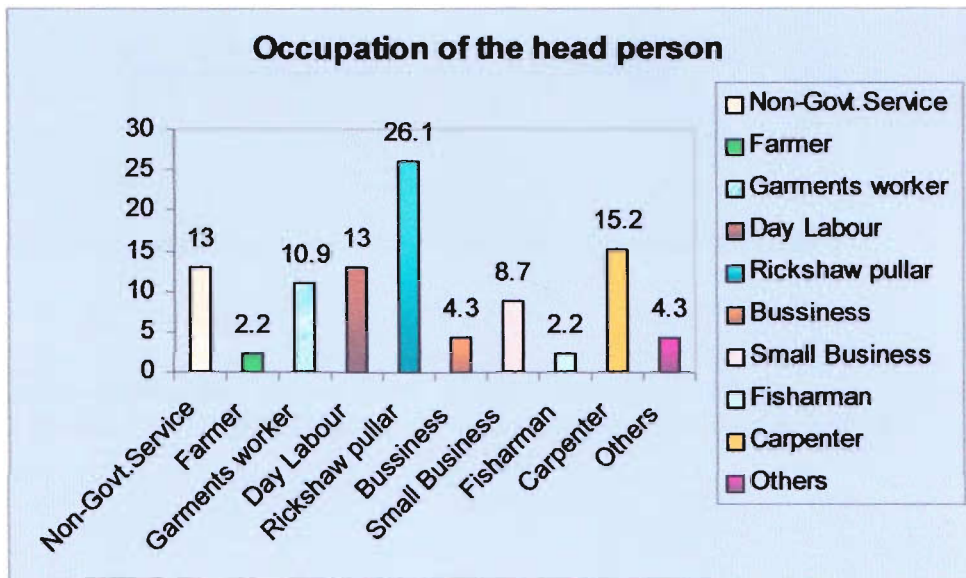
Figure 10 :-Mothers occupation based in Nutritional status



Mean±SD=4.85±1.053

The figure shows the occupational status of the mother's. For convenience, mother's occupation was divided into 5 categories namely housewife, garments worker, maid servant and others. The result shows among the mother 56.55% Housewife, 6.5% garments worker, 34.8% maid servant and 2.2% having other occupation.

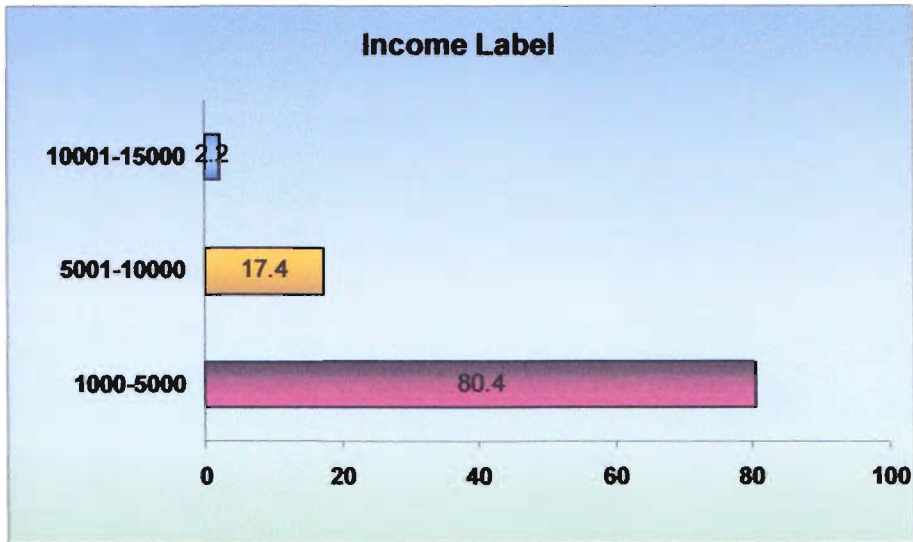
**Figure-11 : Occupation of the head person**



Mean±SD=7.91±3.126

The figure shows the occupational status of the head person. The result shows among the head person Non-Govt. Service 13.0%, farmer 2.2%, garments worker 10.9%, day labor 13.0%, rickshawpuller 26.1%, business 4.3%, small business 8.7%, fisherman 2.2%, carpenter 15.2% and others 4.3%.

**Figure -12 : Income level**

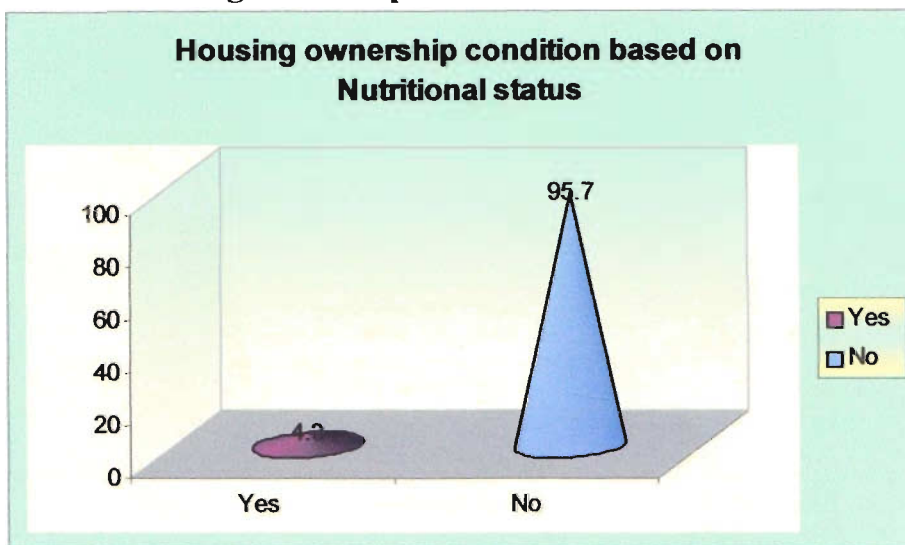


Mean±SD=4721.74±1829.258

The figure shows the income level of the respondents. 80.4% earn 1000-5000 Taka, 17.4% earn 5001-10000 Taka and 2.2% earn 10001-15000 Taka in a month.

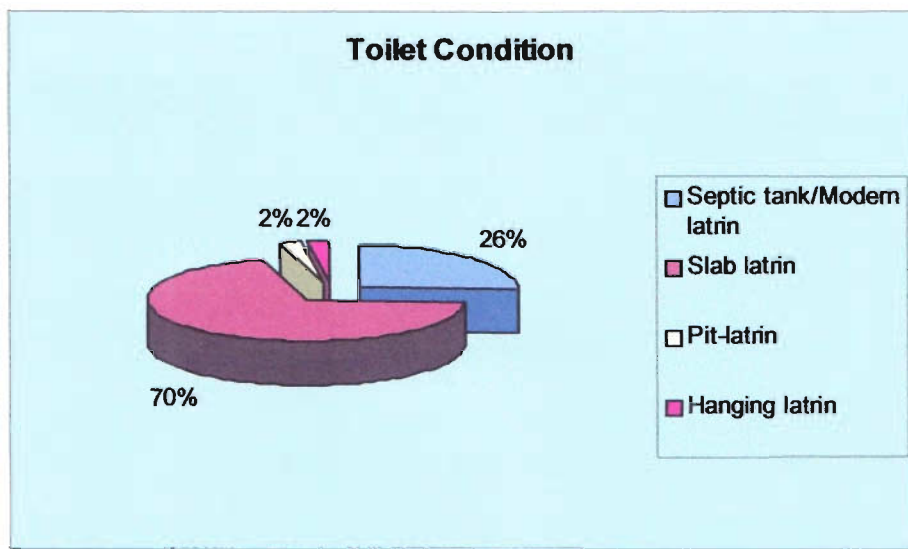


**Figure 13 : Housing ownership condition based on Nutritional status**



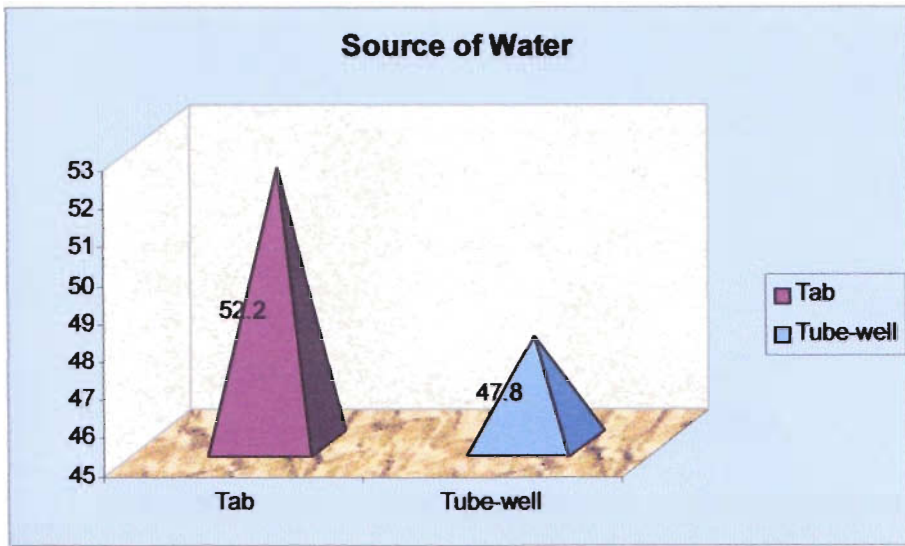
The Figure shows the condition of the house ownership of the respondents. For convenience 95.7% having no household land and 4.3% having household land.

**Figure 14:-Toilet condition**



Toilet condition was represented in this figure. For convenience,26.% use modern latrine,70% used slab latrine,2% used pit latrine and 2% used hanging latrine.

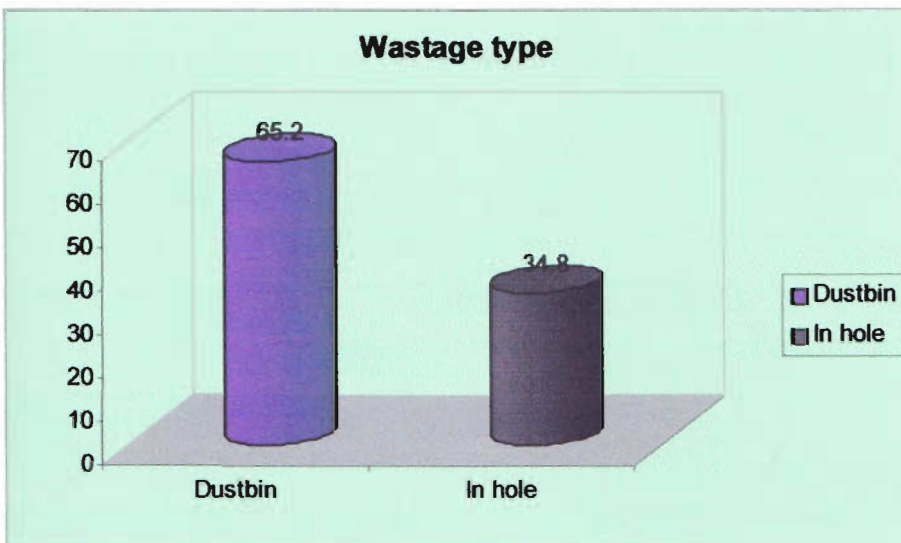
**Figure 15 :- Source of water**



Mean±SD=1.48±.505.

The figure shows that the condition of the water's source of the respondents. For convenience source of water were divided into 2 categories namely tube well and tap. The results shows that tube well 52.2% & tap 47.8% were used .

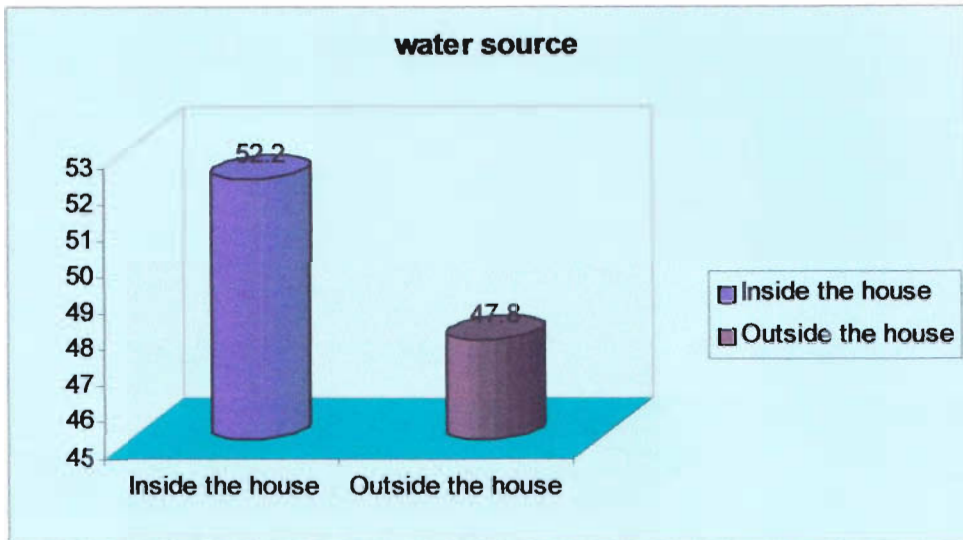
**Figure 16 :- Wastage type**



Mean±SD=1.35±.482

The figure shows that wastage type. 65.2% use dustbin & 34.8% drop wastage in the hole

**Figure 17: - Location of the main water Source**



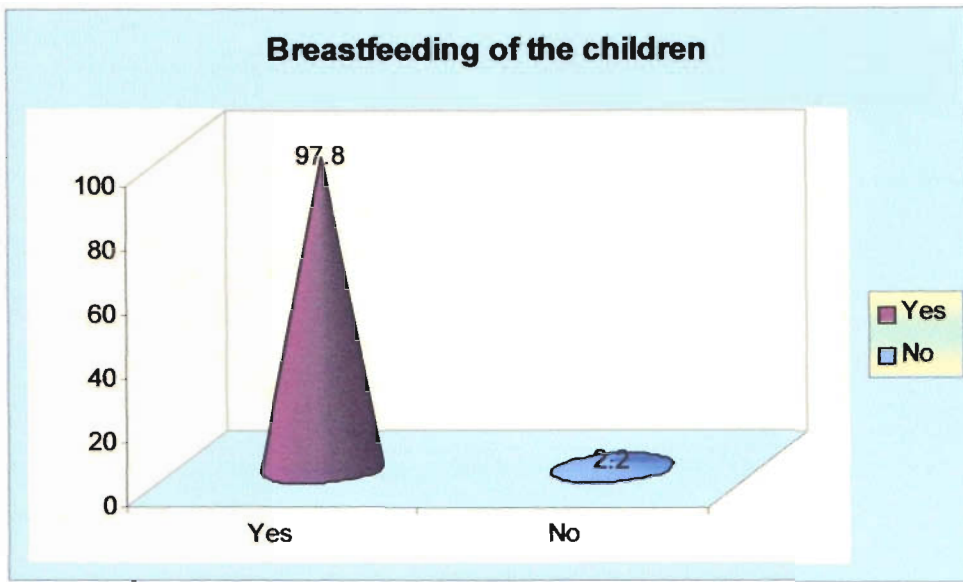
Here, n= 46

Mean±SD=1.48±.505

The figure shows that the condition of the location of water source of the respondents. For convenience of the location of water source is inside the bari 52.2% and outside the bari is 47.8%.



**Figure 18:- Breastfeeding of the child**



Here, n= 46

Mean±SD=1.02 ±.147

The figure shows the status of feeding breastmilk of the child which indicates 97.8% children have fed breastmilk where 48% child haven't fed.

**Table 04 :- Colostrum feeding of the child**

	<b>n</b>	<b>Percent ,%</b>
<b>Yes</b>	<b>38</b>	<b>82.6</b>
<b>No</b>	<b>8</b>	<b>17.4</b>
<b>Total</b>		<b>n=46</b>

Here n=46

Mean±SD=1.17±.383

The table shows the status of feeding colostrums to the child which indicates 82.6% child have fed colostrums where 17.4% children haven't fed colostrums .

**Table 05 :- Initiate feeding of breast-milk just after birth(Hour)**

	<b>n</b>	<b>Percent ,%</b>
<b>&lt;15.00</b>	<b>41</b>	<b>89.1</b>
<b>15.01-30.00</b>	<b>0</b>	<b>0.00</b>
<b>30.01-45.00</b>	<b>1</b>	<b>2.2</b>
<b>45.01-60</b>	<b>1</b>	<b>2.2</b>
<b>&gt;60.01</b>	<b>3</b>	<b>6.5</b>
<b>Total      n=46</b>		

Here, n= 46

Mean±SD=1.35±1.079

The table shows the status of feeding initiate breast-milk just after birth to the child which indicates 89.1% child have fed breast-milk within 15hours where 10.9% children have fed breast-milk from 15 to greater than 60 hours.

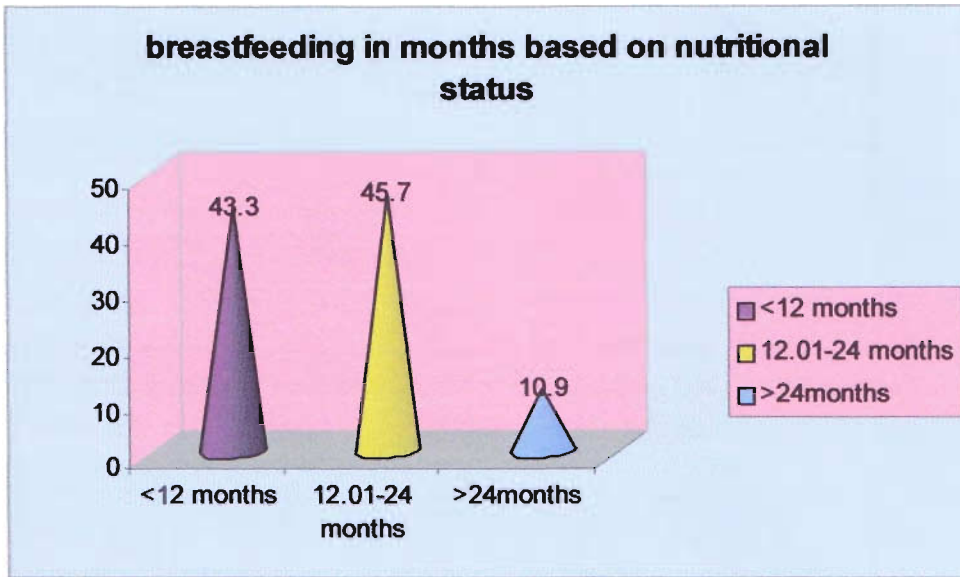
**Table 06 :- Feeding of honey,plain water and sugar water immediately after his or her birth(Hour).**

	<b>n</b>	<b>Percent ,%</b>
<b>Yes</b>	<b>18</b>	<b>39.1</b>
<b>No</b>	<b>28</b>	<b>60.9</b>
<b>Total      n=46</b>		

Here n=46

The table shows the status of feeding of honey,plain water and sugar water immediately after his or her birth(Hour) which indicates 39.1% child have fed where 60.9% children haven't fed.

**Figure 19 : Breast feeding in months based on nutritional status**



Here, n= 46

The figure shows breastfeeding in month of the children. Among the child, 43.3% of children during 0 to 12 months where 45.7% of children during 12 to 24 months and 10.9% have breastfeeding greater than 24 months.

**Table-07 : Type of salt is used for cooking for the children**

	N	Percent ,%
Iodized salt	37	80.4
Un-iodized salt	9	19.6
<b>Total</b>		<b>n=46</b>

Here n=46

The table shows the status of type of salt was used for cooking for the children which indicates 80.4% mother used iodized salt for there child where 19.6% mother haven't used iodized salt .

**Table 08 : Specially cooked food for the children**

	N	Percent ,%
Yes	17	37
No	19	63
<b>Total n=46</b>		

Here n=46

The table shows the status of cooking food specially for the children which indicates 37% mother cooked food specially for the children 63% mother didn't .

**Table 09 :Using more oil in the preparation of baby's food**

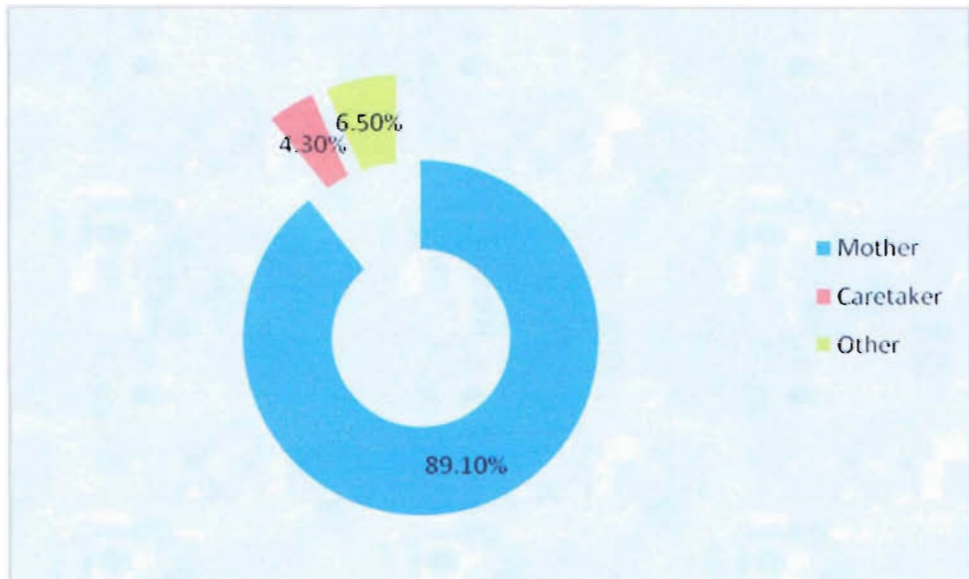
	N	Percent ,%
Yes	12	26.1
No	34	73.9
<b>Total n=46</b>		

Here n = 46

Mean±SD=1.17±0.529

The figure shows that the use of more oil in the baby's food or not. Here 26.1% use more oil in the food & 73.9% didn't use more oil.

**Figure 20 : The main care giver of the child**



Here n=46

The figure shows that who the main caregiver of the child was. For convenience, the main caregiver was divided into 3 categories in which mother 89.1%, Caretaker 4.3% and others 6.5%.

**Table 10: Sleeping time of the children according to Nutritional status**

Hours	N	Percent ,%
6-8	27	58.7
8-10	17	37
Other	2	4.3
<b>Total n=46</b>		

Here n = 46

The table represents the sleeping time of the child was 58.7% child sleep 6 to 8 hours, 37% child 8 to 10 hours & 4.3% child were sleeping greater than that time.

**Table 11 : Brushing teeth regularly of the child:**

	n	Percent ,%
Yes	10	21.7
No	35	78.3
<b>Total n=46</b>		

Here n=46

The figure shows that 21.7% child brushes teeth regularly & 78.3% child didn't brushes teeth regularly .

**Table 12:- Cutting nail regularly of the child**

	n	Percent ,%
Yes	24	52.2
No	22	47.8
<b>Total n=46</b>		

The table shows that 52.2% cut nails regularly and 47.8% didn't cut regularly.



**Figure 21: Taking the first six vaccine of the child:**



The figure shows that 89.1% children have taken the first six vaccine & 10.9% haven't taken the first six vaccine.

**Table 13 :- Taking the polio vaccine of the child**

	n	Percent ,%
Yes	100	100
No	0	.00
<b>Total</b>		<b>n=46</b>

The table shows taking the polio vaccine 100 % have taken polio vaccine .

**Table 14 :- Sickness of child within last 15 days:**

	n	Percent ,%
Yes	11	23.9
No	35	76.1
<b>Total</b>		<b>n=46</b>

The table shows the sickness of child within last 15 days the figure shows that 23.9% become sick and 76.1% didn't sick within last 15 days.

**Table 15:-Intake level of Zinc of lower socio-economic status compare with the Recommended Dietary Allowance for Zinc.**

Intake level of Zinc	RDA for 2-4 years old children (mg/day)	Zinc intake level in 2-4years children in lower socio-economic status(SES)		
	10 mg/day	Intake level(mg/day)	N	Percent
		<5	37	80.4
		5-10	9	19.6
		>10	0	0
Total, n = 46				

Here , n = 46

Mean  $\pm$  SD =3.43  $\pm$  1.326

The table shows that 81% children were not getting proper intake of Zinc these children are survive as a Zinc deficient children where its indicate in Bangladesh there were lots of Zinc deficient children in lower socio-economic status.Only 19% children were getting a tiny amount of zinc which was not sufficient for the 2-4years old children. The compare of standard amount of Zinc with the normal food intake level in 2-4years children in lower socio-economic status(SES) the research indicates deficiency of Zinc by considering their daily food sources or daily food habitation using 24 hour dietary recall method.

## Intake of different food in the method of 24 hours re-call dietary method

Table 16: Intake amount of bread(gm)

Amount(gm)	N	Percent ,%
0	27	58.7
15	16	34.8
30	3	6.5
<b>Total</b> n=46		

Here n =46

Mean  $\pm$ SD= 7.17 $\pm$ 9.35

The table shows intake of bread. Among the children 58.7% didn't eat bread where in 34.8% eat 15 gram and 6.5% eat bread 30 gram in a whole day.

### Amount of zinc in bread:

There were no zinc in bread.

Table 17: Intake amount of pulse(gm)

Amount(gm)	N	Percent ,%
<b>0</b>	<b>26</b>	<b>56.5</b>
<b>15</b>	<b>11</b>	<b>23.9</b>
<b>30</b>	<b>9</b>	<b>19.6</b>
<b>Total</b> n=46		

Here n =46

Mean  $\pm$ SD= 9.46 $\pm$ 11.98

The table shows intake of pulse Among the children 56.5% didn't eat pulse where in 23.9% eat 15 gram and 19.6% eat pulse 30 gram in a whole day.

### Amount of zinc in pulse:

Among the children 56.5% didn't get zinc from pulse where in 23.9% get 0.47 mg and 19.6% get 0.95mg Zinc in a whole day.

**Table 18: Intake amount of fish(gm)**

Amount(gm)	N	Percent ,%
0	32	69.6
30	10	21.7
40	2	4.3
60	2	4.3
Total	n=46	

Here n =46

Mean  $\pm$ SD= 10.87 $\pm$ 17.62

The table shows intake of fish Among the children 69.6% didn't eat fish where in 21.7% eat 30 gram,4.3% eat 40 gram and 4.3% eat fish 60 gram in a whole day.

**Amount of zinc in fish:**

There were no zinc in fish

**Table 19: Intake amount of meat (gm)**

Amount(gm)	N	Percent ,%
0	40	87.0
30	2	4.3
60	2	4.3
90	2	4.3
Total	n=46	

Here n =46

Mean  $\pm$ SD= 7.83 $\pm$ 22.30

The table shows intake of meat Among the children 87.0% didn't eat meat where in 4.3% eat 30 gram,4.3% eat 60 gram and 4.3% eat meat 90 gram in a whole day.

**Amount of zinc in meat:**

There were no zinc in meat.

**Table 20: Intake amount of egg(gm)**

Amount(gm)	n	Percent ,%
0	21	45.7
15	19	41.3
30	6	13
Total	n=46	

Here n =46

Mean  $\pm$ SD= 10.11 $\pm$ 10.51

The table shows intake of pulse Among the children 45.7% didn't eat egg where in 41.3% eat 15 gram and 13% eat egg 30 gram in a whole day.

**Amount of zinc in egg:**

There were no zinc in egg.

**Table 21: Intake amount of milk (ml)**

Amount(ml)	n	Percent ,%
0	28	60.9
125	9	19.6
250	7	15.2
375	2	4.3
Total	n=46	

Here n =46

Mean  $\pm$ SD= 78.80 $\pm$ 112.91

The table shows intake of milk Among the children 60.9% didn't drink milk where in 19.6% drink 125ml,15.2% drink 250ml and 4.3% drink milk 375ml in a whole day.

**Amount of zinc in milk:**

There were no zinc in milk

**Table 22: Intake amount of leafy vegetable(mg)**

Amount(mg)	N	Percent ,%
0	26	56.5
15	16	34.8
30	4	8.7
<b>Total</b> n=46		

Here n =46

Mean  $\pm$ SD= 7.83 $\pm$ 9.87

The table shows intake of leafy vegetable Among the children 56.5% didn't eat where in 34.8% eat 15 gram and 8.7% eat leafy vegetable 30 gram in a whole day.

**Amount of zinc in leafy vegetable:**

Among the children 76.1% didn't get zinc from leafy vegetable where in 23.9% get 0.9mg Zinc in a whole day.

**Table 23: Intake amount of other vegetable(gm)**

Amount(gm)	N	Percent ,%
0	39	84.8
15	4	8.7
22	2	4.3
30	1	2.2
<b>Total</b> n=46		

Here n =46

Mean  $\pm$ SD= 7.83 $\pm$ 9.87

The table shows intake of other vegetable Among the children 84.8% didn't eat where in 8.7% eat 15 gram ,4.3% eat leafy vegetable 22 gram and 2.2% eat 30gram other vegetable in a whole day.

**Amount of zinc in other vegetable:**

Among the children 87% didn't get zinc from other vegetable where in 13% get 0.12 mg Zinc in a whole day.

**Table 24: Intake amount of Halua/suji/firni(gm)**

Amount(gm)	N	Percent ,%
0	32	69.6
11	1	2.2
22	11	23.9
44	2	4.3
Total	n=46	

Here n =46

Mean  $\pm$ SD= 7.41 $\pm$ 12.28

The table shows intake of Halua/suji/firni Among the children 69.6% didn't eat where in 2.2% eat 11 gram ,23.9% eat 22 gram and 4.3% eat 44 gram in a whole day.

#### **Amount of zinc in Halua:**

There were no Zinc in Halua.

**Table 25 : Intake amount of fruits(gm)**

Amount(gm)	N	Percent ,%
<10	24	52.2
10-250	21	45.7
250-490	1	2.2
Total	n=46	

Here n =46 ; Mean  $\pm$ SD= 1.5 $\pm$ 0.547

The table shows intake of fruits Among the children 52.2% children were getting fruits less than 10 gram where in 45.7% eat 10-250 gram and 2.2% got 250-490 gram in a whole day.

#### **Amount of zinc in fruits:**

Among the children 67.4% children didn't get Zinc in fruits where 26.1% were getting 0.2 to 0.15mg of Zinc and 6.5% were getting 0.30mg Zinc in a whole day.

**Table-26: Intake of different food in last 24 hours**

Intake of food	Mean $\pm$ SD
Rice	237.9 $\pm$ 89.40
Bread	7.17 $\pm$ 9.35
Egg	10.11 $\pm$ 10.51
Pulse	9.46 $\pm$ 11.98
Fruits	1.5 $\pm$ 0.547
Leafy Vegetables	7.83 $\pm$ 9.87
Fish	10.87 $\pm$ 17.62
Meat	7.83 $\pm$ 22.30
Milk	78.80 $\pm$ 112.91
Other Vegetable	7.83 $\pm$ 9.87
Halua/suji/firni	7.41 $\pm$ 12.28

## Anthropometry

**Table: 27: Percentage distribution of Nutritional status of 2-4 years old children based on weight for Age Z score according to the study groups:**

Nutritional status	Frequency (n)	Percent (%)
Normal : (-2SD or below)	24	52
Moderate Underweight (WAZ -3.00 to -2.01)	13	28
Severe Underweight (WAZ <-3.00)	9	20





**Table: 28 Percentage distribution of Nutritional status of 2-4 years old children based on weight for height Z score according to the study groups:**

Nutritional status	Frequency (n)	Percent (%)
Normal : ( -2SD or below)	42	91
Moderate Underweight (WAZ -3.00 to -2.01)	3	7
Severe Underweight (WAZ <-3.00)	1	2

These study indicates there were 52% normal in the study weight for age Z score and 28% were moderate Underweight .There were 20% severe Underweight which indicates approximately 48% children were Underweight because of zinc deficiency. In other hands among the 46 children there were 91% normal in the study weight for height Z score and 7% were moderate wasting .There were 2% severe wasting which indicates approximately 9% children were Under height because of zinc deficiency,here weight for height was not more effective in zinc deficiency.

## **Discussion:**

In Bangladesh 20% of the total population lives in the urban areas, particularly large cities, are experiencing phenomenal growth in population. The 2001 national census showed that the urban population had growth by 34%in the preceding ten years, compared to only 10% growth in the rural areas. If the current trends continue, it is predicted that the number of people affected by urban poverty will rise from current 7 million to 23 million by 2010.

A large number of the urban poor live in the slums of the three largest cities - Dhaka, Chittagong and Khulna . The Nutritional condition of urban slams is the worst. Being exposed to over crowding, unhygienic environment, poor living conditions and poverty, most of the urban poor suffer from malnutrition and chronic infections diseases. And there is no way of escaping from the fight of driving malnutrition out of community The first and foremost plan of development has to be the model of creating educated woman who in turn would be mothers.

In Bangladesh, according to division, the under five mortality rate of the children caused by malnutrition was in Chittagong 5.3%, Dhaka 5.4%, Khulna/ Barisal 2.8%, Sylhet

2.1%. According to sex the rate is in male 4.6% & female 2.4%. On the other hand, in rural Bangladesh 2.3% & in urban 8.3% died caused by malnutrition. The total mortality rate of under five children in 2004 was 88%, 1999-2000 was 94%, 1996-97 was 116%, 1993-94 was 130%.

In my present study, determination of the selected micronutrie

**Table 15:-Intake level of Zinc of lower socio-economic status compare with the Recommended Dietary Allowance for Zinc.**

Intake level of Zinc	RDA for 2-4 years old children (mg/day)	Zinc intake level in 2-4years children in lower socio-economic status(SES)		
	10 mg/day	Intake level(mg/day)	N	Percent
		<5	37	80.4
		5-10	9	19.6
		>10	0	0
Total, n = 46				

Here , n = 46  
 Mean ± SD =3.43 ± 1.326

The table shows that 81% children were not getting proper intake of Zinc these children are survive as a Zinc deficient children where its indicate in Bangladesh there were lots of Zinc deficient children in lower socio-economic status.Only 19% children were getting a tiny amount of zinc which was not sufficient for the 2-4years old children. The compare of standard amount of Zinc with the normal food intake level in 2-4years children in lower socio-economic status(SES) the research indicates deficiency of Zinc by considering their daily food sources or daily food habitation using 24 hour dietary recall method.

## Intake of different food in the method of 24 hours re-call dietary method

Table 16: Intake amount of bread(gm)

Amount(gm)	N	Percent ,%
0	27	58.7
15	16	34.8
30	3	6.5
<b>Total</b> n=46		

Here n =46

Mean  $\pm$ SD= 7.17 $\pm$ 9.35

The table shows intake of bread. Among the children 58.7% didn't eat bread where in 34.8% eat 15 gram and 6.5% eat bread 30 gram in a whole day.

### Amount of zinc in bread:

There were no zinc in bread.

Table 17: Intake amount of pulse(gm)

Amount(gm)	N	Percent ,%
<b>0</b>	<b>26</b>	<b>56.5</b>
<b>15</b>	<b>11</b>	<b>23.9</b>
<b>30</b>	<b>9</b>	<b>19.6</b>
<b>Total</b> n=46		

Here n =46

Mean  $\pm$ SD= 9.46 $\pm$ 11.98

The table shows intake of pulse Among the children 56.5% didn't eat pulse where in 23.9% eat 15 gram and 19.6% eat pulse 30 gram in a whole day.

### Amount of zinc in pulse:

Among the children 56.5% didn't get zinc from pulse where in 23.9% get 0.47 mg and 19.6% get 0.95mg Zinc in a whole day.

**Table 18: Intake amount of fish(gm)**

Amount(gm)	N	Percent ,%
0	32	69.6
30	10	21.7
40	2	4.3
60	2	4.3
Total	n=46	

Here n =46

Mean  $\pm$ SD= 10.87 $\pm$ 17.62

The table shows intake of fish Among the children 69.6% didn't eat fish where in 21.7% eat 30 gram,4.3% eat 40 gram and 4.3% eat fish 60 gram in a whole day.

**Amount of zinc in fish:**

There were no zinc in fish

**Table 19: Intake amount of meat (gm)**

Amount(gm)	N	Percent ,%
0	40	87.0
30	2	4.3
60	2	4.3
90	2	4.3
Total	n=46	

Here n =46

Mean  $\pm$ SD= 7.83 $\pm$ 22.30

The table shows intake of meat Among the children 87.0% didn't eat meat where in 4.3% eat 30 gram,4.3% eat 60 gram and 4.3% eat meat 90 gram in a whole day.

**Amount of zinc in meat:**

There were no zinc in meat.

**Table 20: Intake amount of egg(gm)**

Amount(gm)	n	Percent ,%
0	21	45.7
15	19	41.3
30	6	13
Total	n=46	

Here n =46

Mean  $\pm$ SD= 10.11 $\pm$ 10.51

The table shows intake of pulse Among the children 45.7% didn't eat egg where in 41.3% eat 15 gram and 13% eat egg 30 gram in a whole day.

**Amount of zinc in egg:**

There were no zinc in egg.

**Table 21: Intake amount of milk (ml)**

Amount(ml)	n	Percent ,%
0	28	60.9
125	9	19.6
250	7	15.2
375	2	4.3
Total	n=46	

Here n =46

Mean  $\pm$ SD= 78.80 $\pm$ 112.91

The table shows intake of milk Among the children 60.9% didn't drink milk where in 19.6% drink 125ml,15.2% drink 250ml and 4.3% drink milk 375ml in a whole day.

**Amount of zinc in milk:**

There were no zinc in milk

**Table 22: Intake amount of leafy vegetable(mg)**

Amount(mg)	N	Percent ,%
0	26	56.5
15	16	34.8
30	4	8.7
<b>Total</b> n=46		

Here n =46

Mean  $\pm$ SD= 7.83 $\pm$ 9.87

The table shows intake of leafy vegetable Among the children 56.5% didn't eat where in 34.8% eat 15 gram and 8.7% eat leafy vegetable 30 gram in a whole day.

**Amount of zinc in leafy vegetable:**

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Amount(gm)	N	Percent ,%
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<b>Total</b> n=46		

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Mean  $\pm$ SD= 7.83 $\pm$ 9.87

The table shows intake of other vegetable Among the children 84.8% didn't eat where in 8.7% eat 15 gram ,4.3% eat leafy vegetable 22 gram and 2.2% eat 30gram other vegetable in a whole day.

**Amount of zinc in other vegetable:**

Among the children 87% didn't get zinc from other vegetable where in 13% get 0.12 mg Zinc in a whole day.

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**Table 25 : Intake amount of fruits(gm)**

Amount(gm)	N	Percent ,%
<10	24	52.2
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The table shows intake of fruits Among the children 52.2% children were getting fruits less than 10 gram where in 45.7% eat 10-250 gram and 2.2% got 250-490 gram in a whole day.

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<b>Rice</b>	<b>237.9 <math>\pm</math> 89.40</b>
<b>Bread</b>	<b>7.17<math>\pm</math>9.35</b>
<b>Egg</b>	<b>10.11<math>\pm</math>10.51</b>
<b>Pulse</b>	<b>9.46<math>\pm</math>11.98</b>
<b>Fruits</b>	<b>1.5<math>\pm</math>0.547</b>
<b>Leafy Vegetables</b>	<b>7.83<math>\pm</math>9.87</b>
<b>Fish</b>	<b>10.87<math>\pm</math>17.62</b>
<b>Meat</b>	<b>7.83<math>\pm</math>22.30</b>
<b>Milk</b>	<b>78.80<math>\pm</math>112.91</b>
<b>Other Vegetable</b>	<b>7.83<math>\pm</math>9.87</b>
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## Anthropometry

**Table: 27: Percentage distribution of Nutritional status of 2-4 years old children based on weight for Age Z score according to the study groups:**

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These study indicates there were 52% normal in the study weight for age Z score and 28% were moderate Underweight .There were 20% severe Underweight which indicates approximately 48% children were Underweight because of zinc deficiency. In other hands among the 46 children there were 91% normal in the study weight for height Z score and 7% were moderate wasting .There were 2% severe wasting which indicates approximately 9% children were Under height because of zinc deficiency,here weight for height was not more effective in zinc deficiency.

## Chapter-4

### Discussion:

In Bangladesh 20% of the total population lives in the urban areas, particularly large cities, are experiencing phenomenal growth in population. The 2001 national census showed that the urban population had growth by 34% in the preceding ten years, compared to only 10% growth in the rural areas. If the current trends continue, it is predicted that the number of people affected by urban poverty will rise from current 7 million to 23 million by 2010.

A large number of the urban poor live in the slums of the three largest cities - Dhaka, Chittagong and Khulna. The Nutritional condition of urban slums is the worst. Being exposed to over crowding, unhygienic environment, poor living conditions and poverty, most of the urban poor suffer from malnutrition and chronic infectious diseases. And there is no way of escaping from the fight of driving malnutrition out of community. The first and foremost plan of development has to be the model of creating educated woman who in turn would be mothers.

In Bangladesh, according to division, the under five mortality rate of the children caused by malnutrition was in Chittagong 5.3%, Dhaka 5.4%, Khulna/ Barisal 2.8%, Sylhet 2.1%. According to sex the rate is in male 4.6% & female 2.4%. On the other hand, in rural Bangladesh 2.3% & in urban 8.3% died caused by malnutrition. The total mortality rate of under five children in 2004 was 88%, 1999-2000 was 94%, 1996-97 was 116%, 1993-94 was 130%.

In my present study, determination of the selected micronutrient (Iron) intake of 2-4 years old children of lower socio economic status (SES). Nutritional status of the mothers and her children was closely related with Food Security, Disease control and Caring practices. To ensure food security for the children means to provide the adequate amount and proper food which containing all the necessary micronutrients (Vitamin and Minerals) which was fulfill the child's nutritional need to live a healthy life with no malnutrition. This can be done if the main caregivers of the child have the proper knowledge about the child's food composition. But in our country the knowledge about food which is given to the children by the main caregiver is very poor and this lead to the increased rate of malnutrition in our country. With the knowledge of proper food, care for the children is also important. For example, if mother is malnourished and has to spend excess time for household work, her ability to provide adequate childcare can be compromised. Lack of care may result into malnutrition of her young children.

The study were conducted among the families having 2-4 years old children in the three slums (Senpara, Manda and Korael) located at Mirpur, Mughda and Mohakhali thana in Dhaka city. The total slums were about 46. The general objective of the study was " A study on selected micronutrient (Zinc) intake of 2-4 years old children of lower socio economic status (SES)." the specific objective were :-

1. To find the present selected micronutrient (Zinc) intake of 2-4 years old children.
2. To find the 24 hour food intake of that particular aged children group.
3. To find the socio-economic status and profession of the parents.
4. To find the level of family care of the children in health issues to determine their daily dietary food intake.

A total of 46 under 5 children were included in the study where 41.3% male and 58.7% female. In majority of the cases the family income was 1000-5000 taka and the percentage was 80.4%. Most of the mothers were illiterate and there percentage was 43.5%. There was a relationship between the nutritional status and income level. The study shows that where the income level was low, the rate of malnutrition is high. The percentage was 80.4% who were having monthly income of about 1000-5000 taka and therefore not able to provide proper food to their children. Nutritional status of the children is influenced by mother's education. Because this study shows that if the mother is not well educated then the rate of malnutrition was high and the percentage is 43.5%. This study shows that 82.6% mother feed colostrums to their children. Every mother has breastfeed the child at least for a while, because breast milk was the only perfect food for the first few months (0-6) of a baby. 89.1% mother initiating to feed breast milk to their children just after birth. 60.9% mother did not feed any honey, plain water, and sugar water immediately just after the birth of their children.

The study shows that the intake amount of micronutrient "Zinc" was 80.4 % in children which means this percentage of children were taken Zinc at an amount of less than 5 mg/day whereas the Recommended Dietary Allowance of Zinc for this particular aged is 10 mg and other 19.6% children were getting 5-10 mg Zinc per day. This indicated that the children of lower socio-economic status were not getting the adequate amount of Zinc in their daily food habit and day by day they were getting Zinc deficient children

Among the 46 children there were 52% normal in the study weight for age Z score and 28% were moderate Underweight. There were 20% severe Underweight which indicates approximately 48% children were Underweight because of zinc deficiency. In other hands among the 46 children there were 91% normal in the study weight for height Z score and 7% were moderate wasting. There were 2% severe wasting which indicates approximately 9% children were Under height because of zinc deficiency, here weight for height was not more effective in zinc deficiency.



## Conclusion:

Rates of malnutrition in Bangladesh are among the highest in the world. More than 54% of preschool-age children, equivalent to more than 9.5 million children, are stunted, 56% are underweight and more than 17% are wasted. Although all administrative divisions were affected by child malnutrition there were important differences in the prevalences of the three anthropometric indicators. The prevalence of underweight ranged from 49.8% in Khulna to 64.0% in Sylhet which also showed the highest prevalence of stunting (61.4%) and wasting (20.9%)<sup>[78]</sup>. Despite the high levels, rates of stunting have declined steadily over the past 10 years. Improving nutrition can have a significant impact on survival as well as physical and cognitive development and productivity. Good nutrition, comprising adequate quality and quantity of food intake and reduction of illness is also a basic human right and is an essential input for economic development. Significant progress has been made in cereal production in Bangladesh over the past decades. However, the rapid population growth and resulting high and growing food requirements pose a difficult challenge given the limited availability of cultivable land in Bangladesh. Re-occurring disasters further complicate the stability of food production. Recently the government of Bangladesh and interested organisations have started to encourage non-cereal food production and consumption along with food self-sufficiency. Greater attention is being given to supportive policies for agriculture input, research on non-cereal crops, and commercial and homestead promotion of poultry and fruits/vegetables are receiving greater attention. There is a clear need to diversify food sources both in terms of land/environmental sustainability, development of the rural economy and increased consumption to achieve improvements in the nutritional status of the people of Bangladesh and zinc supplement should increase by the intake of Zinc rich food<sup>[78]</sup>.

## Chapter-5

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ANNEXURE

**Section 1: Identification of Children**

Starting time: Hour

Minutes

Division Code :  Name : \_\_\_\_\_

District Code :  Name : \_\_\_\_\_

Upazila Code :  Name : \_\_\_\_\_

Union Code :  Name : \_\_\_\_\_

Mouza Code :  Name : \_\_\_\_\_

Village Name : \_\_\_\_\_

Bari Name : \_\_\_\_\_

Household (HH) # :  HH Head's Name : \_\_\_\_\_

Mother's Name: \_\_\_\_\_

Child's Name : \_\_\_\_\_

Sex :  (1= Male, 2= Female)

Date of Birth :  :  :   
dd mm yyyy

Present Age :  :  :   
dd mm yy

His/her birth order :

His/her order among living sons :

His/her order among living daughters :

Q#	Questions and filters	Categories	Code
Q 1:	How old are you?	Age.....	<input type="checkbox"/> <input type="checkbox"/>
Q 2:	Have you ever attended School?	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>
Q 3:	What type of Schooling have you last attended?	School/College/University.....01 Madrasah,.....02 Non-formal.....03 could just read or write or both .....04 Don't Know.....05	<input type="checkbox"/> <input type="checkbox"/>
Q 4:	What are the Education period of yours?	Below class 5.....01 Class 5-10.....02 S.S.C .....03 H.S.C .....04 Vocational Course .....05 B.A/B.Com/B.S.S (Pass).....06 B.Sc.(Hons.).....07 M.Sc.....08 Others.....09	<input type="checkbox"/> <input type="checkbox"/>
Q 5:	What is the occupation of yours?	Govt. Service..... 01 Non-Govt. Service..... 02 Teaching/Tuition..... 03 Housewife..... 04 Garments worker..... 05 Work in house..... 06 Others .....07 (Specify)	<input type="checkbox"/> <input type="checkbox"/>

**Section 3: Information about Socio-economic Status:**

Q#	Questions and filters	Categories	Code																								
Q 6:	What is your Husband's occupation?	Govt. Service..... 01 Non-Govt. Service..... 02 Teaching/Tuition..... 03 Farmer (Self-employed)..... 04 Farmer.....06 Garments worker..... 07 Day Labor.....08 Rickshaw puller/Boatman/Van driver...09 Business.....10 Small Business/Traders.....11 Fisherman.....12 Carpenter ..... 13 Others .....14 (Specify)	<input type="checkbox"/> <input type="checkbox"/>																								
Q 7:	What are the materials of roof, wall and floor of your (main) dwelling unit?	<table border="1"> <thead> <tr> <th>Material</th> <th>Roof</th> <th>Wall</th> <th>Floor</th> </tr> </thead> <tbody> <tr> <td>Leaves</td> <td>1</td> <td>1</td> <td></td> </tr> <tr> <td>Mud</td> <td></td> <td>2</td> <td>2</td> </tr> <tr> <td>Bamboo</td> <td>3</td> <td>3</td> <td>3</td> </tr> <tr> <td>Tin</td> <td>4</td> <td>4</td> <td></td> </tr> <tr> <td>Pucca/cement/tiles</td> <td>5</td> <td>5</td> <td>5</td> </tr> </tbody> </table>	Material	Roof	Wall	Floor	Leaves	1	1		Mud		2	2	Bamboo	3	3	3	Tin	4	4		Pucca/cement/tiles	5	5	5	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Material	Roof	Wall	Floor																								
Leaves	1	1																									
Mud		2	2																								
Bamboo	3	3	3																								
Tin	4	4																									
Pucca/cement/tiles	5	5	5																								
Q 8:	What is your monthly family income?	___, ___, ___/= Tk.																									
Q 9:	Does your household own any land?	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>																								
Q 10:	Source of Washing /bathing water	Tap.....01 Tubewell.....02 Ring well.....03 Pond.....04 Ditch/Canal/Lake.....05 River/Fountain.....06 Rain water.....07 Others.....08 (Specify)	<input type="checkbox"/> <input type="checkbox"/>																								

Q 11:	Source of drinking water	Tap.....01 Tubewell.....02 Ring well.....03 Pond.....04 Ditch/Canal/Lake.....05 River/Fountain.....06 Rain water.....07 Others.....08 (Specify)	<input type="checkbox"/> <input type="checkbox"/>																																										
Q 12:	Does your household/any member of your household have?	<table border="0"> <thead> <tr> <th></th> <th>Yes</th> <th>No</th> </tr> </thead> <tbody> <tr> <td>Electricity .....</td> <td>1</td> <td>2</td> </tr> <tr> <td>Almirah/Wardrobe .....</td> <td>1</td> <td>2</td> </tr> <tr> <td>Table.....</td> <td>1</td> <td>2</td> </tr> <tr> <td>Chair/bench .....</td> <td>1</td> <td>2</td> </tr> <tr> <td>Dining table.....</td> <td>1</td> <td>2</td> </tr> <tr> <td>Khat/Chowki .....</td> <td>1</td> <td>2</td> </tr> <tr> <td>Functioning radio/ Two-in-one .....</td> <td>1</td> <td>2</td> </tr> <tr> <td>Functioning TV .....</td> <td>1</td> <td>2</td> </tr> <tr> <td>Bicycle.....</td> <td>1</td> <td>2</td> </tr> <tr> <td>Motor bike .....</td> <td>1</td> <td>2</td> </tr> <tr> <td>Sewing machine .....</td> <td>1</td> <td>2</td> </tr> <tr> <td>Electric fan .....</td> <td>1</td> <td>2</td> </tr> <tr> <td>Telephone (cell/land).....</td> <td>1</td> <td>2</td> </tr> </tbody> </table>		Yes	No	Electricity .....	1	2	Almirah/Wardrobe .....	1	2	Table.....	1	2	Chair/bench .....	1	2	Dining table.....	1	2	Khat/Chowki .....	1	2	Functioning radio/ Two-in-one .....	1	2	Functioning TV .....	1	2	Bicycle.....	1	2	Motor bike .....	1	2	Sewing machine .....	1	2	Electric fan .....	1	2	Telephone (cell/land).....	1	2	<input type="checkbox"/> <input type="checkbox"/>
	Yes	No																																											
Electricity .....	1	2																																											
Almirah/Wardrobe .....	1	2																																											
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Motor bike .....	1	2																																											
Sewing machine .....	1	2																																											
Electric fan .....	1	2																																											
Telephone (cell/land).....	1	2																																											
Q 13:	Wastage type	Dustbin .....	<input type="checkbox"/> <input type="checkbox"/>																																										
		In hole .....																																											
Q 14:	Where is the (main water source) located?	Inside the house.....01 Outside the house, but inside the bari....02 Outside the bari.....03 Others.....04 (Specify)	<input type="checkbox"/> <input type="checkbox"/>																																										
Q 15:	What kind of toilet Facility does your household have?	Septic tank/Modern latrine.....01 Slab Latrin.....02 Pit Latrin .....	<input type="checkbox"/> <input type="checkbox"/>																																										
		Hanging Latrin.....04																																											
		Open latrine.....05																																											
		Bush/field/Yard.....06																																											
		Others.....07 (Specify)																																											
Q 16:	Do you share this facility with other household?	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>																																										



**Section 4: Anthropometric Measurement of Children:**

Q#	Categories	Figure	Unit
Q17:	Height (cm) .....	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> .	cm.
Q 18:	Body Weight (kg).....	<input type="text"/> <input type="text"/> .	Kg.
Q 19:	MUAC (cm).....	<input type="text"/> <input type="text"/> .	cm.

**Section 5: Child feeding practices:**

Q#	Questions and filters	Categories	Code
Q20	Did you breastfeed your child?	Yes.....01 No.....02	<input type="text"/> <input type="text"/>
Q21	Did you feed colostrum to your child?	Yes.....01 No.....02	<input type="text"/> <input type="text"/>
Q22	When did you initiate of breast-milk just after birth?	Minutes ..... Hour..... Days..... (Specify the time)	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
Q23	Did you feed honey, plain water, and sugar water Immediately after his or her birth?	Yes.....01 No.....02	
Q24	How long did you breastfeed to your child?	Days ..... Months..... Year..... (Specify the time)	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
Q25	Did you have separate feeding pots for the child?	Yes.....01 No.....02	<input type="text"/> <input type="text"/>
Q26	Which type of pots do you use for feeding your baby?	Bottle feeding.....01 Clay/Bowl.....02 Crystal pot.....03 Earthen basin.....04 Tinplate.....05 Plastic Plate.....06 Steel plate.....07 Others.....08 (Specify)	<input type="text"/> <input type="text"/>

Q 27	What type of salt is used for cooking by your household?	Packet (Iodized) salt.....01 Unpacked (Non-iodized) salt.....02	<input type="checkbox"/> <input type="checkbox"/>
Q 28	Do you cook food specially for your child	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>
Q 29	Do you use more oil in your baby's food?	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>
Q 30	Do you know how to prepare kichuri?	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>
Q 31	How many times have you cook kichuri for your child?	1 time.....01 2 time.....02 3 time.....03 Others.....04 (Specify)	<input type="checkbox"/> <input type="checkbox"/>
Q 32	How many times the child eat kichuri per day?	1 time.....01 2 time.....02 3 time.....03 Others.....04 (Specify)	<input type="checkbox"/> <input type="checkbox"/>

### Section 6:Caring Practices

Q#	Questions and filters	Categories	Code
Q 33:	Who is the main caregiver of the child?	Mother.....01 Caretaker.....02 Others.....03 (Specify)	<input type="checkbox"/> <input type="checkbox"/>
Q 34:	How many hours the child sleep?	6-8 hours.....01 8-10hours.....02 Others.....03 (Specify)	<input type="checkbox"/> <input type="checkbox"/>
Q 35:	What do you do when the child deny to eat?	Play with the child.....01 By singing.....02 By gossiping.....03 By telling History.....04 Others.....05 (Specify).	<input type="checkbox"/> <input type="checkbox"/>
Q 36	Do you gossip with the child?	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>
Q37	:Do you Encourage your child to play?	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>

Q38	Do you play with the child?	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>
	To whom child play with?	Mother.....01 Father.....02 Brother.....04 Cousin.....05 Caretaker.....06 Grandparents.....07 Others.....08 (Specify)	
Q 39	DO you take your child to outside home	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>
Q 40	Does child use shoe out side of the room?	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>
Q 41	Dose the child brushes teeth twice a day?	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>
Q 42	Do you cut your child's nail per week?	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>
Q 43	Does the child take a bath per day?	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>
Q44	Do you maintain hygiene?	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>
Q45	Does the child have own plate& glass?	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>
Q46	How many time child use that per day?	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>
Q47	What does things the child do about study?	Rhymes.....01 Story.....02 Limbs.....03 Counting.....04 Math.....05 Painting.....06 Larn about Environmental element.....07 Others.....08 (Specify)	<input type="checkbox"/> <input type="checkbox"/>



**Section 7: DISEASE CONTROL:**

Q#	Questions and filters	Categories	Code
Q 48	<b>Does the child have taken the first six vaccines?</b>	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>
Q 49	<b>Does the child have taken polio vaccine?</b>	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>
Q 50	<b>Did the child become sick with in last 15 days?</b>	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>
Q 51	<b>If yes then which type?</b>	Fever.....01 Cough/Cold.....02 Diarrhoea/dysentery.....03 Vomiting/Stomach-ache.....04 Pneumonia.....05 Ear Infection.....06 Skin problem.....07 RTI.....08 Others.....0 9 (Specify)	<input type="checkbox"/> <input type="checkbox"/>
Q 52	<b>Within how many days the child has taken to the doctor after become sick?</b>	Number of days..... (Specify)	<input type="checkbox"/> <input type="checkbox"/>
Q 53	<b>Does child use soap after coming from toilet?</b>	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>
Q 54	<b>Does child use soap before eating?</b>	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>
Q 55	<b>How long your child had been ill at the past?</b>	Number of days..... (Specify)	<input type="checkbox"/> <input type="checkbox"/>

Q 56	Still have any diseases in your child	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>
Q 57	If yes, then what are the diseases that have your child?	Fever.....01 Cough/Cold.....02 Diarrhoea/dysentery.....03 Vomiting/Stomach-ache.....04 Pneumonia.....05 Ear Infection.....06 Skin problem.....07 RTI.....08 Others.....09 (Specify)	<input type="checkbox"/> <input type="checkbox"/>
Q 58	How long your child are sick?	Number of days..... (Specify)	<input type="checkbox"/> <input type="checkbox"/>
Q 59	Is your child in Hospitalization for this sickness?	Yes.....01 No.....02	<input type="checkbox"/> <input type="checkbox"/>
Q 60	How long your child are sick?	Number of days..... (Specify)	<input type="checkbox"/> <input type="checkbox"/>



প্রশ্ন নং:৩	কোন ধরনের স্কুলে আপনি শেষে যোগদান করেছিলেন?	স্কুল/কলেজ/বিশ্ববিদ্যালয়.....০১ মাদ্রাসা,.....০২ অন-আনুষ্ঠানিক.....০৩ গুধু লিখতে অথবা পড়তে পারে অথবা উভয়ই.....০৪ জানে না.....০৫ অন্যান্য.....০৬ (নির্দিষ্ট)	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:৪	আপনার শিক্ষার নির্দিষ্ট বিভাগ কোনটি?	৫ম শ্রেণীর নীচে.....০১ ৫ম-১০ম শ্রেণী.....০২ এস, এস, সি.....০৩ এইচ, এস, সি.....০৪ কারিগরি শিক্ষা.....০৫ বি, এ/বি, কম/বি. এস. সি(পাস).....০৬ বি, এস, সি(সম্মান).....০৭ এম, এস, সি(সম্মান).....০৮ অন্যান্য.....০৯ (নির্দিষ্ট)	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:৫	আপনার পেশা কি?	সরকারী চাকুরী.....০১ বেসরকারী চাকুরী.....০২ শিক্ষকতা/টিউশনী.....০৩ গৃহিনী.....০৪ গার্মেন্টস শ্রমিক.....০৫ ঘরের কাজের লোক.....০৬ অন্যান্য.....০৭ (নির্দিষ্ট)	<input type="checkbox"/> <input type="checkbox"/>

অংশ ৩: সামাজিক অর্থনৈতিক প্রতিষ্ঠার তথ্য:

প্রশ্ন নং :	প্রশ্ন	শ্রেণী	কোড
প্রশ্ন নং:৬	আপনার স্বামীর পেশা কি?	সরকারী চাকুরী.....০১ বেসরকারী চাকুরী.....০২ শিক্ষকতা/টিউশনী.....০৩ কৃষিকাজ (নিজের জমিতে).....০৪ কৃষিকাজ.....০৫ গার্মেন্টস শ্রমিক.....০৬ দিন মজুর.....০৭ রিকশা/নৌকা/ভ্যান চালক.....০৮ ব্যবসায়ী.....০৯ ক্ষুদ্র ব্যবসায়ী.....১০ জেলে.....১১ মিস্ত্রি.....১২ অন্যান্য.....১৩ (নির্দিষ্ট)	<input type="checkbox"/> <input type="checkbox"/>

প্রশ্ন নং: ৭	আপনার বাড়ীর ছাদ, দেয়াল এবং মেঝে কি কি উপাদান দিয়ে তৈরী?	উপাদান	ছাদ	দেয়াল	মেঝে	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>									
		পাতা/খড়	১	১											
		মাটি		২	২										
		বাঁশ	৩	৩	৩										
		টিন	৪	৪											
		পাকা/সিমেন্ট/টাইলস্	৫	৫	৫										
প্রশ্ন নং: ৮	আপনার পরিবারের মাসিক আয় কত?	____, _____, _____ / = টাকা													
প্রশ্ন নং: ৯	আপনার বসতবাড়ীটি কি নিজস্ব?	হ্যাঁ.....০১	না.....০২			<input type="checkbox"/> <input type="checkbox"/>									
প্রশ্ন নং: ১০	কাপড় কাচার /গোসল করার পানির উৎস কি?	কল.....০১	টিউবওয়েল.....০২	পুকুর.....০৩	নরদমা/খাল/হ্রদ.....০৪	নদী/ফোয়ারা.....০৫	বৃষ্টির পানি.....০৬	অন্যান্য.....০৭	(নির্দিষ্ট)	<input type="checkbox"/> <input type="checkbox"/>					
প্রশ্ন নং: ১১	খাবার পানির উৎস কি?	কল.....০১	টিউবওয়েল.....০২	পুকুর.....০৩	নরদমা/খাল/হ্রদ.....০৪	নদী/ফোয়ারা.....০৫	বৃষ্টির পানি.....০৬	অন্যান্য.....০৭	(নির্দিষ্ট)	<input type="checkbox"/> <input type="checkbox"/>					
প্রশ্ন নং: ১২	আপনার বসতবাড়ীতে নিবলিকিত কি কি জিনিস আছে?	বিদ্যুৎ.....১.....২	আলমারী/ওয়ান্ড্রব.....১.....২	টেবিল.....১.....২	চেয়ার/বেন.....১.....২	খাওয়ার টেবিল.....১.....২	খাট/টোকি.....১.....২	রেডিও (সচল).....১.....২	টিভি (সচল).....১.....২	সাইকেল.....১.....২	হুন্ডা.....১.....২	সেলাই মেশিন.....১.....২	পাখা.....১.....২	টেলিফোন (মোবাইল/লোকাল).....১.....২	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং: ১৩	আর্বজনা ক্ষয়	ডাস্টবিন.....০১	গর্তে.....০২			<input type="checkbox"/> <input type="checkbox"/>									





		(নির্দিষ্ট করুন)	
প্রশ্ন নং:২৩	জন্মের পর পরই বাচ্চাকে মধু, পানি, চিনির পানি, মিছরির পানি খাইয়েছিলেন কি?	হ্যাঁ.....০১ না.....০২	
প্রশ্ন নং:২৪	বাচ্চা কত মাস বয়স পর্যন্ত বুকের দুধ খেয়েছে?	দিন ..... মাস ..... বছর..... (নির্দিষ্ট করুন)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:২৫	আপনার বাচ্চার জন্য আলাদা পাত্র আছে কি?	হ্যাঁ.....০১ না.....০২	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:২৬	কি ধরনের পাত্র আপনার শিশুকে খাওয়ানোর জন্য ব্যবহার করেন?	বোতল .....০১ থাল্লা/ বাটি .....০২ কাঁচের প্লেট .....০৩ আর্থেন বেসিন .....০৪ টিনের প্লেট.....০৫ প্লাস্টিকের প্লেট .....০৬ স্টিলের প্লেট .....০৭ অন্যান্য.....০৮ (নির্দিষ্ট করুন)	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:২৭	কোন ধরনের লবণ আপনি খাওয়ার জন্য ব্যবহার করেন ?	প্যাকেটের (আয়োডিনযুক্ত) লবণ .....০১ খোলা (আয়োডিনবিহীন) লবণ.....০২	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:২৮	আপনি কি বিশেষভাবে বাচ্চার জন্য খাবার তৈরী করেন?	হ্যাঁ.....০১ না.....০২	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:২৯	আপনি কি বেশি তেল বাচ্চার খাবার তৈরীতে ব্যবহার করেন?	হ্যাঁ.....০১ না.....০২	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:৩০	আপনি কি খিচুরি তৈরী করতে জানেন?	হ্যাঁ.....০১ না.....০২	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:৩১	কতবার আপনি বাচ্চার জন্য খিচুরি তৈরী করেছেন?	১ বার.....০১ ২ বার.....০২ ৩ বার.....০৩ অন্যান্য.....০৪ (নির্দিষ্ট করুন)	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:৩২	কতবার আপনার বাচ্চা খিচুরি খেয়েছে একদিনে?	১ বার.....০১ ২ বার.....০২ ৩ বার.....০৩ অন্যান্য.....০৪ (নির্দিষ্ট করুন)	<input type="checkbox"/> <input type="checkbox"/>

অংশ-৬: সর্ভকতার পদ্ধতি :

প্রশ্ন নং :	প্রশ্ন	শ্রেণী	কোড
প্রশ্ন নং: ৩৩	আপনার বাচ্চার প্রধান তত্বাবধায়ণ কে করেন?	মা.....০১ তত্বাবধায়ক.....০২ অন্যান্য.....০৩ (নির্দিষ্ট করুন)	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং: ৩৪	আপনার বাচ্চা কতক্ষণ ঘুমায়?	৬-৮ঘন্টা.....০১ ৮-১০ঘন্টা.....০২ অন্যান্য.....০৩ (নির্দিষ্ট করুন)	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং: ৩৫	আপনি কি করেন যখন আপনার বাচ্চা খেতে না চায়?	বাচ্চার সাথে খেলে.....০১ গান গেয়ে.....০২ গল্প করে.....০৩ ইতিহাস পড়ে.....০৪ অন্যান্য.....০৫ (নির্দিষ্ট করুন)	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং: ৩৬	আপনি কি বাচ্চার সাথে গল্প করেন?	হ্যাঁ.....০১ না.....০২	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং: ৩৭	আপনি কি বাচ্চাকে খেলতে উৎসাহ করেন?	হ্যাঁ.....০১ না.....০২	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং: ৩৮	আপনি কি বাচ্চার সাথে খেলেন?	হ্যাঁ.....০১ না.....০২	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং: ৩৯	আপনার বাচ্চা কার সাথে খেলে?	মা.....০১ বাবা.....০২ ভাই.....০৩ কাজিন.....০৪ তত্বাবধায়ক.....০৫ দাদা/দাদী.....০৬ অন্যান্য.....০৭ (নির্দিষ্ট করুন)	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং: ৪০	আপনি কি বাচ্চাকে বাইরে নিয়ে যান?	হ্যাঁ.....০১ না.....০২	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং: ৪১	আপনার বাচ্চা ঘরে জুতা ব্যবহার করে?	হ্যাঁ.....০১ না.....০২	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং: ৪২	আপনার বাচ্চা দিনে দুইবার দাঁত ব্রাশ করে?	হ্যাঁ.....০১ না.....০২	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং: ৪৩	আপনি কি বাচ্চার নখ প্রতি সপ্তাহে কাটেন?	হ্যাঁ.....০১ না.....০২	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং: ৪৪	আপনি কি বাচ্চাকে প্রতি সপ্তাহে গোসল করান?	হ্যাঁ.....০১ না.....০২	<input type="checkbox"/> <input type="checkbox"/>

প্রশ্ন নং:৪৫	আপনি কি স্বাস্থ্য বিষয় সর্মথণ করেন?	হ্যাঁ.....০১ না.....০২	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:৪৬	আপনার বাচ্চার নিজস্ব খালা এবং গ্রাস আছে?	হ্যাঁ.....০১ না.....০২	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:৪৭	আপনার বাচ্চা লেখাপড়ার ব্যাপারে কি করে?	কবিতা.....০১ গল্প.....০২ অঙ্ক-প্রতঙ্গ.....০৩ গণনা.....০৪ অংক.....০৫ অংকণ.....০৬ পরিবেশের উপাদান শিখা.....০৭ অন্যান্য.....০৮ (নির্দিষ্ট করুন)	<input type="checkbox"/> <input type="checkbox"/>

অংশ-৭:রোগ নিয়ন্ত্রন করা :

প্রশ্ন নং :	প্রশ্ন	শ্রেণী	কোড
প্রশ্ন নং:৪৮	আপনার বাচ্চাকে কি প্রথম ছয়টা ভ্যাকসিন দিয়েছিলেন?	হ্যাঁ.....০১ না.....০২	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:৪৯	আপনার বাচ্চাকে কি পোলিও ভ্যাকসিন দিয়েছিলেন?	হ্যাঁ.....০১ না.....০২	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:৫০	আপনার বাচ্চা কি গত ১৫ দিনে অসুস্থ হয়েছিল?	হ্যাঁ.....০১ না.....০২	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:৫১	যদি হ্যাঁ হয় ,তাহলে কোন ধরনের?	জ্বর.....০১ কাঁশি /ঠান্ডা.....০২ ডায়রিয়া/পাতলা পায়খানা.....০৩ বমি.....০৪ নিউমোনিয়া.....০৫ কানেক্ত.....০৬ চর্ম রোগ.....০৭ ফুসফুস সমস্যা.....০৮ অন্যান্য.....০৯ (নির্দিষ্ট করুন)	<input type="checkbox"/> <input type="checkbox"/>

প্রশ্ন নং:৫২	আপনার বাচ্চা কতদিন ডাক্তারের কাছে নিয়েছিলেন যখন সে অসুস্থ হয়েছিল?	দিন সংখ্যা..... (নির্দিষ্ট করুন)	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:৫৩	আপনার বাচ্চা কি সাবান ব্যবহার করে টয়লেট থেকে আসার পর?	হ্যাঁ.....০১ না.....০২	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:৫৪	আপনার বাচ্চা কি সাবান ব্যবহার কতে খাবারের পূর্বে?	হ্যাঁ.....০১ না.....০২	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:৫৫	আপনার বাচ্চা অতীতে কতদিন অসুস্থ হয়েছিল?	দিন সংখ্যা..... (নির্দিষ্ট করুন)	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:৫৬	তার কি এখনও কোন রোগ আছে?	হ্যাঁ.....০১ না.....০২	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:৫৭	যদি হ্যাঁ হয় ,তাহলে কোন ধরনের?	জ্বর.....০১ কাঁশি /ঠান্ডা.....০২ ডায়রিয়া/পাতলা পায়খানা.....০৩ বমি.....০৪ নিউমোনিয়া.....০৫ কানেফত .....০৬ চর্ম রোগ.....০৭ ফুসফুস সমস্যা.....০৮ অন্যান্য.....০৯ (নির্দিষ্ট করুন)	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:৫৮	কতদিন সে অসুস্থ ছিল?	দিন সংখ্যা..... (নির্দিষ্ট করুন)	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:৫৯	সে কি এই অসুস্থতার জন্য হাসপাতালে ছিল?	হ্যাঁ.....০১ না.....০২	<input type="checkbox"/> <input type="checkbox"/>
প্রশ্ন নং:৬০	কতদিন সে হাসপাতালে ছিল?	দিন সংখ্যা..... (নির্দিষ্ট করুন)	<input type="checkbox"/> <input type="checkbox"/>



অংশ-৮: খাবার গ্রহণের তালিকা ইন্টারভিউ শুরুও আগে:  
(২৪ ঘন্টা পুনরায় খাবার পদ্ধতি)

নং	খাবারের নাম	পরিমাণ	কয়বার খেয়েছে
০১	ভাত (কাপ)	□□	□□
০২	রুটি (টুকরা)	□□	□□
০৩	ডাল (কাপ)	□□	□□
০৪	মাংস/মাছ (টুকরা)	□□	□□
০৫	ডিম (কয়টি)	□□	□□
০৬	দুধ (কাপ)	□□	□□
০৭	খিচুড়ী (সাধারণ)	□□	□□
০৮	খিচুড়ী (Formulated cup)	□□	□□
০৯	শাক সবজি (কাপ)	□□	□□
১০	ফল (কয়টি)	□□	□□
১১	হালুয়া/সুজি/ফিরনি (কাপ)	□□	□□
১২	চিড়া/মুড়ি (কাপ)	□□	□□
১৩	বিস্কুট	□□	□□
১৪	চিনি/গুড় (চা-চামচ)	□□	□□
১৫	তৈল (চা-চামচ)	□□	□□
১৬	অন্যান্য (নির্দিষ্ট করুন)	□□	□□

