

**A STUDY ON THE NUTRITIONAL
STATUS OF PRE-SCHOOL CHILDREN
IN A SELECTED AREA**

SUBMITTED BY

Sangita Ghosh

M. Phil (Part-II)

Registration No:-351

Session-1999-2000

GIFT

UNDER THE SUPERVISION OF

Mrs. Khaleda Edib

Professor

428210

Institute of Nutrition and Food Science

University of Dhaka



ঢাকা
বিশ্ববিদ্যালয়
গ্রন্থাগার

**Institute of Nutrition and Food Science
University of Dhaka
October-2007**



A STUDY ON THE NUTRITIONAL STATUS OF PRE-SCHOOL CHILDREN IN A SELECTED AREA

**A Dissertation submitted to the Department of Institute of
Nutrition and Food Science University of Dhaka in partial
fulfillment of the requirements for the degree of master of
Philosophy in Food and Nutrition.**

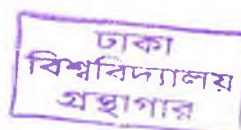
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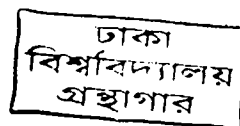
**Institute of Nutrition and Food Science
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October-2007**

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Supervisor's Certificate

This is to certify that I have read the dissertation entitled " A STUDY ON THE NUTRITIONAL STATUS OF PRE-SCHOOL CHILDREN IN A SELECTED AREA " submitted by Sangita Ghosh in partial fulfillment for the degree of M.Phil in Food and Nutrition , Dhaka University and that is an original study carried out by her under my supervision and guidance.



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Abstract

The children, the future leaders of a country, should have no malnutrition. Malnutrition has been recognized as one of the major causes of morbidity and mortality of under 5 children in Bangladesh and almost 50% of total death of under 5s occurs in the age group.

The present study was conducted among 420 pre-school children of 37-59 months old at Savar pouroushava who consented to take part in the study. Nutritional status was determined by anthropometric measurements, clinical sign and dietary information. Besides, monthly income, family size, sanitary condition, immunization status of the children were also collected from the mother of the children by using a structured questionnaire. Using statistical method the results were analyzed and presented as follows:

Among the study children 48.6% were male and 51.4% were female. Half of the study children were 37-48 months and rest 50% were 49-59 months old.

Dietary intake shows that mean food intake of the study children was 435gm of which cereals, potato, pulses, vegetables fruits and fats and oils were 165.0, 33.7, 16.0, 56.0, 20.5 and 11.7 gm respectively. Animal foods intake was 119.7gm, of which 83.2gm and 24.6gm respectively were milk & milk products and fish respectively. Rice, potato, meat, egg and fish intakes were higher among older children of 48-59 months, whereas intakes of other food items were higher among the younger children of 37-47 months old, nutrient intake shows that mean energy, protein and fat intakes of the children were 1010.3 kcal, 27.0gm and 21.6gm respectively. Calcium intake was 263.5mg, while iron intake was only 6.8mg and vitamin-A and vitamin-C intakes were 1088.2 IU and 19.6 mg respectively. Male children could meet about 76.88 and 85% of their energy, protein and fat requirement respectively, while the female children could meet about 78%, 85%, and 80% respectively.

Morbidity shows that 39.5% children had diarrhea, and 20.2%, 29.0%, 2.4% and 7.6% had dysentery, fever, measles and other disease respectively.

Prevalence of stunting, wasting and underweight among the children were 32.2%, 3.1% and 8.1% respectively. Stunting was higher (35.9%) in 37-47 months age group while wasting and under weight rates were much lower compared to 48-59 months old children (27.2%, 1.1% and 5.4% respectively). Stunting was much higher (59.1%) among children of illiterate mothers, which decrease with the increase in education level and the differences were highly significant ($p < .000$). Underweight and wasting prevalence also followed similar trend with mother's education level. The nutritional status of the children of house wife mothers was found to be comparatively better than the children whose mothers were engaged in other occupations.

Overall, the study highlighted the present poor nutritional situation of the under-5 children of Savar pouroushava and need of proper nutritional intervention for the improvement of their sound nutritional status is advocated.

List of abbreviation

BBS	=	Bangladesh Bureau of statistics
Cm	=	Centimeter (s)
etal	=	And others (etallis)
FAO	=	Food and Agricultural organization
gm	=	Gram (s)
H/A	=	Height for age
INFS	=	Institute of Nutrition and Food Science
Kg	=	Kilo gram (s)
MAC	=	Mid Arm Circumference
NCHS	=	National center for Health Statistics
NO	=	Number
SD	=	Standard Deviation
UNICEF	=	United Nations (International children) Emergency fund.
URTI	=	Upper Respiratory tract infection
W/A	=	Weight for age
W/H	=	Weight for height
WHO	=	World Health organization
%	=	Percent

Operational definitions

Respondents : The persons who were interviewed called the respondents.

Children : The children of the study constituted available children households having aged up to 36-59 months of both sex.

Food: It is a composite mixture of substances which when consumed performs certain functions in the body.

Nutrition : Nutrition is a science of food, the nutrients and other substance their in their action , interaction and balance in relation to health and disease and the process by which the organism ingests, digests, absorbs, transports, utilizes and excretes food substances.

Malnutrition: An impairment of health resulting from a deficiency, excess or imbalance of nutrients.

Nutritional status : It is a condition of physical health of an individual resulting from consumption and utilization of food in the body.

Nutritional assessment : It is the process where by the state of nutritional health of an individual or a group of individual is determined.

Anthropometry: The technique that deals with the measurements of the size, weight and proportions of a human body.

Anthropometric assessment: Refers to the use of Anthropometry to provide estimation of the prevalence and severity of malnutrition in community.

Height: Distance from the crown of the head to the bottom of the feet while the child is measured standing. Height or stature is measured for children two years of age or older.

Weight: Measurement of a child's total body mass undressed or lightly dressed.

Mid –Upper –Arm Circumference (MUAC): The measurements of a child's arm Circumference at the mid point between the tip of the shoulder and elbow joint.

Stunted or chronic malnutrition : Stunting is a slowing of skeletal growth and of stature relative to the stature in a reference child of same age.

Under weight : Under weight is a condition of lower than expected tissue and fat mass relative to the amount in a child (mean or median child of reference population) of same age.

Wasted or Acute malnutrition : Wasting is a condition expressed by a deficit in tissue and fat mass relative to the amount in a child of same height or recumbent length. Degree of wasting can be defined using z score categories or percentile location or percent of reference median categories for weight-for-height.

Z-scores : The gap between the observed values of nutritional status indicators and the mean of the reference distribution expressed in reference distribution standard deviation units.

Diarrhoea : Any increase in passing stool in regards to formed habits of an individual.

A.R.I : Fever with productive / unproductive cough ,dyspnoea more than 2/3days

Anemia : Pale skin with pale lower palpebral conjunctiva .

Otitis : Any sorts of discharge from middle ear.

Skin disease : Any sorts of skin lesion in the body.

Fever :nnnnnn Rise of body temperature more than normal (98.4⁰ F)

CHAPTER 1

Chapter-1

Introduction

1.1 Introduction

In September 1990 at the world summit for children, world leaders agreed on an agenda for children and women for the 1990's. The plan of action for the survival, protection and development of the world children identified 7 major and more than 20 supporting goals to be achieved by the year 2000. The World Summit also called on all countries to prepare national programmers of action in order to active the identified goal. Bangladesh being a signatory to the world Summit Declaration, as well as the Colombo and Rawalpindi resolutions of children in south Asia, is committed globally and regionally in achieving these important goals for children. In a country like Bangladesh this enormous problem is hindering not only the target of achieving health for all by 2000 A.D, but it also affects national economy by giving rise of an unproductive population group and taking away working year losses by that particular group. Although Bangladesh still has one of the most malnourished populations in the world, the situation is slowly improving whilst in other parts of the world (e.g. sub-Saharan Africa), it is becoming worse. The manifestations of this transformation are found in the progressive rate of fall in stunting in rural 6-59months old children from 73% in 1990 to 54.8% in 1999- a fall of 24.9% of the 1990 level. In addition, the infant mortality rate has fallen form 94 per thousand live birth in 1990 to 57 in 1998 and the under five mortality rate has fallen from 151 per thousand live births in 1990 to 102 in 1998³ .Children below the age of 5 years

constitute a major vulnerable segment of the population from the nutritional standpoint.

The children are the future nation of the country. A significant number of infants and under five children are the victims of mortality and morbidity due to the cause of poverty, ignorance, traditional belief, custom and prejudices. Only about 10% under five children of Bangladesh are within normal level, which is some how rather alike in all developing countries. Malnutrition is not only a major public health problem, but also a serious impediment to overall nation, social and economic development of Bangladesh where majority of the people live below poverty line.

Bangladesh is a developing country and one of the most densely populated countries of the world in respect to its area. About 85% the people of Bangladesh live in low-social economic condition and none of the basic needs like foods, clothing, shelter, medical care and education is fulfilled living either in the village or town⁴. They live with poor food, clothing, health general medical services and education, lack of awareness about proper hygiene. As such, they suffer from many disease. So they become malnourished.

In Bangladesh 50% of the babies are born with low birth due to malnutrition of mothers. The national survey in 1995-96 revealed that among the children from 6-71 months 26.6% were normal and 73.4% children were malnourished. Among the malnourished children, 4.2% Children were stunted but not underweight, 13% were underweight but not stunted and 51.2% were both stunted and underweight^{5,6}.

In this country, 25% to 50% of the children die before their fifth birth day and more than 50% of these deaths are related directly or indirectly to malnutrition. Though there are a lot of factors, which lie

behind the cause of malnutrition.² Poor socio-economic structure is at the pivotal Point of all of them. It had been observed that due to economic pressure, an influx of people are migrating to towns i. e. urban slum areas. From few studies, it has been revealed that in the slum areas, deficiency of vitamin-C, Folic acid, Zinc, Vitamin B₁₂, B₆, B₂ copper and worm infestation are highly prevalent⁵⁷ and child death rate is extremely high (In 32% families) in the community⁶.

Malnutrition impairs intellectual development and is one of the contributory factors of the generally poor academic performance in poor communities. In developing countries, the most important socio-economic constrains in achieving proper nutrition is poverty⁵. Bangladesh is among the least developed countries in the world which represent all the characteristic features of under development. Some of the pictures are about 84% of 0-5 years children are suffering from some degree of malnutrition⁶. The prevalence of moderate wasting, moderate stunting and moderate under weight are 10.6%, 29.8% and 38.5% respectively whilst the prevalence of severe wasting several stunting and severe under weight are 1.1%, 19.0% and 12.6% respectively. 12% of the boys and 11.4% of the girls were stunted prevalence of under weight was 51.4% in boys and 50.9% in girls. There are statistically significant differences in prevalence of malnutrition between the rural and (10.8%) in urban children. Stunting was found in 50.7% of rural and 38.3% of urban children. Underweight prevalence was 52.8% in rural and 42.2% in urban areas. There are significant increase in the prevalence of wasting, stunting and underweight by age groups, with a particularly steep rise in all three parameters from the 6 to 11 months age group to 12-17 months age group. Among children aged 12 to 59 months the mid upper arm circumference (MUAC) was less than 12.5 cm in 6.5%. In rural areas this figure was 7.0% and in urban areas 3.6%. The gender differences in

prevalence of low MUAC are significant 4.7% for boys and 8.4% for girls. In this country 25% to 50% of the children die before their fifth birth day and more than 50% of these deaths are related directly or indirectly to malnutrition. Though there are a lot of factors, which lie behind the cause of malnutrition.

If we analyze the regional country status as shown in UNICEF's state of the world children 1998⁸. It may be assumed that Bangladesh may possibly have the highest or near highest prevalence of under five malnutrition among the neighboring countries, Bangladesh-56%, India 53%, Pakistan 38%, Srilanka 38% Maldives 23%, Indonesia 14%, Bhutan 38% Malnutrition is largely a silent and invisible emergency exacting a terrible toll on children and their families. Malnutrition is usually the result of a combination of causes including a lack of food, infections, ignorance, inadequate care, unsafe water, poor sanitary conditions, large family size and cultural influences etc.

As per progotir pathay, October 1998, UNICEF⁹ the hard-core poverty in 1980 and 1984 in rural and urban Bangladesh were 38% and 35% respectively. However, in 1995-96, these figures reduced to 25% and 27% respectively while the proportion of normally nourished children was 5.55% in 1985, it increased to 10.3% in 1996. There has been an improvement in the prevalence of severe malnutrition of under-5 children from 9.2% in 1985-86 to 4.3% in 1996. In the past decade, Bangladesh has made great strides towards the education for all goals and they were able to raise the adult literacy rate from 37% in 1990 to 53% in 1998.

According to sample vital registration in Bangladesh BBS-(1990-98)¹⁰, though the under five mortality rate, infant mortality rate and maternal mortality rate (92, 57 and 3 per 1000 live birth respectively)

show significant improvement in the past decade, these also indicate huge loss of life at an early age. This high infant and maternal mortality rates reflect not only the poor health status of the country, but also the low level of living standard and poor maternal and child health care services.

Government of Bangladesh has adopted a number of national policies with a view to accelerate the pace of development activities and services to ensure that children and women enjoy their rights. These include the recently approved national plan of action for children 1997-2002. However, there is a need for stronger enforcement of laws such as, child marriage restraint Act and the Dowry prohibition Act, and also a need to formulate new policies in areas where there are noted gaps and opportunities, such as in the area of early childhood care and development

In the words of Gabriela Mistral “Many of the things that we need can wait but the child cannot. Right now is the time for his bones are being formed, his blood is being made and his sense is being developed. To him we cannot answer tomorrow. His name is “Today”. Since mothers are the key to our future generations, through their nutritional improvements and providing nutritional education to low income group and illiterate mothers, we can ensure the best fetal growth and nutritional status of Children.

Considering these circumstances the present study thus intends to understand deeply the intensity of malnutrition among selected semi urban households in terms of Socio-economic, anthropometric and dietary history. The mothers and under-5 children of these households were thus directly included in the study.

1.2 Literature Review

Hunger and malnutrition are problem everywhere and have harassed mankind and threatened peace throughout history. Malnutrition is a man made disease. It is a disease to human society. It begins quite commonly in the womb and ends in the grave. More than half of the nearly¹² million deaths each year of children under five years in developing countries are directly or indirectly attributable to malnutrition¹². Malnutrition not only increases the mortality and morbidity but it also blunts the intellects and saps the productivity of potentials of entire societies.

The word nutrition is derived from “nutricus” meaning to suckle at the breast. It is said to have been founded by Lovell towards the end of the 18th century.¹³ Nutrition is the process whereby living organisms utilize food for maintenance of life, growth, normal functioning of tissues and the production of energy¹⁴. Growth and development is always related with nutrition.

The nutritional states of one individual is often the result of many interrelated factors. It is the balance between supply of nutrients on the one hand and the expenditure by the body on the other hand. Nutrition has been expressed as a right in international human right instruments since 1924. The goal of pregnancy is to get a healthy mother and a healthy baby. A healthy well nourished mother can only give birth to a healthy baby. Birth weight is strongly correlated to maternal nutritional status. The incidence of LBW ranges from about 4% in developed countries to almost 50% in some of the least developed countries. Currently about 24 million LBW babies are born every year which is 17% of all live birth. More than half of LBW babies are born in developing countries⁵.

Childhood malnutrition remains highly prevalent among pre-school children in less developed countries. In Asia, particularly the children of south-Asia, where almost half of world's malnourished Children live, are affected most¹⁶. According to the WHO, 30-40% of all children Under 5 years of age are malnourished in these less developed countries¹⁷. In many developing countries, the prevalence of growth retardation increase with age during infancy and early Childhood¹⁸. Child health situation is in a very poor shape in Bangladesh. 81.3% of infants aged 6-71 months suffer from various degree of malnutrition of which 11.1% and 24.9% are severely malnourished respectively¹⁹. According to UNICEF, the situation of infant, child and maternal malnutrition in Bangladesh is among the worst in the world. The report also showed that about 10-20% of pre school Children had third degree of malnutrition and a further 50-60% were affected by moderate malnutrition²⁰. In Bangladesh the neonatal, infant and under five mortality rates are 80, 94 and 122/1000 live births respectively. This childhood mortality is primarily due to malnutrition, diarrhoeal disease, acute respiratory infections, neonatal tetanus and measles²¹. Executive summary of world Bank reported that recent positive changes levels of malnutrition in Bangladesh remain to be the highest in the world, 85% are stunted, nearly 50% of women suffer from chronic energy deficit, low birth weight incidence is at 45% perhaps the highest in the world²². A study shows that malnutrition was exceptionally prevalent in children 68.5% stunted, 31.2% wasted and 73.2% under weight for exceeding WHO criteria for very high level of malnutrition. Severely stunted, wasted and under weight children were 37.8%, 5.7% and 39% respectively and moderately stunted, wasted and Under weight Children were 30.7% and 34.2% respectively²³. Analysis of relevant socio-economic and demographic

variables reveals that “Poverty” is the central point of all direct and indirect cause of malnutrition. In several studies socio-economic factors have been found to influence the nutritional status of the Children.

Malnutrition has been recognized as one of the major causes of morbidity and mortality among the children²⁴. A great majority of young children who belong to the poor income group in the developing countries are malnourished. They suffer from various grades of protein energy malnutrition ranging from mild degrees of growth retardation to the very severe forms of kwashiorkor or marasmus. Malnourished children are more susceptible to infection²⁵. For preschool children in the less privileged groups of developing countries, whether the apparent clinical result in nutritional are usually involved²⁶. The Nutrition survey of Rural Bangladesh, 1975-76 made some important findings regarding nutritional status of our children. As it revealed, amongst the children Under 0-12 years, 16% were acutely under nourished, 12% were both stunted and waste, 4% were wasted but not stunted, 74% had chronic under nutrition and 11.82% had both acute and chronic under nutrition. These Survey findings indicate that major portion of our children under 5 years were malnourished as categorized single or multiple standards²⁷.

Nutrition survey of rural Bangladesh 1981-82 revealed some important findings on child nutrition. In this survey, some six-percent of the children (0-11 years) was found to be normal, 20% was observed to have suffered from first-degree malnutrition 51% from second degree and 23% from third degree malnutrition. This survey also revealed that nutritional status of children, especially 0-5 years old children, was poor. Among the under 5 children, 57% were wasting and 13% were both stunting and on the other hand Bangladesh Bureau of statistics (BBS)

conducted three National level child Nutrition survey during the years of 1985-86, 1989-90 and 1992. In the first survey on 1985-86, it was observed that more than 56.1% of the children in Bangladesh among 6-71 months of age were wasted²⁹.

According to second child nutrition survey of Bangladesh (1989-90), the nutrition situation of Bangladesh children using Gomez classification, 6.8% suffered from third degree malnutrition, another 47% can be categorized as suffering from second degree malnutrition, while only 6.6% can be considered normal in terms of their nutritional status³⁰.

Child nutrition survey of Bangladesh (1992), also revealed the following findings taking height-for age and weight-for height into consideration only 31% of all children between 6-71 months of age could be classified as not malnourished. The remaining 69% of the children are victims of malnutrition of one kind or the other. In this survey the total prevalence of stunting, wasting and under weight were 64.2%, 16.7% and 68.3% respectively and the prevalence of malnutrition is higher among the female children³¹.

Nutrition Blindness survey (HKI, 1985) reported that among 6-72 months age children, about half (49.5) were stunted (<90% H/A) and more than one tenth (11.3) were wasted (<80% W/H) Measured by MUAC indicator, 13.4% children were severely malnourished (<12.5 cm)³².

According to World Bank document, 1993. Bangladesh has the severest malnutrition problems in the world, because 68% of the children

Under 5 years are highly or moderately under weight, 64% of them are severely or moderately stunted and 17% are suffering from wasting³³.

Another study find out the prevalence of morbidity among normal and malnourished children (0-5 years) in an urban slum of Dhaka city. Prevalence of morbidity among the malnourished children was found to be higher than the normal children living in same conditions³⁴. Begum and Haque in 1992 studied on health and nutritional status of children in rural Bangladesh. In this study they found that out of the total number of samples studied only 25.89% girls and 21.21% boys had normal nutritional status. While 30.36% girls and 12.36% boys were within the range of 70-80% of the Harvard standard and 43-75% girls and 58.42% boys were within 81.90% of the above standard³⁵.

A study of Brown (1986) reported on nutritional status (Wt./ht) of children aged 4-6 and 7-10 years were 7.4% and 4.8% respectively in <10 percentile for NCHS percentile. It suggests the importance of using height and weight to assess the nutritional status³⁶. Importance was also given to issues in the assessment of nutritional status using anthropometry³⁷.

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Hassan and Ahmem in 1993 studied the nutritional, status of 1108 children of the city of Dhaka. Nutritional status of Children aged 0-12 years was assessed by measuring weight for age, weight for height and height for age from locations. Only 12% of children were found to have normal weight for age and 58% was considered as suffering from malnutrition of second and third degree. The weight for height was normal in 39% and 21% were considered as wasted. Almost 47% were stunted. The percentage of stunted children increased, 47% of the children could be considered normal and 12% had severe malnutrition³⁸.

In 1985-86, a nutrition survey was carried out in the city of Dhaka with samples from the poor, the middle class, the upper middle and the rich. Anthropometrics measurements of height and weight of under 12 children were recorded during the course of the survey to determine the nutritional status of the urban children, to assess the prevalence of malnutrition among them and to identify the children at risk³⁹.

Jahan and Hassan in 1994 studied the nutritional status of children among the 100 households in a village of Nariyangonj district between 1988-89. The study indicated that the children were mostly deficient in calorie (54%), protein (44%), vitamin A (77%) and vitamin B₂ (73%). About 70% children were either wasted or stunted or both. Almost all of them (98%) were found to suffer from various degree of malnutrition, 49% of the children were anemic and disorders were more severe than those of 1981-82 Nutrition survey⁴⁰.

The prevalence of malnutrition among under 5 children in Brazil decreased by more than 60% between 1975 and 1989⁴¹.

A community based survey of the nutritional status of the under 5 children was conducted by Coetzee and Ferrinho in 1994. A cluster sampling technique was used. The weight and height of 426 children were measured compared with clinic-based growth monitoring data. It indicated a high percentage of stunting but no acute malnutrition⁴².

Studies showed that people in the lower socio-economic groups do not usually get required food and treatment and ultimately fall prey to ill health⁴³.

In a cross sectional survey carried out among 4320 under 5 years children in south west Uganda indicated that various socio-economic and environment factors were related to poor nutritional status⁴⁴.

Another study shows incidence of stunting (chronic long term malnutrition) among Bangladeshi children which showed female children (57.6%) were more stunted than male children (54.8%)⁴⁵. Prevalence of wasting (acute malnutrition) by age group, area and sex showed female child (12-23 months, 2.4% and 24-25 months, 11.6%) were more wasted than male⁴⁶.

A BBS report on child death rate per thousand children of age 1 to 4 years showed that mortality rate is higher among female children (16.2%) than male children (13.0%)⁴⁷.

In Pakistan, a 1989 analysis showed that 61% of girls under the age of five were malnourished, compared with 52% of boys in the same age group⁴⁸.

A report in Bangladesh conducted among 6 months to 6 years children also showed that girls (51.3% were more stunted than boys (50.8%)⁴⁹.

A Bangladesh Bureau of statistics report (1993 showed 14% of female children were malnourished in comparison with only 5% of male children. The percent of stunted girls (57.6%) and boys (54.8%), wasted girls (9.5%) and boys (6.8%) and arm circumference were low 17.6% for girls and 11.5% for boys⁵⁰

A report published on prevalence of under nutrition in children under 5 (6-59 months) in developing countries showed that in Bangladesh children are 65.5% under weight, 64.6% stunted, 15.5% wasted and 0.3% over weight among 1,914 children⁵¹.

Nutritional status of 136 adolescent girls age 11-17 years was studied. According to NCHS reference standards, 36% of the girls were

found under weight (Wt/ age <75%) 14% stunted (ht/age < 90%), 32% wasted (wt/ ht <90%) and about 2% were found over weight (wt/ht>120). About 21% of the subjects were found to be anemic (hemoglobin <12.0 g/dl)⁵².

A major part of the world population have been reported to have low food intake of about 200 kcal per person per day in the developing countries ^{53,54}.

In Bangladesh, not only low dietary intake but also ignorance about food is one of the vital causes of malnutrition. Majority of our population is illiterate. They have no knowledge about nutritive value of food. For this reason, usually they cannot take balanced diet resulting malnutrition and ultimately attacked by various nutritional deficiency diseases ⁵⁵.

1.3 Justification of the study

The children are the future nation builders of the country. A significant number of infants and under-5 children are the victims of mortality and morbidity due to the curse of poverty, ignorance, traditional belief, custom and prejudices. Only about 10% under-5 children of Bangladesh are within normal level, which is somehow rather alike in all developing countries. A child requires more nutrition up to first 03 years of life for full development of brain unless which they will be mentally retarded and handicapped. National productivity and performance will be declined by this group of children and instead of being the asset they will be the future burden of the nation.

It is wise in developing countries like Bangladesh to make the best use of food available to the people. Bad customs regarding food and nutrition particularly depriving pregnant and lactating mother's from the requirements of extra food causes malnutrition of the children. Moreover depriving the newly born baby from colostrum, delayed initiation of breast feeding, very low exclusive breast feeding early or late introduction of complementary feeding affect the nutritional status of the child.

Parental, specially maternal education, monthly family income, occupation of the father, immunization status of the children, source of drinking water, extra disposal, birth order of the children, knowledge on family planning, cooking procedure, nutrition education etc are some of the important factors that affect nutritional status of under-5 children.

According to BBS child nutrition survey (2000) mother's literacy is negatively related with malnutrition prevalence. Among children of mothers never attending school, 13.1%, 55.2% & 56.8 were suffering from

wasting, stunting & under weight respectively. But among children of mothers who have passed S.S.C or above, The prevalence of wasting, stunting underweight were 11.5%, 21.2% & 24% respectively,

The prevalence of malnutrition in children were found higher if the mother's age at first pregnancy were 16 years or less. As the number of live birth increased, the rate of stunting and under weight were also increased. No visible effect of number of live births was seen on prevalence of wasting . Malnutrition was more prevalent among children who were not immunized.

Though some scattered nutritional survey have been conducted in Bangladesh to know the nutritional status of under-5 children yet no such study ever been conducted among the under-5 children at savar to know the same. Studies on malnutrition related field in this place is very limited and to fulfill this knowledge gap, the present study is timely and useful.

This study is an effort to assess their nutritional status with a view to put forward some recommendations for improvement of the nutritional status of under-5 children of this area and our country also.

CHAPTER 2

Chapter-2

OBJECTIVE

2.1 Objective of the study

2.2 General objectives

- To assess the nutritional status of under five children in Savar Pouroshava area .

2.3 Specific objectives

- To assess the socio-economic and demographic status of the respondent households and its effect on the under –five (Pre school) children.
- To assess the nutritional status of under –five children by clinical, anthropometric & dietary methods.
- To find out the disease prevalence and relationship with nutrient intake and relationship of nutritional status of the under-five children with the education of the mother and their economic condition of their family.

CHAPTER 3

Chapter-3

Material and Methods

3.1 Study population and location:

The study population consisted of children aged 36-60 months from two of the four wards of Saver Pouro Shova.

3.2 Study period :

The data were collected during the months of February to August, 2005.

3.3 Development of study questionnaire:

A standard questionnaire was developed in accordance with the study objectives to obtain relevant information regarding dietary practice, Socio-economic status, such as educational status, self occupation, monthly family income, family size etc. Anthropometric indices such as wt, ht and MUAC were included in the questionnaire.

3.4 Questionnaire design and field trial:

Before starting the final survey, the initial questionnaire was pre-tested among respondents in another area where the final study was not carried out. Then it was modified as required and finalized for collection of data from the target study population.

3.5 Sampling :

The children were selected by random sampling technique using the following formula-

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

$$n = \text{Sample size}$$

$$z = \text{Standard normal deviate corresponds } = 95\%$$

confidence level = (1.96)

$$p = \text{Proportion of the target population} = 0.5$$

$$d = \text{Degree of desired accuracy} = 0.05\%$$

$$q = 1 - p$$

$$\frac{(1.96)^2 (0.5)(0.5)}{(0.05)^2}$$

$$= 384$$

3.6 Methods

This cross sectional study was done by collecting the following data:

- a) Socio-demographic information were collected through a structured questionnaire.
- b) Height, Weight and mid arm circumference (MAC) were collected through standardized height scale. Salter hanging scale and TALC-MAC measuring tape.
- c) Sign and symptoms of nutritional deficiency disease were collected by clinical examination.
- d) Dietary intake was collected through 24 hours recall method and nutrient calculations were done by conversion factor⁶².
- e) Dietary habit was assessed by 7 days food frequency.

3.7 Collection of Anthropometric data:

Weight:

A bathroom scale (Kubota, Japan) was used to record weight of the children. The balance was standardized with standard weight everyday before use. The weight was recorded on standing position in the weighing machine on bare foot and with light clothes. The arms were made to hang loosely at the body sides.

Height:

Heights of the subjects were measured bare footed in standing position with a wooden height scale.

MAC (Mid Arm Circumference):

It was measured using specialized tape designed for the purpose. The left arm was made hanging freely while the upper portion was measured by a measuring tape placing it gently and firmly around the mid point between acromion process of the scapula and olecranon process of the ulna avoiding compression of the soft tissues.

Age:

It was recorded from the memory of the mothers or from the birth certificates in the case of under 5 children. Even some of the mothers possessed immunization cards from where the ages of the children were recorded.

3.8 Anthropometric indices :

Weight for age, height for age and weight for height of the subjects were calculated and compared with the National Centre for Health Statistics (NCHS) reference media.

Weight for age (W / A):

Weight for age of the subjects were calculated from the body weight and standard weight of the subjects in that age using the following formula-

$$\text{Weight / Age} = \frac{\text{Actual wt. of the children}}{\text{Standard wt. of the children for that age}} \times 100$$

Height for age (H / A):

Height for age of the subject were calculated form the height and standard height of the subjects in that age using the following formula-

$$\text{Height / Age} = \frac{\text{Actual ht. of the children}}{\text{Standard ht. of the children for that age.}} \times 100$$

Weight for height (W / H):

Weight for height of children were measured form the body weight and standard weight in that height using the following formula-

$$\text{Weight / Height} = \frac{\text{Actual wt. of the children}}{\text{Standard wt. of the children for}} \times 100$$

Wasting and stunting as percent (%) deviation form reference median :

A deficit in weight for age does not give any indication whether a child is currently on a deficient diet or he/she has a history of past malnutrition. In order to overcome this difficulty, Water low proposed a two-way classification which takes into accounts both height and weight of the child. If the child is under weight for his / her height he/she is currently on a deficient diet and is classified as wasted. On the other hand, the child is classified as stunted on the basis of percentage deviation form the reference median as described below.

Wasted: Weight for height less than 80% of median.

Stunted: Height for age less then 90% of median.

Wasted & stunted : Height for age less than 90% median & Weight for Height less then 80% of median.

Wasting, stunting & under weight as standard deviation score (Z-scores):

In undernourished population – 2SD weight for height corresponds approximately to 80% of the median weight for height and 90% of the median height for age. The relation proportions of children diagnosed as malnourished by using a cut off point of 80% or below of median score which changes with increasing age of children. For this reason, weight for height and height for age are now expressed as multiples of standard deviation of the reference population. Children with scores of -2SD or below the reference³ are classified as malnourished. Severe and moderate stunting, wasting and underweight are distinguished as following :

Stunting :	Height for age -2SD or below.
Severe	: -3SD or below.
Moderate	: -2SD to 2.99SD.
Wasting	: Weight for height -2SD or below
Severe	: -3SD or below.
Moderate	: -2SD to 2.99SD.
Under weight	: weight for age – 2SD or below
Severe	: -3SD or below.
Moderate	: -2SD to 2.99SD.

Mid circumference (MAC)Arm

Using arbitrary cut of points, children with MAC less than 12.5 cm were classified as malnourished and those with MAC between 12.5 cm and 13.4 cm as borderline cases among children up to 59 months.

CHAPTER 4

Chapter-4

RESULTS

**Table-1 Demographic particulars of the children
(N= 420)**

Particulars	Number	Percentage
Age :		
37-48months (4 th years)	210	50.0
49-59 months (5 th years)	210	50.0
Mean age	48.2 ± 6.2 months	
Sex :		
Male	204	48.6
Female	216	51.4

Table -1 shows that 50 % of the study children were from 4th year (37-48 months) and the rest 50 % from 5th year (49-59 months age group). Mean age of the children was 48.2± 6.2 months and 49 % were male and 51 % were female children.

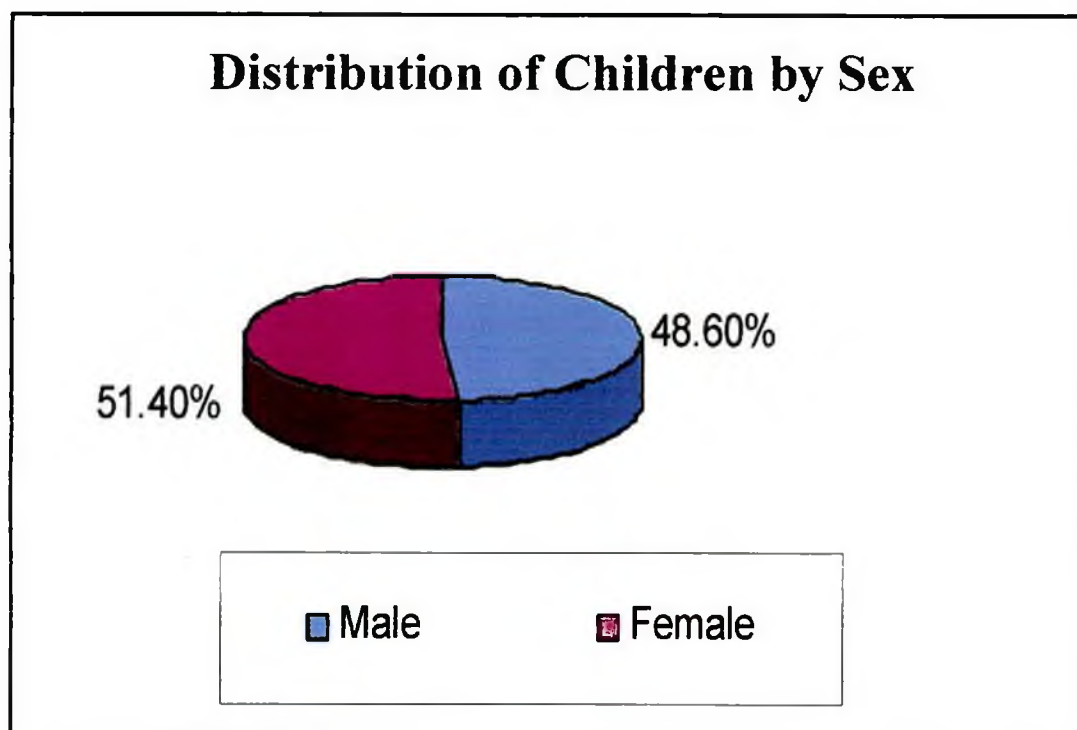


Figure – 1

**Table-2: Demographic particulars of the parents
(N=420)**

Particulars	Fathers		Mothers	
	No.	%	No.	%
Age :				
Up to 25 years	1	0.2	178	42.4
26-30 years	46	10.95	204	48.6
31 years & above	373	88.80	38	9.0
Total	420	100.0	420	100.0
Education :				
Illiterate/Can sign only Primary and secondary	105	25.0	159	37.9
S.S.C & above	60	14.3	67	16.0
	255	60.70	194	46.1
Total	420	100.0	420	100.0
Occupation :				
Service	136	32.4	48	11.4
Business	157	37.4	27	6.4
House wife	—	—	278	66.2
Cottage industry	—	—	33	7.9
Others	127	30.2	34	8.1
Total	420	100.0	420	100.0

Vast majority (88.80) of the fathers were of 31 years and above age group, while majority of mothers (48.6 %) belonged to 26-30 years of age. One forth (25 %) of the fathers, while 37.9 % of children's mothers were illiterate including those who can sign only. Fathers and mothers having education level S.S.C & above were 60.7 and 46.1 percent respectively. About 37% fathers were engaged in business, on the other hand about 66% mothers were housewives. About 32 and 11 percent fathers and mothers were service holders respectively. Thirty three (7.9 %) mothers were found to be engaged in cottage industry.

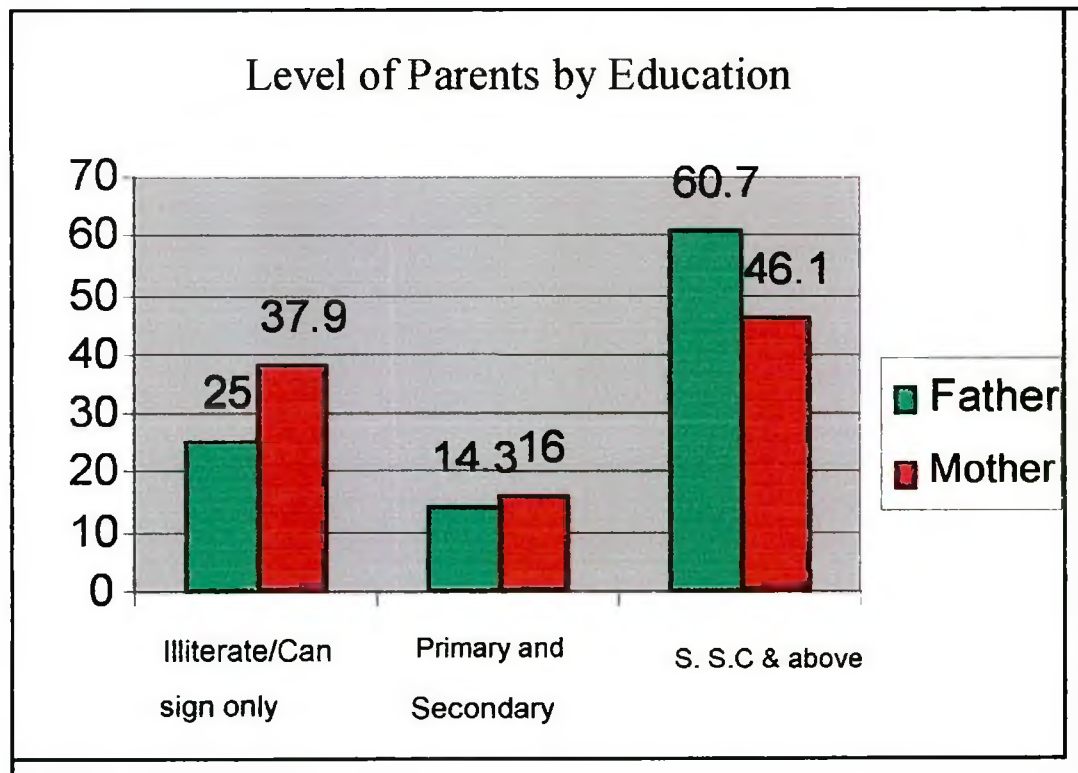


Figure – 2

Table-3 Distribution of the household by monthly income

Monthly income (TK)	No	(%)
<7500	164	39.0
7500-14999	169	40.3
15000 & above	87	20.7
Total	420	100.0

Table shows that 39.0% and 40.3 % had income between monthly income <7500TK and TK7500-14999 respectively. Only 20.7 % households were in the higher income group with monthly income of TK15000 and above.

Table-4 Distribution of children by residence(N=420)

Particular of residence	No.	%
Ownership of the house		
Own house	232	55.2
Rented house	188	44.8
Total	420	100.0
Type of house		
Kaccha	68	16.2
Kaccha floor +tin	73	14.4
Paca floor +tin	57	13.6
Tin shed Building	95	22.6
Building	127	30.2
Total	420	100.0
Number of rooms		
1	31	7.4
2-3	301	71.7
4-5	68	16.2
6 and above	20	4.8
Total	420	100.0

Table- 4 shows that majority of the children (55.2 %) were found to live in their own house, While the rest children were living in rented house. Regarding type of house, 52.8 % were in building including (22.6 %) tin shed buildings as against 16.2 % were kaccha houses. In case of (71.6 %) houses of the children's family had 2-3 rooms.

Table-5 Distribution of children by source of drinking water sanitation and personal hygiene(N=420)

Particulars	NO.	%
Source of drinking water		
Tap water	56	13.3
Pond water	1	0.2
Tube well water	298	71.0
Boiled water	60	14.3
Well	5	1.2
Total	420	100.0
Type of latrine used by the children		
Kaccha latrine	59	14.0
Sanitary latrine	220	52.4
Slub latrine	57	13.6
Child's latrine	33	7.9
No fixed place	51	12.1
Total	420	100.0
Wash hands after defecation		
With water only	273	65.0
With mud & water	33	7.9
With ash & water	4	1.0
With soap & water	110	26.2
Total	420	100.0
Hand Wash before taking meals		
Yes	22	5.2
No	178	42.4
Wash hands occasionally	220	52.4
Total	420	100.0
Mode of tooth brushing		
Only finger	5	1.2
With ash	46	11.0
With Paste & brush	275	65.5
With Tooth powder	93	22.1
Total	420	100.0
Timing of teeth cleaning		
1	355	84.52
2	64	15.2
3	1	0.2
Total	420	100.0

Table-5 shows that in most of the house holds 71.0 % tube well was the source of drinking water and about 14.3 % house holds used boiled water for drinking purpose. In 52.4% and 14.0 % house holds there were sanitary latrine and kaccha latrine respectively, while there was no latrine in 12.1 % house holds. Regarding hand wash after defection 65.0 % children were reported to have used only water as against 26.2 % used soap and water. On the other hand only 5.2 % children used to wash hands, While 42.4 % did not wash hands before taking meals. Of course 52.4 % wash hands occasionally. In respect of tooth brushing 65.5 % children used past and brush, 22.2 % used tooth powder and 11.0 % used ash to clean their teeth. About 84.5 % used to clean teeth only one time.

Table-6 Distribution of the children by health information

Particulars	No.	%
Status of vaccination		
Complete Course	386	91.9
Incomplete Course	34	8.1
Vitamin-A capsule received		
Yes	164	39.0
No	256	61.0
colostrums given		
Yes	175	41.7
No	245	58.3
Breast fed up to 2 years		
Yes	233	55.5
No	187	44.5
Age of Introduce of supplementary food		
From 3-4 months	227	54.2
After 5 months & above	142	33.7
Not remember	51	12.1

Table shows that about 91.9 % children completed their vaccination course, while 61.0% children did not receive Vitamin-A capsule. Only about 42 % children were given colostrums after birth and about 54% and 34% children were introduced with supplementary food at the age of 3-4 months and after 5 months respectively

Table-7 Distribution of children suffering from different nutritional deficiency symptoms (N=420)

Clinical sign	Age group(37-47)	Age group (48-59)	Total
Thin hair	3.3 %	3.3 %	3.3 %
Angular stomatitis	5.2 %	5.2 %	5.2 %
Glossitis	9.5 %	10.0 %	9.8 %
Dental carries	11.0 %	16.2 %	13.6 %
Bleeding gum	10.0 %	12.9 %	11.4 %
Dermatosis	4.8 %	6.7 %	5.7 %
Scabies	1.4 %	2.4 %	1.9 %
Others	1.4 %	1.0 %	1.2 %

Table-7 shows that only 3.3 % children were found to have thin hair in both age groups. 13.6 % children had dental carries , followed by 11.4 % for bleeding gum and 9.8 % for glossitis, dermatosis and angular stomatitis were found in 5.7 and 5.2 % children respectively . The prevalence of dental carries, bleeding gum, glossitis, dermatosis and scabies were found to be higher among older children of 48-59 months old compared to younger children of 37-47 months.

Table-8 Distribution of children by number of episodes of different diseases during last three months

Disease name	No. of episode	
	1	2 & more
Diarrhoea	38.8 (163)	0.7 (3)
Dysentery	20.2 (85)	-
Fever/Cold	29.0 (122)	-
Measles	2.4 (10)	-
Other disease	7.6 (32)	-

Table-8 shows that 38.8 %children were found to have been suffering from diarrhoea during last three months for one time and only 0.7 children suffered for two & more times. Dysentery was found 20.2 % children during last three months for one time only. 29.0 % children had fever/cold during last three months for one time. More than seven percent children suffering from other diseases.

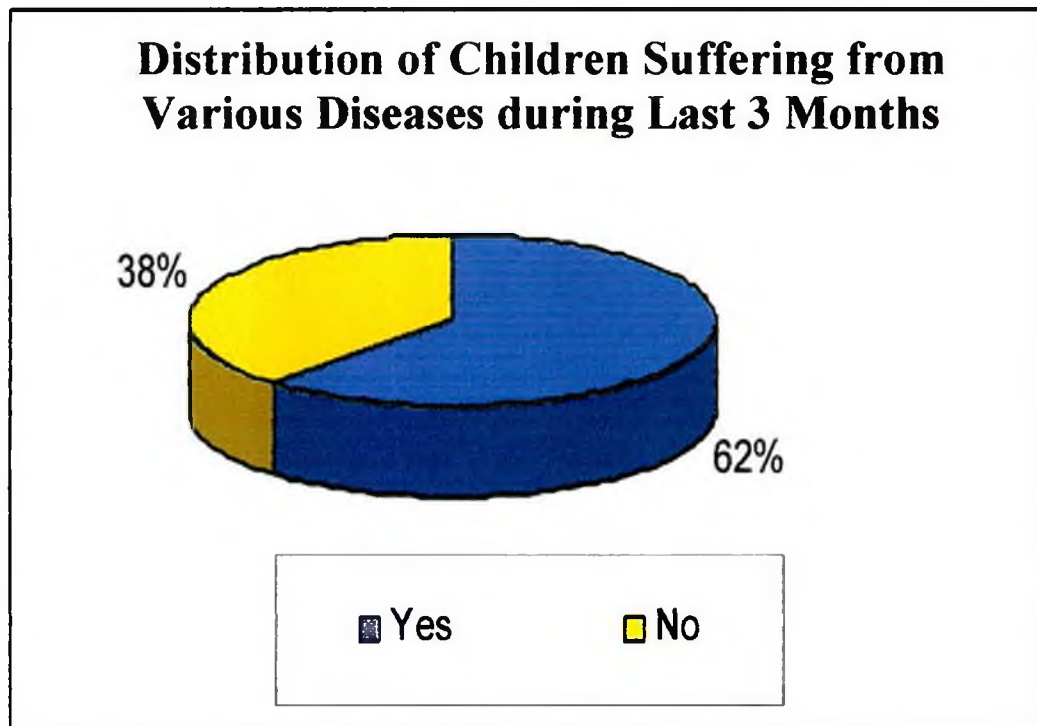


Figure – 3

**Table-9 Food frequency of the study children
(days/week)**

Food source	Male	Female	Both
	Mean	Mean	Mean
Energy giving foods:			
Rice	6.96	6.99	6.97
Parata/Rooti	2.09	2.20	2.15
Bread	3.17	3.00	3.08
Muri/Chira/Khoi	1.66	1.80	1.73
Sugar	5.07	5.06	5.07
Potato	3.40	3.33	3.36
Oil	6.95	6.92	6.93
Body building & repairing foods:			
Fish	3.01	2.97	2.99
Meat	0.91	0.95	0.93
Egg	1.79	1.66	1.72
Milk	4.13	3.97	4.05
Pulse	3.71	3.63	3.67
Protective foods:			
Green leafy vegetable	2.33	2.26	2.30
Non leafy Vegetable	3.24	3.33	3.29
Fruits	2.36	2.07	2.21
Others	0.89	0.91	0.91

Table-9 shows the frequency of food intake by the children for days per week. It was found that rice and oil were found to be consumed daily, while sugar was consumed for 5 days and milk and pulse for 4 days per week. Bread, potato, fish and non leafy vegetable were consumed for 3 days . Puffed rice (Muri) , egg, green leafy vegetable were consumed for 2 days and meat, non specific foods were consumed for 1 day per week only. Frequency of all food items were almost same in both male and female children.

**Table-10 Food frequency of the study children
(time/week)**

Food source	Male Mean	Female Mean	Both Mean
Energy giving foods:			
Rice	14.17	14.39	14.28
Parata/Rooti	2.18	2.26	2.22
Bread	3.35	3.18	3.26
Muri/Chira/Khoi	1.72	1.88	1.80
Sugar	5.49	5.29	5.39
Potato	5.86	5.69	5.77
Oil	14.00	14.00	14.00
Body building & repairing foods:			
Fish	5.55	5.60	5.57
Meat	1.80	1.88	1.84
Egg	1.98	1.88	1.93
Milk	4.32	4.06	4.19
Pulse	6.41	6.46	6.44
Protective foods:			
Green vegetable	2.82	2.73	2.77
Vegetable	5.15	5.49	5.32
Fruits	2.41	2.17	2.29
Others	0.93	1.00	0.97

Table-10 shows the mean frequency of foods intake for times per weak. It was found that rice and oil were found to be consumed about 14 times per week, while pulse was consumed for more then 6 times and sugar, potato, fish, vegetables for 5 times. Only milk was consumed for 4 times per week. Bread and green vegetables were consumed for 3 times per weak and roti ,meat, egg and fruits were consumed for 2 times per week . Frequency of all food items were almost same in both male and female children.

**Table- 11 Per capita per day food intake of children
by age**

Food item	Age group		
	Total	37-47 month	48-59 month
Cereals	165.0	161.5	167.8
Rice (gm)	133.8	128.3	138.1
Wheat (gm)	10.0	12.2	8.2
Roots & Tubers	39.5	39.0	39.9
Potato (gm)	33.7	31.8	35.2
Sugar (gm)	18.8	19.0	18.7
Pulse & Nuts (gm)	16.0	18.7	13.9
Green leafy vegetables	20.9	21.8	20.1
Non leafy vegetables	35.1	36.0	34.5
Fruits (gm)	20.5	24.9	17.0
Meats (gm)	8.0	6.2	9.3
Eggs (gm)	3.9	3.7	4.1
Fish (gm)	24.6	22.0	26.7
Milk and milk products	83.2	87.3	79.9
Fats & oils (Tsp)	11.7	11.3	12.1
Others (gm)	29.6	29.9	29.4
Total	435.3	434.4	436.0

Food intake of the study children shows that rice, potato, pulse, vegetables, fruits, meat, egg, fish, milk fats & oils intake were 133.8, 33.7, 16.0, 56.0, 20.5, 8.0, 3.9, 24.6, 83.2, and 11.7 gm respectively.

The table also shows that intakes of rice, potato, meat, egg & fish were higher among older children of 48-59 months, whereas intakes of other food items particularly wheat, pulses, vegetables, fruits and milk & milk products were higher among the young children of 37-47 months old.

Table- 12 Per capita per day food intake of children by sex

Food item	Mean intake (gm)		
	All	Male	Female
Cereals	165.0	169.9	160.4
Rice (gm)	133.8	133.7	133.9
Wheat (gm)	10.0	12.7	7.4
Roots & Tubers	39.5	40.6	38.4
Potato (gm)	33.7	35.5	32.1
Sugar (gm)	18.8	19.1	18.6
Pulse & Nuts (gm)	16.0	17.3	14.8
Green leafy vegetables	20.9	21.7	20.1
Non leafy vegetables	35.1	35.4	34.9
Fruits (gm)	20.5	26.0	15.2
Meats (gm)	8.0	9.8	6.3
Eggs (gm)	3.9	4.8	3.1
Fish (gm)	24.6	24.0	25.1
Milk & milk products	83.2	87.0	79.6
Fats & oils (Tsp)	11.7	12.5	11.0
Others (gm)	29.6	25.4	33.6
Total	435.3	444.2	426.9

Table 12 shows that intake of all food items was higher among male children compared to female children with the exception of fish and other non specific foods. Of course rice intake was almost same in both groups.

Table- 13 Par capita nutrient intake of children by age

Nutrient	Age group		Total
	37-47 months	48-59 months	
	Mean	Mean	Mean
Energy (kcal)	993.3	1023.5	1010.3
Protein (gm)	26.9	27.1	27.0
Fat (gm)	20.6	22.4	21.6
Calcium (mg)	262.0	264.7	263.5
Iron (mg)	7.1	6.6	6.8
Vitamin-A(I.U)	1029.5	1134.0	1088.2
Thiamin (mg)	0.6	0.6	0.6
Riboflavin (mg)	0.4	0.3	0.4
Niacin (mg)	7.9	8.5	8.2
Vitamin-c (mg)	19.6	19.5	19.6

Table-13 shows that mean intake of energy, protein, fat of the 37-47 months children were 993.3 kcal, 26.9gm, 20.6gm respectively, and that of 48-59 months children were 1023.5kcal, 27.1,22.4gm respectively. Mean intake of energy for all children was 1010.3 kcal and that of protein, and fat were 270 and 21.6gm respectively. Mineral such as calcium, and iron intakes were 263.5 and 6.8 mg respectively. Intakes of vitamin-A, thiamin, riboflavin, niacin, vitamin-C were 1088.2 IU , 0.6 mg, 0.4 mg ,8.2 mg and 19.6 mg respectively. The table also shows that mean intake of calcium, iron, vitamin-A, thiamin, riboflavin, niacin, vitamin-C were allmost same among children of both groups. However, energy, protein and fat intake of older children was higher compared to their younger Counterparts.

Table- 14 Per capita nutrient intake of children by sex

Nutrient	Sex group		Both
	Male	Female	
	Mean	Mean	Mean
Energy (kcal)	1019.8	1001.3	1010.3
Protein (gm)	28.0	26.1	27.0
Fat (gm)	21.8	21.4	21.6
Carbohydrate (gm)	178.2	175.9	177.0
Calcium (mg)	272.8	254.7	263.5
Iron (mg)	7.1	6.5	6.8
Vitamin-A(I.U)	1139.6	1039.7	1088.2
Thiamin (mg)	0.6	0.6	0.6
Riboflavin (mg)	0.4	0.3	0.4
Niacin (mg)	8.3	8.2	8.2
Vitamin-C(mg)	20.4	18.8	19.6

Table-14 shows that mean intake of all nutrients except thiamin was higher among male children compared to female children.

Table-15 Nutrient intake as percent of requirement by age (37-47) and sex (as referred in NSR of 1995-96)

Nutrient	Male			Female		
	Requirement	Intake	As % of requirement	Requirement	Intake	As % of requirement
Energy(kcal)	1330	1007.9	75.78	1260	979.4	77.73
Protein (gm)	32.0	28.0	87.5	30.4	25.9	85.19
Fat (gm)	25	21.3	85.2	25	19.9	79.6
Calcium(mg)	450	273.2	60.71	450	251.2	55.8
Iron (mg)	11	7.5	68.18	11	6.7	60.90
Vitamin(I.U)	1330	1139.5	85.6	1330	1039.7	76.1
Thiamin(mg)	0.78	0.6	76.92	0.72	0.6	83.33
Riboflavin(mg)	0.93	0.4	43.01	0.86	0.3	34.88
Niacin (mg)	10.3	8.0	77.66	9.5	7.9	83.2
Vitamin-C(mg)	40	18.9	47.25	40	20.3	50.75

Table-15 shows that male children of 37-47 months old could meet about 76%, 88%, 85 % of their energy, protein and fat requirement respectively. The corresponding percentage for female children were 78, 85 and 80 percent respectively. Male children could meet more than 60 % of calcium and iron requirement, while female children could meet nearly 60 % of the requirement. The female children could meet 76%, 83% and 83 % of vitamin A, thiamin and niacin requirement respectively, while male children could meet about 85%, 76%, 78 % requirement respectively. The male and female children were able to meet riboflavin requirement by about 43% and 35 % respectively.

**Table- 16 Nutrient intake as percent of requirement
by age (48-59) and sex(as referred in NSR of 1995-96)**

Nutrient	Male			Female		
	Requirement	Intake	As % of requirement	Requirement	Intake	As % of requirement
Energy (kcal)	1709	1029.2	60.22	1551	1018.1	65.64
Protein (gm)	39.1	27.9	71.35	39.9	26.3	65.91
Fat (gm)	25	22.2	88.8	25	22.6	90.4
Calcium (mg)	450	272.4	60.53	450	257.4	67.2
Iron (mg)	11	6.8	61.81	11	6.4	58.18
Vitamin-A(LU)	1330	1139.5	85.6	1330	1039.7	76.1
Thiamin (mg)	0.91	0.6	65.93	0.79	0.5	63.29
Riboflavin (mg)	1.09	0.4	36.69	0.95	0.3	31.57
Niacin (mg)	11.4	8.6	75.43	10.4	8.4	80.76
Vitamin-C (mg)	40	21.6	64.0	40	17.6	44.0

Table-16 shows that 48-59 months old male children could meet their energy, protein and fat requirement by about 60%, 71% and 88 %. Among the female children the corresponding percentages were 65%, 65% and 90 percent respectively. Male children could meet more than 60 % of calcium and iron requirement, whereas female children could meet about 67 and 58 % .The female children could meet 76%, 63% and 80 % of vitamin A, thiamin and niacin requirement, the percentage in male children were about 85%, 65% and 75 % requirement. About 37% and 32% of requirement of riboflavin could be meet by male and female children respectively.

Table-17 Mean standard deviation and skewness of anthropometric indicators of 36-59 months old children.

Anthropometric indicators	Mean statistic	Std. statistic	Skew ness statistic
Height (cm)	95.64	5.71	-0.61
Weight (kg)	15.10	2.17	0.88
M.A.C (cm)	14.56	1.54	0.55
Height –for –age Z score	-1.58	1.14	-0.71
Height –for –age median	93.55	4.63	-0.71
Weight - for –age Z score	-0.713	1.10	0.74
Weight - for –age median	92.68	13.26	0.94
Weight - for – height Z score	0.35	1.30	0.19
Weight - for – height median	104.49	12.89	0.34

Table-17 shows the mean, standard deviations and skewness of the anthropometric indicators of the surveyed children aged 36-59 months.

The mean height and weight of the children were 95.64 cm & 15.10 kg respectively, While the M.A.C of the children was 14.56 cm. The mean height –for –age Z score was -1.58, weight - for –age Z score was -0.71 and mean Z score value of weight - for – height Z score was 0.35.

Table -18 Nutritional status of children using Z- score

Nutritional status	Male (%)	Female (%)	Both (%)
<u>Stunting and Under weight</u>			
Normal	61.8	66.2	64.0
Malnourished	38.2	33.8	35.8
Stunted but not Under weight	28.9	26.9	27.8
Under weight but not Stunted	5.4	2.3	3.8
Both Stunted & Under weight	3.9	4.6	4.2
Stunting and Wasting	63.2	67.1	65.2
Normal	36.8	32.9	34.8
Malnourished	32.4	31.0	31.7
Stunted but not wasted	3.9	1.4	2.6
Wasted but not Stunted	0.5	0.5	0.5
Both Stunted & wasted			
Total Stunted	32.8	31.5	32.0
Total Wasted	4.4	1.9	3.1
Total Under weight	9.3	6.9	8.0

Table-18 shows that in respect of both stunting and under weight, about 35.8 % was malnourished of whom 27.8 % were stunted but not under weight and only 3.8 % was under weight but not stunted, while 4.2 % were simultaneously stunted and under weight. While considering both stunting and wasting 34.8 % were malnourished, of whom 31.7 % were stunted but not wasted, 2.6% wasted but not stunted and those suffered from both stunted and wasted were only 0.5 %. Over all prevalence of stunting, wasting and under weight was 32.0, 3.1 and 8.0 percent respectively. In respect of both stunting and underweight and also in respect of both stunting and wasting the proportion of malnourished children were higher among the male compared to female children, simultaneously stunted and underweight children were higher among females (4.6%) than male children (3.9%), whereas simultaneously stunted and wasted children were equal (0.5 %) in both male and female group. The over all prevalence of stunting, wasting and under weight were also higher in male than female children.

Table-19 Nutritional status of the children by Z-score and age

Age group	HAZ		WHZ		WAZ	
	Severely stunted	Stunted	Severely wasted	Wasted	Severely Under weight	Under weight
37-47 month	17.4	35.9	0.0	1.1	0.0	5.4
48-59 month	12.7	27.2	0.4	4.6	0.8	10.1
All children	14.8	32.2	0.2	3.1	0.5	8.1

Table-19 shows that 32.2 % children were stunted and stunting was higher in 37-47 months age group(35.9 %) compared to the older children of 48-59 months (27.2 %). Severely stunted children were also found higher (17.4 %) among younger children than older children (12.7). On the other hand 1.1 % and 5.4 % respectively were wasted and underweight among younger children, the proportion of which among older children were much higher (4.6 % and 10.1 % respectively wasted and under weight). Off course no severely wasted and under weight children in younger group were found.

Table- 20 Nutritional status by father's education

Nutritional status	Father's education			Total	Significance
	Illiterate/ Can sign only	Primary & Secondary	S.S.C & above		
Stunting HFAZ (<2SD & below)	73 69.5%	24 40.0 %	38 14.9 %	135 32.1%	.000
Under weight WFAZ (<2SD & below)	11 10.5%	3 5.0 %	20 7.8 %	34 8.1 %	.451
Wasted WFHIZ (<2SD & below)	—		13 5.1 %	13 3.1 %	.013

Table-20 shows that stunting was much higher (69.5 %) among children of illiterate father, which decreased with the increase in father's education level and the differences were highly significant ($p < 0.000$). Similarly under weight rate was also found to be higher (10.5%) among children of illiterate fathers and also decreased irregularly with increased education level, but the differences were not significant. On the other hand, 5.1 % children were wasted, all of whom belonged to the fathers having S.S.C and above level of education.

Table- 21 Nutritional status by mother's education

Nutritional status	Mother's education			Total	Significance
	Illiterate/ Can sign only	Primary & Secondary	S.S.C & above		
Stunting IFAZ (<2SD & below)	94 59.1 %	20 29.9%	21 10.8 %	135 32.1 %	.000
Under weight WFAZ (<2SD & below)	17 10.7%	6 9.0 %	11 5.7 %	34 8.1 %	.219
Wasted WHIZ (<2SD & below)	—	4 6.0 %	9 4.6 %	13 3.1 %	.015

Table-21 shows that stunting was much higher (59.1 %) among children of illiterate mothers, which decreased with the increase in education level and the differences were highly significant ($p < 0.000$). Similarly under weight rate was also found to be higher (10.7%) among children of illiterate mothers and decreased with increased education level but the differences were not significant. On the other hand, 6 % and 4.6% children of mothers having primary and S.SC level of education were wasted .It is interesting that no child of illiterate mothers was wasted.

Table- 22 Distribution of nutritional status by father's Occupation

Nutritional status	Father's occupation			Total	Significance
	Service	Business	Others		
Stunting HFAZ ($<2SD$ & bellow)	30 22.1%	39 24.8%	66 52.0%	135 32.1%	.000
Under weight WFAZ ($<2SD$ & bellow)	9 6.6 %	12 7.6%	13 10.2%	34 8.1%	.542
Wasted WFIIZ ($<2SD$ & bellow)	7 5.1%	5 3.2%	1 0.8%	13 3.1%	.124

Table-22 shows that stunting was much higher (52.0 %) among children of fathers who were engaged in other non specific occupations and 22.1 % 24.8 % children of fathers having service and business occupation were stunted. However, the differences were highly significant ($p < 0.000$). Under weight rates also showed similar trend by occupation but in case of wasting most of the wasted children (5.1 %) belonged to fathers having service, followed by business (3.2).

Table- 23 Distribution of nutritional status by
mother's occupation

Nutritional status	Mother's occupation					Total	Significance
	House wife	Service	Business	Cottage industry	Others		
Stunting HFAZ	87	5	14	20	9	135	.000
(<2SD & below)	31.3	10.4	51.9	60.6	26.5	32.1	
Under weight WFAZ	19	4	2	4	5	34	.504
(<2SD & below)	6.8	8.3	7.4	12.1	14.7	8.1	
Wasted WFHZ	7	4	1	—	1	13	.215
(<2SD & below)	2.5	8.3	3.7		2.9	3.1	

Table-23 shows that stunting was higher (60.6 %) among the children of mothers engaged in cottage industry followed by business mother (51.9 %) and housewife (31.3%). The differences were highly significant ($p < 0.000$). Under weight rate was found to be higher (14.7%) among the children of mothers having other non-specific occupations, while most of the wasted children (8.3 %) belonged to mothers having service.

Table-24 Nutritional status by monthly family Income

Nutritional Status	Monthly Family Income				Level of significance
	Tk <7500	Tk 7500-14999	Tk 15000 & above	All	
Stunted HFAZ (<2SD & bellow)	58.5	18.9	8.0	32.2	0.000
Under weight WFAZ (<2SD & bellow)	7.3	10.1	5.7	8.0	0.437
Wasted WFHIZ (<2SD & bellow)	0.6	5.3	3.4	3.1	0.045

Table -24 shows that stunting was much higher (58.5 %) among children of lower income group (TK <7500/) which decreased with the increase of monthly income and the difference were highly significant ($p<.000$), but in case of under weight and wasting, the prevalence were higher in middle income group (TK7500-14999/). However ,the differences, were not significant.

Table-25 Relationship between nutrient intake and monthly family income

Nutrient	Monthly Family Income			Level of significance
	TK <7500	TK 7500-14999	TK 15000 & above	
Energy (kcal)	901.3	1019.9	1197.0	.000
Protein (gm)	22.9	27.4	34.0	.000
Fat (gm)	12.4	25.1	32.3	.000
Calcium (mg)	309.4	349.2	263.5	.000
Iron (mg)	6.2	6.8	8.1	.007
Vitamin-A(IU)	473.8	1217.7	1994.9	.000
Thiamin (mg)	0.6	0.5	0.6	.019
Riboflavin (mg)	0.2	0.4	0.5	.000
Niacin (mg)	8.2	7.7	9.3	.001
Vitamin-C (mg)	15.6	19.8	26.5	.000

The table 25 shows that energy, protein and fat intake of children were 901.3 kcal, 22.3 gm and 12.4 gm respectively in lower income group (TK<7500), which increased to 1019.9 kcal, 27.4 gm and 25.1 gm in middle income group (TK 7500-14999) and further increased to 1197.0 kcal, 34.0 gm and 32.3 gm in higher income group of TK15000 & above monthly income. The difference were highly significant ($p<.000$). Other nutrients intake also showed more or less similar trend of increment with a few exception, but the intakes were significantly different ($p<.000$)

**Table-26 Relationship between nutrient intake
and stunting**

Nutrient	Stunted	Not stunted	Level of significance
Energy (kcal)	897.7	1063.6	.00
Protein (gm)	22.7	29.1	.00
Fat (gm)	15.0	24.7	.00
Calcium (mg)	201.7	292.8	.00
Iron (mg)	6.2	7.1	.05
Vitamin-A(I.U)	615.1	1312.3	.00
Thiamin (mg)	0.5	0.6	.04
Riboflavin(mg)	0.3	0.4	.00
Niacin (mg)	7.9	8.4	.16
Vitamin-C(mg)	15.6	21.4	.00

The Table-26 shows that energy, protein, fat, calcium, vitamin-A, thiamin, riboflavin, niacin, and vitamin-C intakes were lower among stunted children compared to not stunted children, but the differences in intake of all the nutrient except niacin were statistically significant.

**Table-27 Relationship between nutrient intake
and underweight**

Nutrients	Under weight	Not underweight	Level of significance
Energy (kcal)	986.7	1012.3	0.677
Protein (gm)	26.2	27.1	0.612
Fat (gm)	23.5	21.4	0.636
Calcium (mg)	22.1	266.7	0.256
Iron (mg)	6.1	6.9	0.186
Vitamin-A(I.U)	1135.5	1084.1	0.874
Thiamin (mg)	0.5	0.6	0.447
Riboflavin (mg)	0.3	0.4	0.392
Niacin (mg)	8.1	8.3	0.856
Vitamin-C (mg)	16.6	19.8	0.805

The Table-27 shows that all the nutrient except fat and vitamin –A intake were lower among the under weight children compared to them who were not underweight children. But the differences in intakes of all the nutrients were not statistically significant ($p>0.005$).

**Table-28 Relationship between nutrient intake
and wasting**

Nutrient	Wasted	Not wasted	Level of significance
Energy (kcal)	1005.2	1153.6	.062
Protein (gm)	26.8	35.6	.002
Fat (gm)	21.3	32.7	.004
Calcium (mg)	260.1	368.9	.021
Iron (mg)	6.8	8.5	.016
Vitamin-A (I.U)	1055.1	2125.5	.036
Thiamin (mg)	0.6	0.6	0.724
Riboflavin (mg)	0.3	0.5	.015
Niacin (mg)	8.2	9.0	.376
Vitamin-C (mg)	19.6	19.9	.927

Table-28 shows that intake of all the nutrients except thiamin were lower among the wasted children compared to those who were not wasted. Thiamin intake was same in both groups. But the differences in intakes of protein, fat, calcium, iron, vitamin-A, riboflavin were significant ($p < .005$)

Table-29 Nutrient intake of the study children compared to urban and children of Bangladesh.

Nutrient	Study Area	Urban Area	Bangladesh.
Energy (kcal)	1010.3	1094	1146
Protein (gm)	27.0	31.0	29.3
Calcium (mg)	263.5	226	218
Iron (mg)	6.8	8.3	7.4
Vitamin-A(I.U)	1088.2	1099	1046
Thiamin (mg)	0.6	0.65	0.71
Riboflavin(mg)	0.4	0.31	0.30
Niacin (mg)	8.2	10.0	10.9
Vitamin-c (mg)	19.6	25.3	24.4

Table-29 shows that energy, protein, iron, thiamin, niacin, Vitamin-C intakes of the study children were lower while calcium and riboflavin intakes were higher than the children of urban area and Bangladesh ,

Table-30 Nutritional status of the study children
Dhaka University Institutional Repository
compared to urban children.

Nutritional status	Age group (in month)			
	36-47		48-59	
	Study	Urban	Study	Urban
Stunting	35.9	64.9	27.2	58.0
Wasting	1.1	13.7	4.6	12.7
Under weight	5.4	63.9	8.1	60.4

Table-30 shows that Stunting, Wasting, and under weight prevalence were much lower in the study children as compared to the urban children of Bangladesh. The differences were highly significant.

CHAPTER 5

Chapter-5

DISCUSSION

5.1 Discussion

The present study was carried out in some selected areas of savar pourashova to assess the nutritional status of under five children in respect of anthropometric indices and food and nutrient intake pattern. The mean height & weight of the study children was 95.64 ± 5.71 cm and 15.10 ± 2.17 kg respectively, while the M.A.C of the children was 14.6 ± 1.54 cm. The study findings reveal that the overall prevalence of stunting, wasting and underweight were 32.0%, 3.1%, and 8.0 %, respectively. while the prevalence were slightly higher among male children (32.8%, 4.4%, and 9.3 % respectively) compared to female ones (31.5%, 1.9% and 6.9 % respectively). When considering both stunting and underweight 27.8 % were found stunted but not underweight and only 3.8 % were underweight but not stunted, while 4.2 % were simultaneously stunted and underweight. While considering both stunting and wasting 31.7 % were found stunted but not wasted, 2.6% wasted but not stunted and only 0.5 % were both stunted and wasted. In respect of both stunting and underweight and also in respect of both stunting and wasting the proportion of malnourished children was higher among the male compared to female children, but simultaneously stunted and underweight children were higher among females (4.6%) than male children (3.9%) ,whereas simultaneously stunted and wasted children were equal (0.5 %) in both male and female groups. The observed prevalence of stunting, wasting and under weight were comparatively more better than that found in the National Nutritional Survey of Bangladesh in 1995-96 where the prevalence of stunting, wasting and

under weight rate were 60.4 %,17.0 % and 64.2% respectively. Stunting, wasting, underweight among the present study children was 43.1 % which was much lower than that found by BBS child nutrition survey (59.5%) in 1997. ⁶¹ Stunting was much higher (58.5 %) among children of lower income group (TK<7500.00) which decreased with the increase of monthly income and the difference were highly significant ($p<.000$), but in case of underweight and wasting, the prevalence were higher in middle income group (TK 7500-14000). However, the difference, were not significant. Among the study children 13.6 % children had dental carries, 11.4 % had bleeding gums and 9.8 % had glaucitis. Dermatitis and angular stomatitis were found in 5.7% and 5.2 % children respectively. The prevalence of dental carries, bleeding gum, glaucitis, dermatitis and scabies were found to be higher among older children compared to younger children of 37-47 months. In habitual food intake pattern, in respect of frequency of different food intake for number of times per week, it was found that rice and oil were found to be consumed daily, while sugar was consumed for 5 days and milk and pulse for 4 days per weak. Bread, potato, fish and non leafy vegetable were consumed for 3 days. Muri, egg, green leafy vegetable were consumed for 2days and meat, non specific foods were consumed for 1 day per weak only. Frequency of all food items were almost same in both male and female children. It was found that rice and oil were found to be consumed about 14 times per weak, while pulse was consumed for more than 6 times and sugar, potato, fish, vegetables for 5 times. Only milk was consumed for 4 times per weak. Bread and green vegetables were consumed for 3 times per weak and roti , meat, egg and fruits were consumed for 2 times per week. Frequency of all food items was almost same in both group. Per day per capita food intake of all study children was 435.3gm, which was 444.2gm in male and 426.9 gm in female children. By food

group, intake of rice, potato, pulse, vegetable and fruits were 133.8gm, 33.7 gm, 16.0gm 56.0 gm and 20.5 gm and 83.2 gm respectively. Meats, egg, fish, milk intakes were, 8.0 gm, 3.9 gm, 24.6gm and 83.2 gm respectively, while fats & oils intake was 11.7 gm. Intake pattern also shows that intakes of rice, potato, meat, egg and fish were higher among older children, whereas intakes of other food items particularly wheat, pulses, vegetables, fruits and milk & milk products were higher among the young children (Table-10). Intake of all food items was higher among male children compared to female children with the exception of fish and other non specific foods. Of course rice intake was almost same in both groups. Nutrient intake shows that mean intake of energy, protein, and fat was for all children were 1010.3 kcal, 27.0gm and 21.6gm respectively. Mineral such as calcium, and iron intakes were 263.5 and 6.8 mg respectively, while vitamin-A, and vitamin-C intakes were 1088.2 IU, and 19.6 mg respectively. Mean intake of calcium, iron, vitamin-A, and vitamin-C were all most same among children of both older and younger group.

However, energy, protein and fat intake of older children was higher compared to their younger counterparts. Mean intake of all nutrients except thiamin was higher among male children compared to female children. In comparison to national RDA of different nutrients as shown in NNS report in 1995-96, the 37-47 months old male children could meet about 76%, 88% requirement, and 85 % of their energy, protein, fat requirement. Female children could meet about 78%, 85% and 80% respectively. Male children could meet 60.7 % of calcium and iron requirement, while female children could meet about 56% and 61% of their requirement respectively. The male children could meet about 86 %, 77%, 43%, 78% and 47% of their vitamin A, thiamin, riboflavin, niacin and vitamin-c requirement respectively. While female children

could meet about 76%,83%,35%,83% and 51% respectively. The percentage of stunting and underweight was much higher (69.5 %,10.5%)respectively. Among children of illiterate father, which decreased with the increase of fathers education level and the differences in stunting were highly significant ($p<000$), and in case of underweight ($p>0.05$) the differences were not significant. On the other hand, all the wasted children (5.1%) belonged to the fathers having S.SC and above level of education, the prevalence of Stunting and underweight was also much higher 59.1 % and 10.7% respectively among children of illiterate mothers, which decreased with the increase in education level and the differences in stunting were highly significant ($p<000$). But the differences in underweight were not significant ($p>0.05$).The results indicate that literacy of fathers and mothers has as effective influence on the causation of stunting and to some extent underweight among the under five children. On the other hand, wasting was found to occur among the children of literate fathers and mothers.

Stunting was much higher (52 %) among children of fathers who were engaged in others non specific occupations and 22 % children of service holder fathers and 24.8% children of business man fathers were stunted. However, the differences in respect of stunting were highly significant ($p<000$). Under weight rates was also showed similar trend by occupation as stunting, whereas wasting rate was found to highest among the children of service holder father (5.1) compared to the fathers having other occupation.. Stunting was also significantly higher among the children of mothers engaged in cottage industry (60.6%) and business mothers (51.9%) compared to the children of mothers engaged in other occupation. Under weight rate was found to be insignificantly higher among the children of mothers with non-specific occupations, (14.7%) and engaged in cottage industry (12.1%) compared

to mothers of other occupation. The situation of wasting was also found to be the worst among children of house wife mothers was found to be comparatively better than the children whose mothers were engaged in other occupations. The findings indicate that the housewife mothers can take more care of their children in respect of feeding food and other aspects of child care and nursing which reflected in the nutritional status of children, compared to the mothers who are engaged in other occupation activities and as such they can not look after and take care of their children properly mainly due to lack of time and load of work, which has been also reflected in the study findings.

The study reflects the nutritional status of under-5 children in a selected area of Savar Pouro Shova who are vary much a selective group of peoples of the country. The main purpose of this study was to assess the nutritional status of under-5 children only and other aspects of nutritional knowledge, attitude and practice of the parents as well as the children were not considered. Only the anthropometric findings have been analyzed and presented in this study.

On the basis of the study findings, it has been found that maternal education has a positive effect on nutritional status of under-5 children. House wife mothers with higher level of education can do well for their under-5 children in respect of child care practices and timely appropriate feeding resulting into improved nutritional status of their children. So to improve the nutritional status of under-5 children an effective strategy would be to increase the educational level of the mothers.

5.2CONCLUSION

The nutritional status of the study children were found better than the overall nutritional situation of the country, which might be due to better socio-economic condition, availability health care facilities, and better sanitation practices existed in the area.

In this study the prevalence of stunting was 32.2%, wasting was 3.1% and underweight was 8.0% and the situation prevails more in male than female children. Food intake was higher in male children with an exception of fish and other non specific foods than female children. Similarly mean intake of all nutrients except thiamine was higher among male children.

A good percentage of the children suffer from different disease and nutritional deficiency disorder. The prevalence of dental carries, bleeding gum, glossitis, dermatosis and scabies were found to be higher among older children compared to younger children. Maternal education, socio-economic status of the family adds to better nutritional status of their children.

In overall, the study highlighted the present nutritional situation of the under-5 children of savar pouroshova. So, an integrated proper nutritional intervention such as feeding of children, nutritional education, and training of mothers, and kitchen gardening etc. for the improvement of sound nutritional status of the children is recommended.

5.3 Limitation of the study

1. The parents of the children could not mention the actual age or date of birth of the child.
2. During interview the respondents sometimes found difficulties in eliciting accurate answers. In such situation the data were recorded on estimation and calculation by the researcher using calendar of events.
3. Anthropometric measurements used for assessing nutritional status of under five children were weight for age, height for age, weight for height and mid arm circumference (MAC) once only.
4. Due to using 24 hours recall method it may have up to 10 percent lower than actual consumption.
5. Food items estimation is a complicated method so nutrients calculation may a little bit higher or lower.

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“A study on the nutritional status of pre school children (3-5 years) in a selected area”.

Identification No.

A. House hold information

1. Name of the study children :-

Address:

Sex : 1 Male 2 Female Age month, Birth order

2. Father's name :-

Age year

Educational qualification :-

1 Illiterate

2 Can sign only

3 Primary

4 SSC

5 HSC

6 Degree

7 Masters

8 Others

Occupation :-

1 Service

2 Business

3 Farmer

4 Rickshaw/Van puller

5 Driver

6 Laborer

7 Professional

8 Others

3. Mother's name :-

Age year

Educational qualification :-

1 Illiterate

2 Can sign only

3 Primary

4 SSC

5 HSC

6 Degree

7 Masters

8 Others

Occupation :-

1 House wife

2 Service

3 Business

4 Cottage industry

5 Laborer

6 Professional

7 Others

4. Monthly household income (Tk.)

5. How many members are there in your family

6. Amount of land (decimal)

Agricultural land (deci.)			Homestead land (deci.)			Others land (deci.)			Total land (deci.)		

7. Ownership of the house ☐ 1 Own ☐ 2 Rented

8. Type of house-

☐ 1 Kaccha ☐ 2 Kaccha floor + Tin
☐ 3 Paca floor + Tin ☐ 4 Tinsed Building ☐ 5 Building
9. Number of rooms

10. What is your source of drinking water?

☐ 1 Tap water ☐ 2 Pond water ☐ 3 Tube well water ☐ 4 Boiled water ☐ 5 Well

11. What kind of latrine do your child use?

☐ 1 Kaccha latrine ☐ 2 Sanitary latrine ☐ 3 Slab latrine ☐ 4 Childs latrine ☐ 5 No fixed place
12. Do your body go to latrine with bare foot? ☐ 1 Yes ☐ 2 No

13. How do you wash his / her hands after coming from latrine?

☐ 1 With water only ☐ 2 With mudd water ☐ 3 With ash & water ☐ 4 With soap & water

14. Do you wash his / her hands before taking meals?

☐ 1 Yes ☐ 2 No ☐ 3 Wash hands occasionally
15. Do your child brush his / her teeth everyday? ☐ 1 Yes ☐ 2 No.

If yes, what do he / she use?

☐ 1 Ash ☐ 2 Only finger ☐ 3 Past& brush ☐ 4 Tooth powder ☐ 5 Meswac
How many times the baby cleans his / her teeth daily? Times

(Questions are applicable only for those children who are 4 & above years)

16. Have your children been admitted to school?

☐ 1 Yes ☐ 2 No

If yes, do your child go to school regularly?

☐ 1 Yes ☐ 2 No

B. Anthropometrics information :

Height (Cm.)				Weight (Kg.)			M.A.C		

C. Clinically Examination :-

No.		Yes = 1	No = 2
1	Hair :	i) Thin hair	
		ii) Color of hair	
2	Eye :	i) Pallor	
		ii) Biotot spot	
		iii) Night blindness	
3	Mouth & Tongue :	i) Angular stomatitis	
		ii) Tongue ulcer	
4	Teeth :	i) Dental carries	
5	Gums :	i) Gum swcaling	
		ii) Gum bleeding	
6	Skin :	i) Skin depigmentation	
		ii) Rough skin	
		iii) Skin disease	
7	Glands :	i) Enlarged thyroid	
8	Edema :		
9	Otitis :		
10	U.R.T.I		
11	Others		

Has the child been suffering from any disease since last 3 months ☐ 1 Yes ☐ 2 No

Name of the disease	Disease frequency during last 3 months	Duration of disease during last 3 months
Diarrhea		
Dysentery		
Fever / Cold		
Measles		
Pneumonia		
Others		

3. Did you vaccinated your child? ☐ 1 Yes ☐ 2 No
 If yes, do you complete the vaccination course. ☐ 1 Yes ☐ 2 No
 4. If the child was feed Vit-A capsule. ☐ 1 Yes ☐ 2 No

5. Did you offer colostrums to your child? ☐ 1 Yes ☐ 2 No
6. Did your child breast fed upto 2 years of age? ☐ 1 yes ☐ 2 No
7. When did you introduce extra food (supplementary food) to your child along with breast milk?
- ☐ 1 From 3/4 months ☐ 2 Just after 5 months
- ☐ 2 After completion of 6 months ☐ 2 After 1 year
- ☐ 1 Can't remember

D. Food frequency of the child during last week.

No.	Name of the food	Days per week	Times per week
1.	Rice		
2.	Porota / Rooti		
3.	Bread		
4.	Khichuri		
5.	Muri / Chira / Khoi		
6.	Sugar / Gur		
7.	Potato / Sweet potato / Others		
8.	Oil / Ghee / Butter		
9.	Small fish / Big fish / Dry fish		
10.	Mutton / Beef / Chicken meat		
11.	Liver		
12.	Egg		
13.	Milk		
14.	Horlicks		
15.	Pulse / Beans / Nuts		
16.	Green leaf vegetable		
17.	Vegetable		
18.	Fruits / Fruit juice		
19.	Burger / Chips		
20.	Chop / Singara		
21.	Nudules		
22.	Cold drinks		
23.	Chocolates		
24.	Pais / Frinc / Other sweets		
25.	Pudding		
26.	Chanachur		
27.	Biscuit		
28.	Other foods		

Information about individual dietary intake
(using 24 hours recall method)

Food time	Name and description of food	Cooked / raw food					Edible wt.
		Household measurement	Total Wt.	Items used in the food	Raw wt.	Food code	
Morning							
In between morning and noon							
Noon							
Afternoon							
Night							