

**HOUSEHOLD NUTRITIONAL STATUS AND ITS ASSOCIATION WITH
ILLNESS OF TWO SELECTED DISTRICTS IN BANGLADESH**

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**HOUSEHOLD NUTRITIONAL STATUS AND ITS ASSOCIATION WITH ILLNESS OF
TWO SELECTED DISTRICTS IN BANGLADESH**

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CERTIFICATE

This is to certify that the research work entitled, “**HOUSEHOLD NUTRITIONAL STATUS AND ITS ASSOCIATION WITH ILLNESS OF TWO SELECTED DISTRICTS IN BANGLADESH**” conducted by **MST. AKHI KHATUN** bearing Registration No. **11-04573 (July-December/2018)** under my supervision and guidance in the partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE (M.S.) IN DEVELOPMENT AND POVERTY STUDIES** in the Faculty of Agribusiness Management, Sher-e-Bangla Agricultural University, Dhaka 1207, Bangladesh. No part of this thesis has been submitted for any other degree or diploma.

I further certify that any help or source of information received during this study has been dully acknowledged by her.

Dated: December, 2018

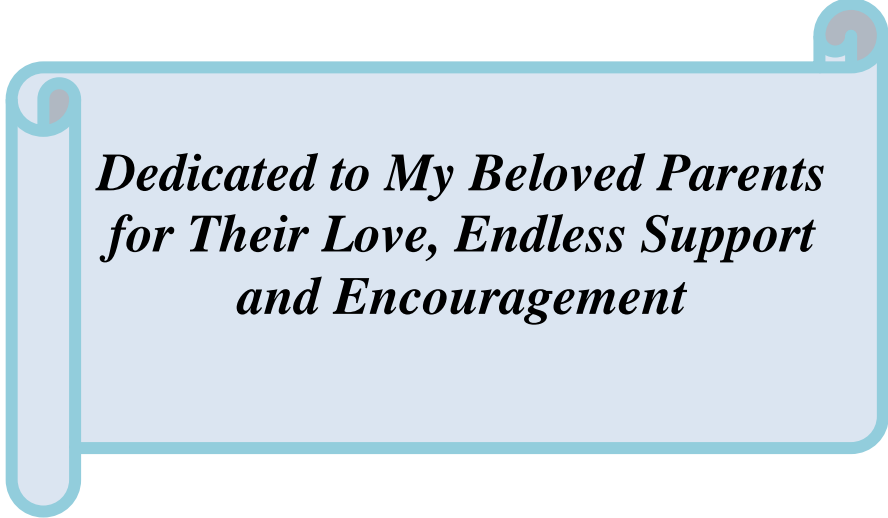
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ABBREVIATION AND ACRONYMS

BBS	Bangladesh Bureau of Statistics
GDP	Gross Domestic Product
HIES	Household Income and Expenditure Survey
<i>et al.</i>	Latin phrase et alia which means "and others."
NGO	Non Government Organization
FAO	Food and Agriculture Organization
SPSS	Statistical Package for Social Science
BER	Bangladesh Economic Review
IFAD	International Fund for Agricultural Development
USDA	United States Department of Agriculture
NIPORT	National Institute of Population Research and Training
UNICEF	United Nations Children's Fund



*Dedicated to My Beloved Parents
for Their Love, Endless Support
and Encouragement*

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The Author

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**HOUSEHOLD NUTRITIONAL STATUS AND IT'S ASSOCIATION WITH ILLNESS
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MST. AKHI KHATUN

ABSTRACT

Nutritional status is an important factor in determining the health status because it can describe a balance between the needs of the body to the intake of nutrients. Good nutrition is the basic component of good health. In this study, I analyze the probable relationship between dietary calorie intake and health status of population living in Narayanganj and Kurigram districts of Bangladesh. Poverty rate is the highest in Kurigram and lowest in Narayanganj. Secondary data has been used in this study. Descriptive analysis has been carried out to get idea about socio-demographic characteristics of the population which helps towards statistical analysis. The status of chronic illness and illness has been found out in the selected districts. Multiple binary logistic regression analysis has been used to predict the possibility of suffering from chronic illness and illness influenced by the selected independent variable. The independent variables are household size, gender, age, education, intake of carbohydrate, protein, oil & fats and vitamin & minerals. It was found from the study that calorie intake has significant contribution to the probability of suffering chronic illness and illness. In the poorer region of this study average duration of suffering chronic illness is higher than the others lower to lower calorie intake. It can be suggested that policy program to avail required calorie among the poor and make them health conscious should be undertaken to build an effective man power.

CHAPTER I

INTRODUCTION

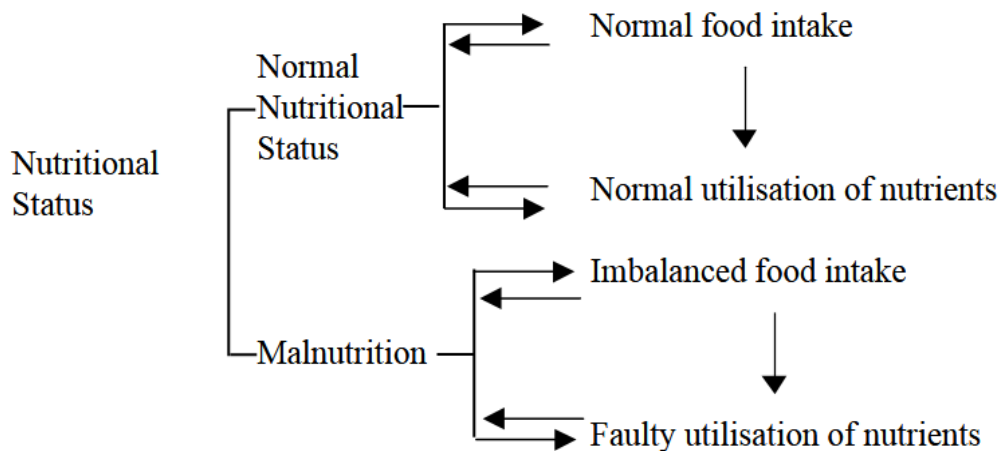
1.1. Background of the study

Nutrition is the quantity and quality of food that the body receives. The body breaks down the food to get the molecules that it actually needs: proteins, fats, carbohydrates, vitamins, and minerals. Nutrition refers to sum of all processes involved in how organisms obtain nutrients, metabolize them, and use them to support all of life's processes. If body does not have these things, than the body will unable to work properly. And the possessions of bad nutrition can be terrible.

Nutritional status refers the condition of the body in those respects influenced by the diet; the levels of nutrients in the body and the ability of those levels to maintain normal metabolic integrity. In other word it also refers to the availability of nutrients and calories in the individual's diet compared to nutrition recommendations for the individual's age group and overall health status. The diet provides nutrients which are required in varying amounts in different parts of the body. These nutrients are utilized by the body for performing specific functions. This means that good nutrition is the basic component of good health.

Nutritional status of the people of a country is mainly influenced by the food they intake regularly. Taking improper amount of food results in mal-nutrition (i.e., overweight, obese or under nutrition) which ultimately affects physical well-being of the people. Nutritional status of people is also closely linked with dietary fat intake.

Nutritional status is an important factor in determining the health status because it can describe a balance between the needs of the body to the intake of nutrients. Normal nutritional status would be achieved if the nutrient intake needs are met optimally. Normal nutritional status is managed by balance food consumption and normal utilization of nutrients. If these needs are not met will cause problems such as malnutrition and over nutrition. The following figure clearly depicts this condition-



Source: Adhikari,2017

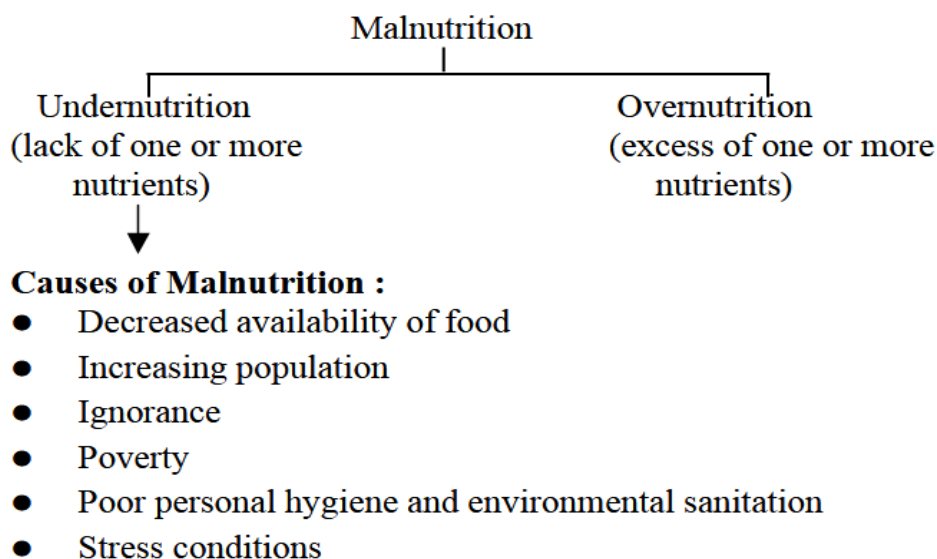
Figure 1.1 Different situation of nutritional status

Nutrition is regarded as a signal of the beginning of the emergence of degenerative diseases which are prevalent in developed and developing countries. Nutrition is of utmost importance in achieving normal growth and development and for maintaining good health throughout life. When diet provides the nutrients in incorrect amounts, either very less or in excess of what is required, it results in an imbalance of nutrients in body. This condition is responsible for various diseases, slow or no growth of body and it can even lead to death. Young children, pregnant women and lactating mothers commonly suffer from health problems arising due to inadequate nutrition.

The condition of health of a person that is influenced by the intake and utilization of nutrients is called nutritional status. We need a nutritious diet for our well-being and good health. When our body receives all the nutrients in appropriate amounts so as to meet the needs of the body, then we are in the state of good nutrition. We have a normal nutritional status. However, when the nutrients provided in the diet are inadequate or not utilized properly, it results in a state of imbalance in the body. If this continues for sometime it may develop into a severe problem which may even prove fatal.

When there is a lack or excess intake of one or more nutrients and/or faulty utilization of nutrients in our body, it leads to the state of imbalance in the body. This condition is known as malnutrition. There are two types of malnutrition. The condition of health of a person that results

due to the lack of one or more nutrients is called under nutrition. However, when there is an excess intake of nutrients, it results in over nutrition. Thus the condition of malnutrition covers both the states of under-nutrition and over-nutrition. People who eat energy rich foods in amounts more than what is required by their bodies become fat/obese. This is the result of over-nutrition. This state of being obese is harmful as it may lead to serious health problems. But under-nutrition is more common around us. In fact malnutrition has become a synonym of 'under-nutrition'. Indeed malnutrition has serious ill-effects. The people affected by mal-nutrition suffer from deficiencies of different nutrients and have infections. They also have poor physical as well as mental growth and development which cause various handicaps. Malnutrition can also lead to death. It also leads to decreased work capacity of malnourished population. Some causes of malnutrition are as follow-



Source: Adhikari, 2017

Figure 1.2 Causes of malnutrition

Based on the recent estimates of the Food and Agriculture Organization, 842 million people, accounting for about 12% of the global population, were unable to meet their dietary energy requirements. This shows that around one in eight people in the world is likely to have suffered from chronic food shortage or not having sufficient food for an active and healthy life (FAO, 2013). Although levels of food insecurity decreased globally, the difference was only 0.6%

between 2010 and 2012 (14.9%) and 2011 and 2013 (14.3%) according to reports of undernourishment in developing countries (FAO, 2013).

The subject of food insecurity has attracted attention of the world, given its direct link to malnutrition. According to Collins (2005), food insecurity is linked to acute and chronic physical and mental health conditions such as higher levels of stress, anxiety, irritability, social isolation, heightened emotional responsiveness, eating disorders, depression as well as impaired cognitive abilities. This is harmful to human capital formation as it can ultimately result in low labor productivity. The undesirability of food insecurity due to its negative effect on the livelihoods and economy has prompted governments to commit themselves for acquiring food security through food self-sufficiency given the unreliability of imports. Food insecurity is increasing in the world where 795 million people are suffering from hunger. Out of them, about 780 million people are living in developing countries (FAO, 2015). Compared to other regions, the progress towards decreasing the number of hunger and malnourished people has been slow in South Asia and sub-Saharan Africa. The highest burden of hunger occurs in South Asia, where as many as 281 million people are undernourished (FAO, 2015).

Bangladesh being a developing country of South Asian area, food insecurity and associated malnutrition is common. About 60 million people of Bangladesh consume less than the minimum daily recommended amount of food (HIES,2010). About 20 per cent of rural households live in extreme poverty. Chronically poor people suffer persistent food insecurity, having no cultivable land or assets, are often illiterate and may also suffer serious illnesses or disabilities. Another 29 per cent of the rural population is considered moderately poor. They may own a small plot of land and some livestock, but while they generally have enough to eat, their diets lack protein and other nutritional elements (IFAD,2010.) Further A report by USDA (2010) indicated that of the 165 million people in Bangladesh, 33 million were registered as food insecure in 2010, and this is projected to be 37 million by 2020. Although food grain production has more than doubled since independence in 1971, food insecurity both in national and household level remains a matter of thought for the government of our country. About one fourth of the population cannot reach the minimum dietary energy requirement (2122 kcal/capita/day) and half of them subsist in utmost shortage of energy consuming less than 1800 kcal/capita/day (HIES 2016).

About 35 percent of Bangladesh's population remains food insecure (NIPORT et al. 2013). Apart from the prevailing deficit in total calorie intake, the normal diet of Bangladeshi people is seriously imbalanced, with inadequate shares of fat, oil and protein (GOB, 2000). Women and children are especially vulnerable due to their narrow access to food. Food insecurity, under nutrition and poor health status is also a common character of elderly people in rural Bangladesh. This dietary imbalance reflects inadequate domestic production of non-cereal foods (pulses, oilseeds, fruits, meat, milk and eggs), low incomes, food preferences and lack of nutrition knowledge. Moreover, the general health and sanitary environment and caring practices compound the problem of translation of food consumption into nutrients, contributing to poor nutritional result.

The dietary balance is particularly important for young children and adolescent girls, who need nutrients for growth, and for pregnant and lactating women. Nutrition, comprising adequate quality and quantity of food intake and reduction of illness is a basic human right and is an essential input for economic development in Bangladesh. According to the latest *Bangladesh Demographic and Health Survey*, stunting among children declined modestly, going from 43 percent in 2007 to 41 percent in 2011 (NIPORT et al. 2012). A nationally representative survey (State of Food Security and Nutrition in Bangladesh, 2011) estimates that nearly 45 percent of households in Bangladesh suffer from some form of food insecurity. The prevalence of inadequate maternal dietary diversity is nearly 62 percent whereas that of chronic malnutrition among children is 45 percent (HKI and JPGSPH. 2011). Rah et al. (2010) find that good dietary diversity is strongly negatively associated with stunting among children aged less than five years.

Health and well being of any individual depend on different factors like physical, social, psychological and nutritional factors. Nutritional status is the physiological state of an individual, which results from the relationship between nutrient intake and requirements and from the body's ability to digest, absorb and use these nutrients. Nutrition plays an important role in the health and development of an individual (UNICEF, 2011). The adequate nutritional needs of an individual ensure tissue renewal, maintaining a good physical and mental health, but also reduce the risk of non communicable diseases related to food (C.D.U, 2009). Dietary intakes not meeting the needs of the body are the root cause of malnutrition. Malnutrition defines to all deviations from adequate nutrition, including under nutrition, over nutrition and specific

deficiencies (or excesses) of essential nutrients such as vitamins and minerals. Poverty is the root cause of malnutrition. Most micronutrient deficiencies primarily influence poor and disadvantaged households whose members cannot produce or procure adequate food, who live in marginal or unsanitary environments without access to clean water and basic services, who lack access to appropriate education and information, or are otherwise socially disadvantaged.

Malnutrition in women and men can result in decreased productivity, slow recovery from illnesses, increased susceptibility to infections, and a heightened risk of adverse pregnancy outcomes. However, in many developing countries, under- and over nutrition are occurring simultaneously among various population groups. This phenomenon is referred to as the “double burden” of malnutrition. Improving nutrition contributes to productivity, economic development, and poverty reduction by improving physical work capacity, cognitive development, school performance, and health by reducing diseases and mortality (Hunt,2005).Thus nutrition is a keystone that affects and defines the health of all people, rich and poor. Conversely, malnutrition makes us all more vulnerable to disease and premature death.

1.2. Statement of the problem

Bangladesh is small country having a huge population size of 16.10crore. Population growth rate is 1.37 (BER 2018). The country is facing massive problem to provide sufficient to food to its population. Though after liberation war of 1971, the economic situation of the country is improving day by day, yet 24.3% of its’ population live under poverty line (HIES 2016). So this large portion of the population cannot reach the minimum dietary energy requirement (2122 kcal/capita/day) as well as required nutrition. As a result most of the country’s population face food insecurity and so their nutritional status remains poor. Low intake of healthy foods and micronutrients is associated with worse health status and immunity system. If people do not have the right balance of nutrients in their diet, their risk of developing certain health conditions increases. Good nutrition is important to reduce the risk of chronic diseases and promote the overall health. Differentiate the poverty gap between the poorest district (Kurigram with 70 percent poverty rate) and the well off district (Narayanganj with a poverty rate of only 2.6 percent) in Bangladesh (Ahmed 2018). Certainly there is difference between nutritional status of those two districts. That’s why the researcher selected these two districts to investigate

household food security and nutritional status of people living in the poorest district and least poor district of Bangladesh. Thus the researcher undertook this piece of study entitled **“HOUSEHOLD NUTRITIONAL STATUS AND ITS ASSOCIATION WITH ILLNESS OF TWO SELECTED DISTRICTS IN BANGLADESH”**

1.3. Key Research Questions

The purpose of the study was to find out the answers of following questions:

- i. What is the level of nutritional status?
- ii. What is the proportion of malnutrition in different dimension?
- iii. Is there any association between illness and nutritional status of the study area?
- iv. What type of illness are the people suffering from in the study area?

1.4. Objectives of the study

- i. To determine the level of nutritional status
- ii. To identify illness and chronic illness in different dimension
- iii. To find out the association between illness and nutritional status of the study areas

1.5. Justification of the study

Research studies on household nutritional status and its association with illness of two selected districts in Bangladesh are very scarce in number. Moreover those studies focused on food insecurity and malnutrition status of different particular group such as women, children etc. whereas the present study will focus on food security along with nutritional status and its association with illness of overall population regardless of male, female, children, adolescent boys and girls of two selected districts in Bangladesh. The previous studies were not carried out to compare the association between nutritional status and illness in two districts of Bangladesh but the present study will be carried out to see this comparison between two particular district of Bangladesh. Keeping in view the dearth of information concerning malnutrition, food security status and health status of the people with the aim to reduce illness and improve nutritional status in our country, the present study will be carried out to fill the gaps.

The study would enable the policy makers, different NGO who work for the poor to prepare plans and develop projects/schemes to improve livelihood standards of poor and vulnerable

people that in turn helpful for the development of the economy. The study help the concerned authority easily reach to the poor people to improve their nutritional and health status.

1.6. Limitation of the study

- i. Though there are 64 districts in Bangladesh, only two districts named Kurigram and Narayongonj are selected.
- ii. No primary data were used in this study. All data were secondary data.
- iii. All the data were collected from HIES report 2010. So updated data were not used.
- iv. The respondents tend to give information relating to their household consumption items in their respective local units that may not exactly match with the official standard units.

1.7. Statement of the Hypothesis

In accordance with the theoretical discussion, the following hypothesis are presented as a basis for examining the extent to which some selected demographic characteristics and their nutritional status have an effect on the probability of suffering from chronic illness and illness:

- The family household size, gender, age and education of respondent, have an effect on the probability of suffering from chronic illness and illness.
- The nutritional status of the household members in the selected two districts bears an effect on the probability of suffering from chronic illness and illness.

1.8. Outline of the Study

This thesis contains a total of six chapters which have been organized in the following sequence. Chapter 1 includes introduction. The review of literature is presented in Chapter 2. Data and methodology of the relevant study is discussed in Chapter 3. Chapter 4 presents background characteristics of the surveyed households. Chapter 5 explains health status and its determinants. Chapter 6 represents conclusions and recommendations.

CHAPTER II

LITERATURE REVIEW

This chapter presents the views of other authors and the findings of other studies on the topics on nutritional status and its association with illness. In Bangladesh only a few studies have so far conducted related to the present research. Moreover this study was conducted based on secondary data. Therefore, this section provides a brief review of the studies related to the present study that was conducted in Bangladesh and abroad.

However, the literature reviews were presented in the following three major sections:

First section: Reviews on nutritional status

Second section: Reviews on the relationship between nutritional status and illness

Third section: The conceptual framework of the study

2.1 Reviews on nutritional status

Ijarotimi *et al.*, (2018) showed from a study that high prevalence of household food insecurity among the respondents' families, which varied between mildly, moderately and severely, while nutritional outcome of the respondents equally showed high prevalence of underweight and emerging prevalence of overweight and/or obesity among adolescents.

Betebo *et al.*, (2017) found from a study that malnutrition is still an important major public health problem among children in their selected area.

Ahmed (2016) found that higher frequency of anemia and some micronutrient deficiency in Manipuri community of Bangladesh.

Fanzo J *et al.*, (2016) showed that children and adolescents are often affected by household food insecurity through both nutritional and non-nutritional pathways despite parental intentions or beliefs to the contrary.

Unisa *et al.*, (2016) found that food insecurity level has a significant negative relationship with the nutrition level of under two children. Moreover, under two children's nutritional status is very much dependent on the mother's food intake during pregnancy and breastfeeding. Food security is essential for the betterment of nutritional status of children.

Anna D'Souza and Sharad Tandon (2015) found from a study that many women and children in rural Bangladesh are undernourished in households in which their male head of household is adequately nourished, based on an analysis of the Bangladesh Integrated Household Survey.

Brhane *et al.*, (2014) revealed from a study that the existence of unacceptably higher prevalence of malnutrition (especially stunting) among children aged under five in their study area.

Bangladesh Bureau of Statistic (2013) gives prevalence's of stunting, wasting and underweight as 41.2%, 13.4% and 34.4%, respectively.

Medical Gazzette (2012) defined that nutrition is a core pillar of human development and concrete large scale programming not only can reduce the burden of under nutrition and deprivation but also advance the progress of nations.

Mudambi (2012) stated that nutritional status is the state of our body as a result of the foods consumed and their use by the body. Nutritional status can be good, fair or poor.

Uddin *et al.*, (2012) showed that Bangladesh, a densely populated lower-middle income country which often encounters natural calamities resulting in around 40% of its households being food insecure.

Alam *et al.*, (2011) revealed from a study that food insecurity is an important risk factor associated with poorer nutritional status among rural older persons and there was gradual increase of nutritional status of rural elderly with the improved status of rural elderly.

Kuku *et al.*, (2010) identified that household food insecurity is one determinant of nutritional status of children especially in developing countries.

Rahman *et al.*, (2009) revealed that the overall nutritional status of Bangladeshi children is very poor and more than 56% pre-school children in this country are in some form of malnutrition.

Hassan (2007) identified from a research study that overall only 12.5% of the visited households met the required daily protein and iron intake. with respect to protein, only 8.3% of the household visited from rural areas were found to be food secure of the households visited in the urban areas, 25% were found to be food secure .This means that there are more food secure households in urban than rural areas.

WHO (2005) revealed that the children were suffering from higher rate of micronutrient deficiencies including vitamin-A, iron, iodine and zinc deficiency in Bangladesh.

Cook *et al.*, (2004) found that food insecurity may lead to insufficient dietary intake that can lead to nutrition deficiencies among children.

Srilakshmi (2002) stated that nutrition has been defined as the food at work in the body. Nutrition includes everything that happens to food from the time it is eaten until it is used for various functions in the body.

2.2. Relational between nutritional status and illness

Rahman *et al.*, (2018) showed that Lack in nutritional balance intake food along with minimum physical activities and pitiable socio-economic situation of the adolescent girls may be affected their future unexpected problem during motherhood and hamper their cognitive development. The nutritional status of the adolescent girls should not be over looked and nutrition education programs need to be implemented to improve the nutritional status.

Jemal *et al.*, (2016) revealed from a study that household food insecurity was significantly associated with stunting, but not with underweight and wasting among children studied. The study also revealed emerging prevalence of overweight and/or obesity among study subjects. The finding implies nutrition interventions targeting children need to address household food security.

Hakim *et al.*, (2016) found from a study that malnutrition problem is multi dimensional having different linkages to social, economic and demographic conditions. The street children are in physical, mental, social and spiritual health perils and they are between the devil and the deep sea in front of different violence, abuse and other social discrimination. Along with the

government, different national and international NGOs child rights organizations and human rights organizations should speed up with their level best educational, health, nutrition and WASH programs with a view to attain their splashing childhood.

UNWFP (2015) revealed that Household food insecurity (HFI) happens when people do not have, at all times, physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life.

Talukder *et al.*, (2015) found from a study that the problem of malnutrition is multifaceted and has various links to socioeconomic and demographic factors.

Trude *et al.*, (2015) identified that inadequate nutrition is related to several chronic diseases that greatly impact morbidity, mortality, and quality of life.

Kaewpitoon *et al.*, (2015) indicated that elderly age group had under-and over-nutritional status. Carbohydrate consumption was needed to improve. Meanwhile, behavior of some elderly group regarding to food consumed that related to liver fluke infection is poor, therefore, health education pertaining good nutrition is need required.

Rahman (2015) showed that nutritional status is one of the significant health indicators to evaluate a country's health standard and morbidity pattern.

Owais *et al.*, (2015)observed that more food-secure households employ improved infant feeding practices. It was also noted that interventions aimed at improving infant nutritional status need to focus on both complementary food provision and education.

Nutricional *et al.*, (2014) found that the need to plan programs of nutritional education in the universities in order to increase the understanding of nutritional aspects that will be of help in food and life style choices, providing health and well-being to the students and permitting them to recognize the fundamental importance of the diet and the context experienced in order to promote and preserve their own health and the health of the population.

Rahman *et al.*, (2014) observed in a study that the overall nutritional status of the population were below acceptance which have been expressed through various indices. The per capita

dietary intake was very poor, that compounded with imbalanced diet with poor micronutrient intake leading to malnutrition.

Irving *et al.*, (2014) found a positive relationship between food insecurity and hypertension after adjusting for selected characteristics.

Chinnakaliet *al.*, (2014) found that around half of the monthly income was spent on purchasing food and, even then, there was a high prevalence of food insecurity. It might be due to the large family size where the amount spent on food would have been insufficient to meet the food requirements of all the family members. Although the main part of the income was spent on the food procurement, ironically, the quality of the food consumed was compromised as respondents reportedly consumed more food of cheap carbohydrate sources and relatively little of pulse and fruits.

Perez-Escamilla (2013) found that food deprivation and poor dietary quality in childhood influence children's growth, psycho-emotional, social and cognitive development, and overall health.

Saaka *et al.*, (2013) identified that a major public health problem in developing countries as millions of households live in poverty and have difficulties in accessing nutritious food.

Drimie *et al.*, (2013) showed that poor households are more likely to suffer from poor food access and poor dietary diversity which in turn affects the nutritional status of young children as these households may have wasted and/or stunted children as well as obese children which is affecting the majority of the population in South Africa.

WHO (2013) revealed that nutritional status of children under the age of five is a good proxy indicator of a household's nutrition status and health over a sustained period.

Battersby *et al.*, (2013) showed that children's nutritional status is related to household food security, socioeconomic status, and local context. Any limitations in household income and access to food can result in different forms of nutritional status in children as households may decrease dietary quality and quantities to cope with food shortages.

Coleman-Jensen *et al.*, (2013) found that the nutrition deficiencies during pregnancy, lactation can contribute to inappropriate growth attainment such as stunting and underweight among young children.

Bashir *et al.*, (2013) revealed that livestock assets, education, no. of income earners in a household have a positive impact while family size and household heads' age had a negative impact on food security.

Sullivan *et al.*, (2013) found that inadequate intake and inappropriate food choices can be modified, together with self-feeding impairment, which can help in improving their nutritional status.

Corsi *et al.*, (2011) found from a study that very limited, though increasing evidence of obesity among women living in Dhaka region and other urban centers of the country. In the context of Bangladesh where many people struggle to get adequate calories, obesity has been considered a much less serious problem than insufficient calorie intake.

FAO (2011) revealed that access to sufficient quantity and variety of safe food is a precondition to a healthy life.

Osei *et al.*, (2010) in Kailali District of Nepal To assess the relationship between household food insecurity and malnutrition among children aged 6 to 23 month .their main finding was that there was no significant association between household food insecurity and measures of under nutrition among children in this age group. On the other hand, lower household socioeconomic status was associated with both household food insecurity and childhood stunting, underweight, and anemia.

Rah *et al.*, (2010) found that good dietary diversity is strongly negatively associated with stunting among children aged less than five years.

Black *et al.*, (2008) found that there is substantial evidence that malnutrition, particularly micronutrient deficiencies, is a contributing factor in up to 35% of mortality in children less than 5 years of age and growing body of evidence exists that malnutrition plays a similar role in maternal mortality.

Kuperminc *et al.*, (2008) found that Impaired nutritional status is a prime contributor to poor growth.

Bernell *et al.*, (2006) showed that the household head has ill health, this household is more likely to be food insecure.

Baig-Ansari *et al.*, (2006) found that food insecurity is related to an inadequate dietary intake and increased levels of stunting and underweight.

Bener *et al.*, (2006) found that Overweight and obesity are among the most prevalent nutritional problems in developed and developing countries. They are risk factors of health problems such as cardiovascular diseases, diabetics, dislipidemia, somecancers.

Haseen (2005) found that more than 50 percent of women from ultra poor households have been facing chronic energy deficiency, while 48 percent have, anaemia. Maintaining a balanced diet with adequate variety of food is simply beyond their reach.

Bloem *et al.*, (2004) found more than 20 percent of slum women in Dhaka suffering chronic energy deficiency (BMI < 18.5); in Chittagong and Khulna about 35 percent of slum women suffered chronic deficiency.

Ramakrishnan *et al.*, (2004) found that in women, it also results in fetal malnutrition and low birth weights of babies.

Yousafzai *et al.*, (2003) showed that among low-income countries, consequent micronutrient deficiencies further had a negative impact on the child's nutritional status and health.

Polnay (2002) revealed from a study that Adolescents have been found to have the highest prevalence of any age group of an unsatisfactory nutritional status.

Aurélio *et al.*, (2002) found that the chronic changes in food habit can lead to malnutrition, dehydration, aspiration, and pneumonia.

Matheson *et al.*, (2002) indicated that growth failure in food-insecure children, and it is unlikely that food-insecure children are chronically not meeting their energy needs. Nonetheless, food-

insecure children may experience periodic food restrictions that may cause nutrient deficiencies and psychological distress.

Wasito *et al.*, (2001) found that food insecurity at the household level involve the well-known association between household food insecurity and poor health status, inadequate food intake, lower cognitive and academic attainment, and psychosocial problems among children.

Tulchinsky *et al.*, (2000) found that Nutrition is one of the most important single factors for the health of the individual or the community, and is consequently a fundamental issue in modern public health.

2.3. Conceptual framework of the study

Conceptual frameworks are often visual in nature and allow the readers to understand the flow of research. In other words, the conceptual framework is the researcher's understanding of how the specific variables in his/her study connects with each other. Considering these issues, the conceptual framework of the study is presented in figure 2.1

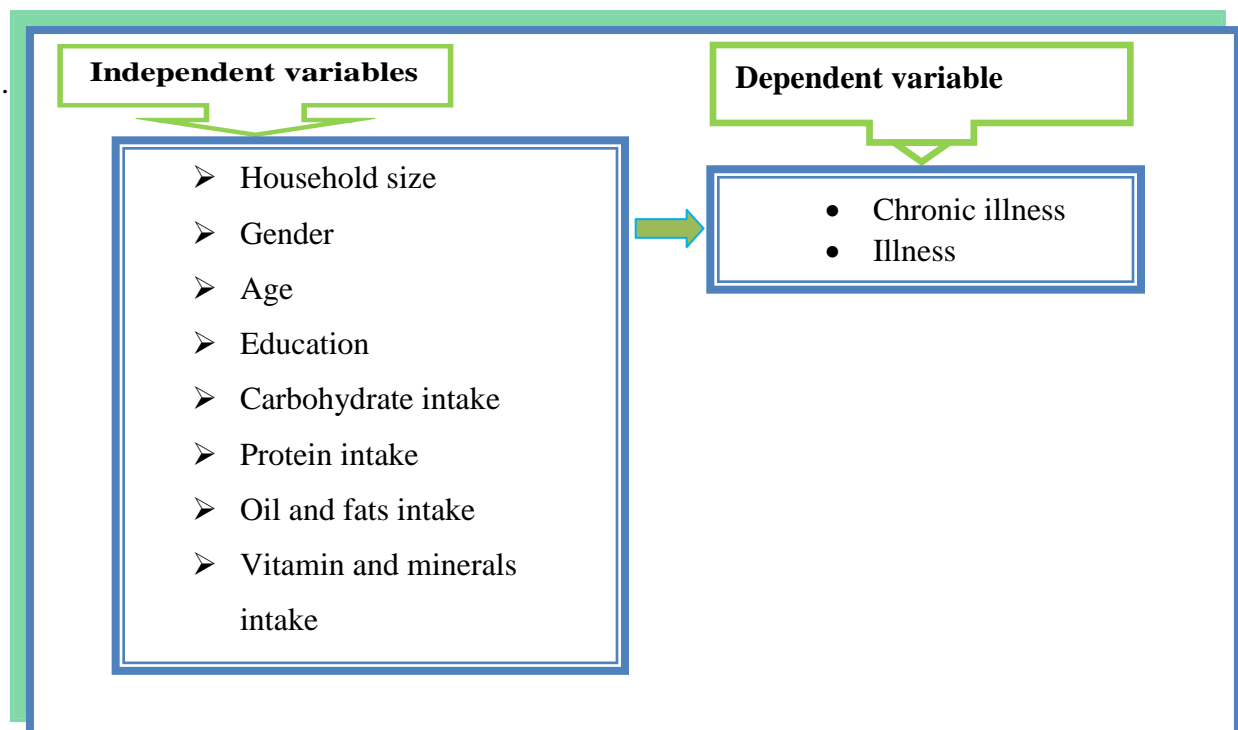


Figure 2.1: The conceptual framework of the study

CHAPTER III

METHODOLOGY

Methodology is simply the means by which a researcher collects and analyzes data. Research data refers to any information that has been collected, observed, generated or created to validate original research findings. Thus, how researcher arrive at results is just as important as the results alone. Research methodology is the important part of research paper as it can be used as a validation point for research. This chapter describes the actions to be taken to investigate the research problem and the rationale for the application of specific procedures or techniques used to identify, select, process, and analyze information applied to research study. The methodology section answers two main questions: How was the data collected or generated? And, how was it analyzed?

3.1 Source of Data

The researcher used secondary data in this study. The data were collected from data sets of “Household Income and Expenditure Survey (HIES)-2010” which was primarily conducted by Bangladesh Bureau of Statistics (BBS), Statistics Division, Ministry of Planning, Government of Bangladesh. The HIES data series generated by the BBS is considered to be the main data source for estimation of poverty and its correlates in Bangladesh. In HIES-2010, 12240 households were selected where 7840 from rural area and 4400 from urban area. In present study the researcher selected 100 households from Narayanganj and 120 households from Kurigram for research purpose. The data were collected during the period from 1st February, 2010 to 31st January, 2011.

3.2 Analytical Tools and Techniques

In this study several statistical tools and techniques, both descriptive and inferential were used to analyze the data. Specially, Binary Logistic Regression Model was applied to analyze the data for the study. Besides, some descriptive tools and techniques such as measurement of central tendency and dispersion, tabulation, cross-tabulation, graphing etc. were also used in the study.

3.2.1 Multiple Binary Logistic Regression Model

When the dependent variable is dichotomous, logistic regression model is widely used not only to identify risk factors but also to predict the probability of success. The simple linear logistic regression model can be expressed as $\log_e \left[\frac{\pi(X_i)}{1 - \pi(X_i)} \right] = \beta_0 + \beta_1 X_i$

Where, the quantity $\pi(X_i) = E(y_i = 1 | X_i)$ represent the conditional probability that Y=1 given X and expressed as $\pi(X_i) = \frac{e^{\beta_0 + \beta_1 X_i}}{1 + e^{\beta_0 + \beta_1 X_i}}$.

If one consider a collection of p independent variables denoted by the vector $X' = (X_1, X_2, \dots, X_p)$ then the multiple logistic regression model is given by the equation as

$$\log_e \left[\frac{\pi(X_i)}{1 - \pi(X_i)} \right] = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_p X_{pi}$$

X₁= Household size

X₅= Carbohydrate

X₂= Gender

X₆= Protein

X₃= Age

X₇= Oil and fats

X₄= Education

X₈= Vitamin and minerals

3.3 Statistical Software

In this study, the entire analysis was done in personal computer. A well-known statistical package named SPSS (Statistical Package for Social Science) Windows version 21 was used for analysis. This program produced lists, frequencies; cross tabulations, and Multiple Binary Logistic Regressions Model (BLRM). Variables were recoded and selected using defined variables, if statements, mathematical and logical operations, complex report formatting and programming language are related to the analysis. Besides SPSS package program other well-known packages viz., MS Word, MS Excel were also used for various purposes like report writing and for graphical representation.

3.4 Dependent and Independent Variables

Before executing any statistical analysis, it is important to check the data very carefully and selecting dependent and independent variables carefully is also important. In this study, only two dependent variable and 8 independent variables are used for binary logistic regression model (BLRM). The construction of variables and their categories are discussed below.

Dependent variable

The study measured determinants of nutritional status. Chronic illness and illness were used as dependent variable of Binary Logistic Regression Model (BLRM). In Binary Logistic Regression Model (BLRM), dependent variable (Chronic illness and illness) is used as a binary variable (0 and 1). Categories of dependent variable are given below:

Chronic illness and/or illness = 0; Code-0 was used when respondent suffered from chronic illness and/or illness

1; Code-1 was used when respondent was not suffered from chronic illness and/or illness

Independent variables

The study included total of 8 independent variables for multiple binary logistic regression models. The selected independent variables are household size, gender, age, education, carbohydrate, protein, oil and fats and vitamin and minerals. The value of these variables were taken from data sets of “Household Income and Expenditure Survey (HIES)-2010”.

CHAPTER IV

BACKGROUND CHARACTERISTICS OF THE SURVEYED HOUSEHOLDS

Prior to performing any statistical analysis it is critical to know the background characteristics of the study population or nature of the data. So as to study these characteristics of different variables, it is important to concentrate on the percentage dissemination of the considered variables. The percent an endeavor has been made to age distribution exhibits the pattern of variables and perceptions in various groups. In this chapter, discuss some significant characteristics viz., socio-demographic and economic characteristics of the households are crucial in portraying the sort of subjects engaged with the study. Their profile can provide the delimitation of the study so that whatever findings brought out of the study can be portrayed within the scope just of this profile. So, to have insights household nutritional status and its association with illness in the surveyed areas, exploration of these characteristics is essential. This chapter has described, analysed and explored the profiles of the study households in terms of socio-demographic characteristics.

4.1 Socio-Demographic characteristics

The socio-demographic profiles of the households have been analyzed in terms of characteristics of the household members.

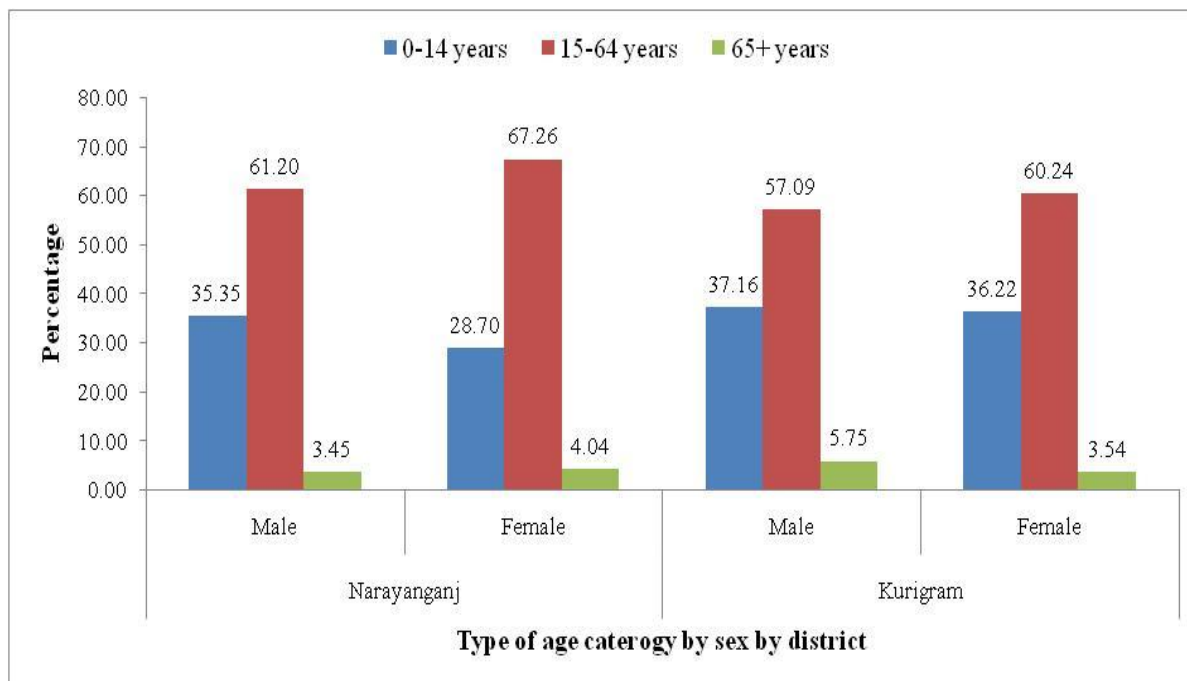
4.1.1 Characteristics of the Household Members

This subsection provides the characteristics of household members, which are useful in distinguishing socio-economic behavior of the households. The characteristics of household members have been analyzed in terms of their age, sex, marital status, education status, occupation, and household size & composition and are shown in Table 4.1, Table 4.2, Table 4.3, Table 4.4 and Table 4.5 respectively.

Age and sex

The 220 study households from selected from two districts (namely Narayanganj and Kurigram) of rural Bangladesh had a total Sample of 970 of which Narayanganj and Kurigram having 455

and 515 Sample respectively. The sex percentage based on age group of the two districts is presented by the following figure:



Source: Analysis from HIES data,2010

Figure 4.1: Distribution of household members on the basis of age and sex

The distribution of household members according to sex indicates that among 0-14years old 35.35% were male and 28.70% were female in Narayanganj compared to 37.16% were male and 36.22% were female in Kurigram (Fig 4.1). The figure also shows that among 15-64years old 61.20% were male and 67.26% were female in Narayanganj compared to 57.09% were male and 60.24% were female in Kurigram. Further figure presents that among more than 65years old 3.45% were male and 4.04% were female in Narayanganj whereas 5.75% were male and 3.54% were female in Kurigram. The figure indicates that the young people is higher in Narayanganj than those of Kurigram.

Figure 4.1 can be illustrated by the table 4.1. It was shown from the table that the average age of the male of the surveyed households was estimated at 26 years and of the female 27 years in Narayanganj district whereas in Kurigram the average age of the male 27 years and of the female 26 years.

Table 4.1. Distribution of household members on the basis of age and sex

Age group	Narayanganj				Kurigram				Total
	Male	%	Female	%	Male	%	Female	%	
0-14 years	82	35.35	64	28.70	97	37.16	92	36.22	335
15-64 years	142	61.20	150	67.26	149	57.09	153	60.24	594
65+ years	8	3.45	9	4.04	15	5.75	9	3.54	41
Total	232	100	223	100	261	100	254	100	970
Average \pm SD	26 \pm 19		27 \pm 18		27 \pm 21		26 \pm 19		
Sex Ratio	104 male per 100 women				103 male per 100 women				
Child dependency ratio	50				63				
Dependency Ratio	56				71				
Old dependency ratio	6				8				

Source: Analysis from HIES data,2010

Table 4.1 indicates that in Narayanganj district, the sex ratio was found out 104 male per 100 women whereas it was found out 103 in Kurigram. The dependency ratio of the study population was estimated at 56% in Narayanganj compared to 71% in Kurigram. In Narayanganj district, the child dependency ratio is estimated at 50% and old dependency ratio 6% while in Kurigram the child dependency ratio is estimated at 63% and old dependency ratio 8%. From the table 4.1, the dependency ratio in Kurigram (71%) district is higher than the dependency ratio in Narayanganj (56%). So, the people of Kurigram are more vulnerable than the people of Narayanganj.

Marital status

Marital status of the selected household in the selected two districts is presented by the following table:

Table 4.2: Marital status (age > 15 years)

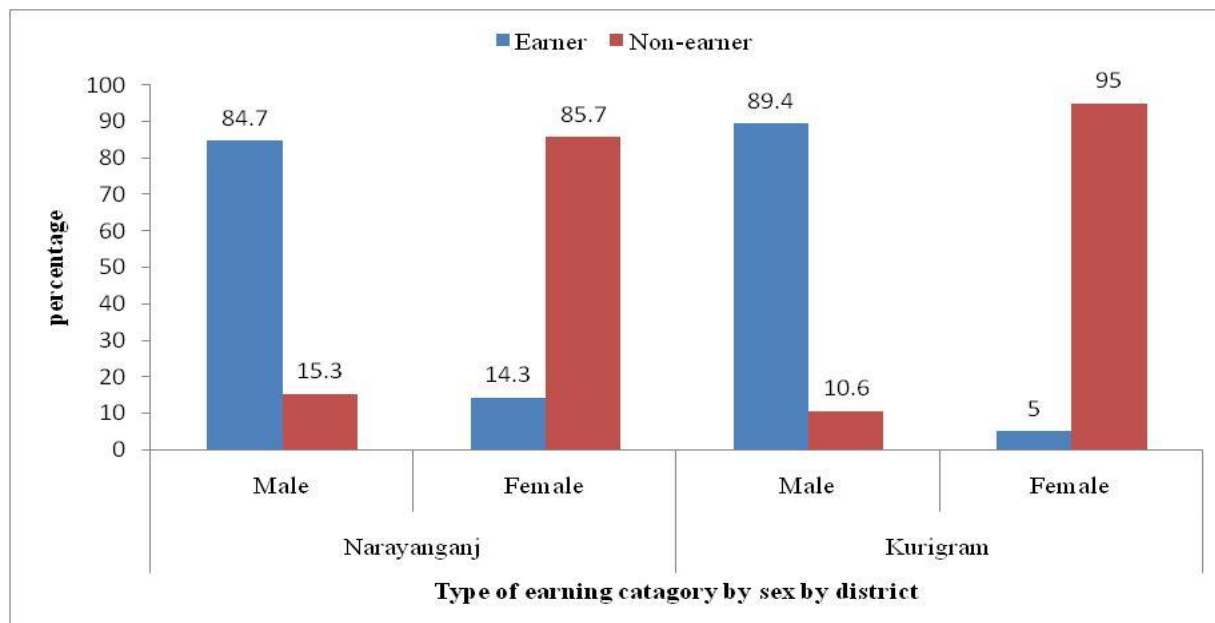
Marital status	Narayanganj				Kurigram				Total
	Male	%	Female	%	Male	%	Female	%	
Married	107	74.3	120	77.9	126	78.8	135	83.9	488
Unmarried	36	25	14	9.1	31	19.4	5	3.1	86
Widow	1	0.7	19	12.3	3	1.9	18	11.2	41
Divorced	0	0	1	0.6	0	0.0	3	1.9	4
Total	144	100	154	100	160	100	161	100	619

Source: Analysis from HIES data,2010

In Narayanganj, the marital status of the household members in case of male aged 15 years or more (at the time of the survey) indicates that about 74.3% were married, 25% were unmarried and 0.7% were widow and in case of female aged 15 years or more indicates that about 77.9% were married, 9.1% were unmarried, 12.3% were widow and 0.6 divorced. In Kurigram district, the marital status of the household members in case of male aged 15 years or more (at the time of the survey) indicates that about 78.8% were married, 19.4% were unmarried and 1.9% were widow and in case of female aged 15 years or more indicates that about 83.9%, 3.1%, 11.2% and 1.9 were married, unmarried, widow and divorced respectively (Table 4.2). From the table, it can be said that in both district female are more vulnerable than men which portrays the same scenario in the whole country.

Occupational status

The type of occupation of the employed household members has a link to and bearing on the economic condition of the respective household. The Occupational status of the household members in the selected two districts is described below:



Source: Analysis from HIES data,2010

Figure: 4.2.Earning status by sex (age > 15 years)

In this figure shows that, in Narayanganj, 84.7% male and 14.3% female were involved with earning while 15.3% male and 85.7% female were not involved with earning. Again in Kurigram, 89.4% male and 5% female were involved with earning while 10.6% male and 95% female were not involved with earning. Therefore, it can be said that, the female of Kurigram district are less involved with earning than the female of Narayanganj.

Figure 4.2 can be illustrated by the table 4.3.1 which both number and percentage of Earner and Non-earner person of selected household members.

Table.4.3.1.Earning status by sex (age > 15 years)

Earning status	Narayanganj				Kurigram				Total
	Male	%	Female	%	Male	%	Female	%	
Earner	122	84.7	22	14.3	143	89.4	8	5	295
Non-earner	22	15.3	132	85.7	17	10.6	153	95	324
Total	144	100	154	100	160	100	161	100	619

Source: Analysis from HIES data,2010

Table 4.3.1 indicates that in Narayanganj district the number of earning male person is 122 and female person is 22 while Kurigram district is 143 and 8. The table also shows that the Narayanganj area non-earning male person is 22 and female is 132 while Kurigram is 17 and 153. In both district non-earner female person is higher than male person.

Number of earning people in the rural and urban area as well as source of their occupation in the selected two districts is presented below by figure and table:



Source: Analysis from HIES data,2010

Figure: 4.3. Distribution of earning household members in rural and urban area

Figure 4.3 shows that, in Narayanganj district, 98% people works in rural area and 2% people works in urban area. Its also indicate that 5% people work in urban area and 95% people working in rural area in Kurigram district. In case of Narayonganj district more people work in rural than those of Kurigram.

Figure 4.3 can be illustrated by the table 4.3.2.It was indicated that in Narayanganj, 8.70 people involved with agricultural activities and among them 14.23 are day labor and in Kurigram 66.88% people involved with agricultural activities and among them 63.81% are day labor. So it may be concluded that the economic status of the people of Kurigram is lower than the people of Narayanganj.

Table.4.3.2 Occupational category of two districts

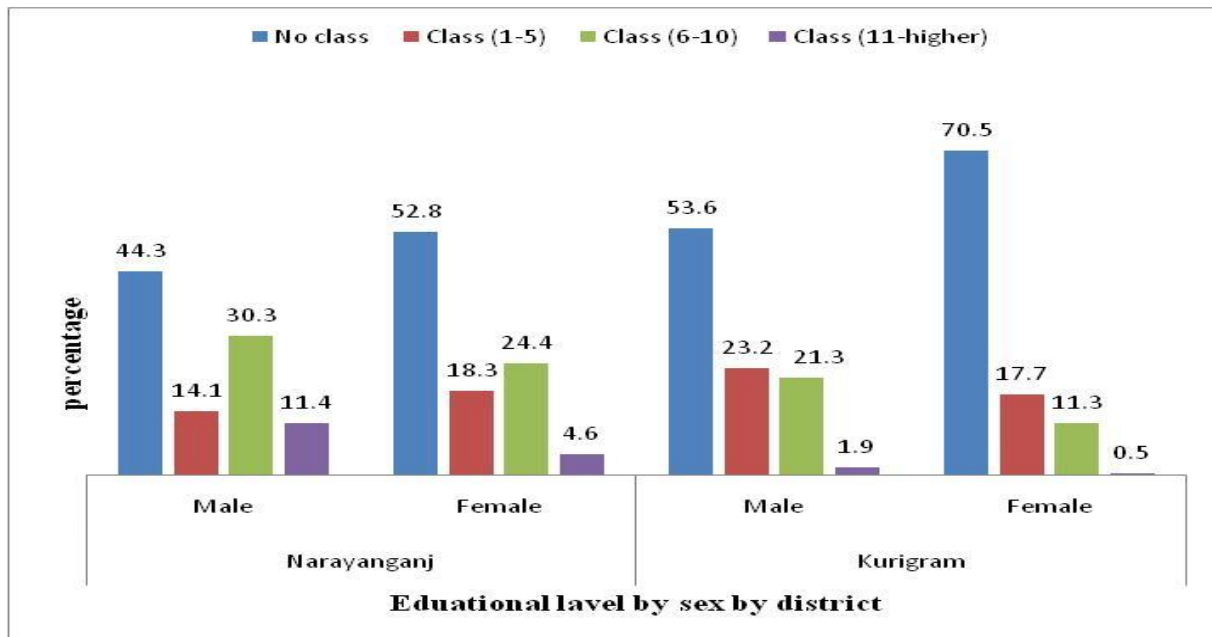
Occupational category	Narayanganj		Kurigram		Total
	No of people	%	No of people	%	
Rural	157	97.52	149	94.90	306
Urban	4	2.48	8	5.1	12
Total	161	100	157	100	318
Agriculture	14	8.70	105	66.88	119
Non-agriculture	147	91.30	52	33.12	199
Total	161	100	157	100	318
Agriculture:					
Day labor	2	14.23	67	63.81	69
Self employed	12	85.71	38	36.19	50
Total	14	100	105	100	119
Non-agriculture:					
Day labor	47	31.97	10	19.23	57
Self employed	40	27.21	38	73.08	78
Employee	60	40.82	4	7.69	64
Total	147	100	52	100	199

Source: Analysis from HIES data,2010

Again in case of non-agricultural activities, 31.97%, 27.21% and 40.82% people are day labor, self employed and employee in Narayanganj and in Kurigram, 19.23%, 73.08% and 7.69% are day labor, self employed and employee respectively. So it may be concluded that, in case of non-agricultural activities the people of Kurigram are more self employed than Narayanganj.

Educational Status

Education is a significant factor to determine the lifestyle and status of an individual in a society. Several studies indicate that educational attainment has strong effects on demographic and health behavior. Literacy implies the capacity to read and write and its rate is expressed in percentage. Educational level according to sex in two districts is depicted by the following figure:



Source: Analysis from HIESdata,2010

Figure:4.4 Educational Status by sex (age > 7 years)

In this figure show that in Narayanganj, about 44.3% male and 52.8% female were illiterate while in Kurigram, about 53.6% male and 70.4% female were illiterate. 14.1% male and 18.3% female had primary education, 30.3% male and 44% female had secondary education, 11.4% male and 9% female had higher secondary education in Narayanganj. The figure also indicate that 23.2% male and 17.7% female had primary education, 21.3% male and 11.3% female had secondary education, 1.9% male and .5% female had higher secondary education in Kurigram. It also indicate that, the more people of Narayanganj had attended higher secondary education than the people of Kurigram.

Figure 4.3 can be illustrated by the table 4.4 which shows illiteracy rate and comparison of overall educational level between the selected two districts.

Table.4.4. Educational Status by sex (age > 7 years)

Educational Status	Narayanganj				Kurigram				Total
	Male	%	Female	%	Male	%	Female	%	
No class	82	44.3	104	52.8	111	53.6	143	70.5	440
Class (1-5)	26	14.1	36	18.3	48	23.2	36	17.7	146
Class (6-10)	56	30.3	48	24.4	44	21.3	23	11.3	171
Class (11-higher)	21	11.4	9	4.6	4	1.9	1	.5	35
Total	185	100	197	100	207	100	203	100	792

Source: Analysis from HIES data,2010

The data presented in Table 4.4 indicate that, female of both district have low educational status than male. Overall educational status of both male and female of Narayanganj area was better than that of Kurigram area.

Household Size & Composition

Household Size & Composition of the selected household in the selected two districts is presented by the following table:

Table.4.5. Household Size & Composition (number of persons per household)

Number of family members	Narayanganj		Kurigram		Total
	No. of households	%	No. of households	%	
1	1	1	4	3.33	5
2	9	9	12	10	21
3	20	20	18	15	38
4	28	28	39	32.5	67
5	20	20	29	24.17	49
6	9	9	10	8.33	19
7	3	3	2	1.67	5
8	4	4	2	1.67	6
9	4	4	1	0.83	5
10 & above	2	2	3	2.5	5
Total	100	100	120	100	220
Average \pm SD	4.55 \pm 1.92		4.29 \pm 1.81		4.41 \pm 1.86

Source: Analysis from HIES data,2010

With respect to the composition of the households, this study found that in Narayanganj, the households 57% consisted of 4-6 members while in Kurigram the households 65% consisted of 4-6 members. In Narayanganj, 30% households consisted of 1-3 members and 15% consisted of 7 or more members. On the other hand in Kurigram district 28.33% and 6.67% the households consisted of 1-3 members and 7 or more members respectively.

Briefly it could be said that the number of household consisting of 4-6 member in Narayanganj was lower than that of Kurigram. And the number of household consisting of 7 or more members in Narayanganj was higher than that of Kurigram. However, the average family size of selected two district was almost same.

CHAPTER V

HEALTH STATUS AND ITS DETERMINANTS

Nutritional status is an important element for sound health and well being. Several studies have shown that people of food insecure households have poorer self-rated health, poorer mental and physical health, poorer oral health, greater stress, and are more likely to suffer from chronic conditions such as diabetes, hypertension and mood and anxiety disorders. Nutritional deficiency makes it difficult to manage existing chronic conditions such as diabetes, blood pressure, heart disease, cancer etc. Regarding the relationship between health status and food security, it may be sufficient to define good health as the ability to withstand the effects of exposure to illness and injury. The connection between nutritious food and health status is, from this perspective, fundamental, whether or not innate. Undernourishment and malnutrition are two conditions widely agreed to be the results of food insecurity. Nutritional deficiency worsen the effects of all diseases and can accelerate degenerative conditions. This chapter dealt with the health status and the responsible determinants for it and also explores the probability of risk of chronic illness and illness with household size, gender, age, education, intake of carbohydrate, protein, oil and fats and vitamin and minerals.

5.1. Population suffering of chronic illness

The distribution of population suffering from chronic illness in the two districts has been presented by following tables:

Table 5.1.1 Distribution of household members on the basis of whether suffering from chronic illness according to age category

Age Category (Years)	Narayanganj				Kurigram				Total			
	Suffered		Not Suffered		Suffered		Not Suffered		Suffered		Not Suffered	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Age less than equal 10 Years	1	0.9	109	99.1	0	0.0	144	100.0	1	0.4	253	99.6
Age greater than 10 Years	52	15.1	293	84.9	31	8.4	340	91.6	83	11.6	633	88.4
Total	53	11.6	402	88.4	31	6.0	484	94.0	84	8.7	886	91.3

Source: Analysis from HIES data,2010

In Nayaranganj district total household members for this study was 455. Among them the number of population not more than 10 years is 110 of which about 1% suffered from chronic disease and rest all of the people did not suffer from chronic disease. Again the number of population more than 10 years is 345 of which 15.1% suffered from chronic disease and 84.9% did not suffer from chronic disease.

On the other hand In Kurigram district total household members for this study was 515. Among them the number of population not more than 10 years is 144 of which no one suffered from chronic disease. Again the number of population more than 10 years is 371 of which 8.4% suffered from chronic disease and 91.6% did not suffer from chronic disease.

It can be concluded from Table 5.1 that in Narayanganj district more people (11.6%) suffered from chronic disease than those of (6%) Kurigram district.

Table 5.1.2 Distribution of household members on the basis of whether suffering from chronic illness

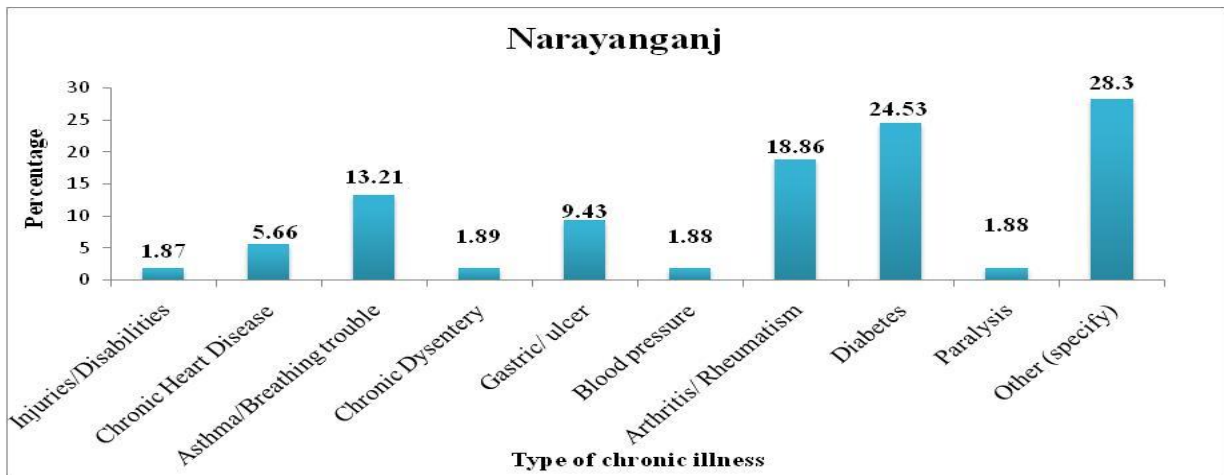
suffered chronic illness	Narayanganj		Kurigram		Total	
	No.	%	No.	%	No.	%
Suffered	53	11.65	31	6.02	84	8.66
Not suffered	402	88.35	484	93.98	886	91.34
Total	455	100	515	100	970	100

Source: Analysis from HIES data,2010

In Nayaranganj area total household members for this study was 455 which 11.65 % suffered from chronic disease and 88.35% people did not suffer from chronic disease. On the other hand in Kurigram area total household members for this examination was 515 which 6.02% suffered from chronic disease and 93.98% people did not suffer from chronic disease.

Table 5.1.2 indicated that the health position of Kurigram's people was higher than that of Narayanganj's people.

People in Nayaraganj were suffered from different chronic illness, some of which with suffering ratio are listed by the following figure-

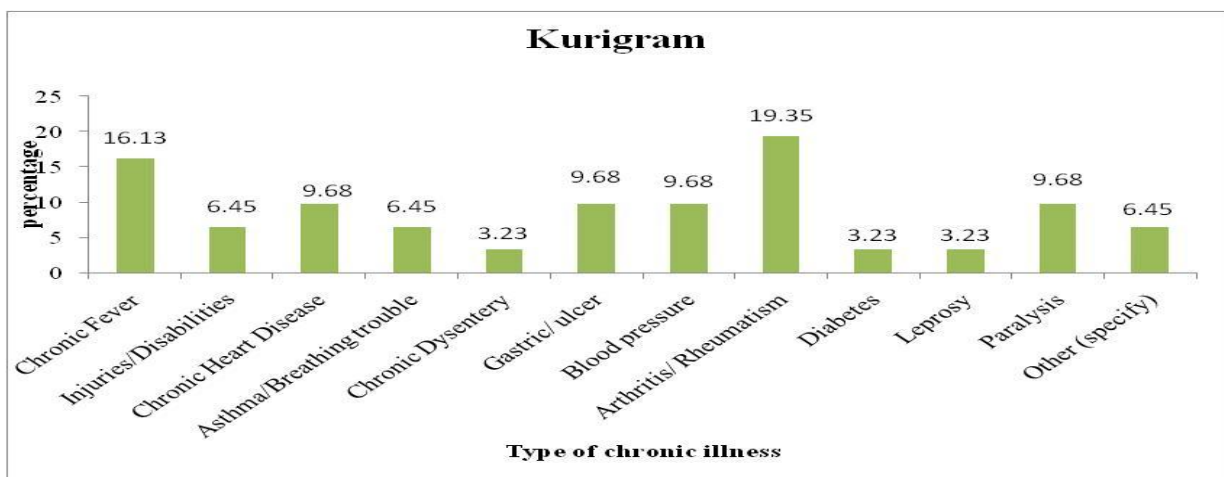


Source: Analysis from HIES data,2010

Figure 5.1: Distribution of household members on the basis of suffering from some selected chronic illness in Narayanganj

In Narayanganj area total household members for this study was 455 among them 53 people suffered from chronic illness. Figure5.1 showed that the highest proportion of the population (24.53%) suffered from diabetes while 18.86% of them suffered from arthritis/rheumatism, 13.21% suffered from asthma/breathing trouble, 9.43% suffered from gastric/ ulcer, 5.66% suffered from chronic heart disease and 28.30% suffered from some other (specific) disease.

People in Nayaraganj were suffered from different chronic illness, some of which with suffering ratio are listed by the following figure-



Source: Analysis from HIES data,2010

Figure 5.2: Distribution of household members on the basis of suffering from some selected chronic illness in Kurigram

In Kurigram area total household members for the present study was 515 among them 31 people suffered from chronic illness. Figure 5.2 showed that the highest proportion of the population (19.35%) suffered from arthritis/rheumatism whereas 16.13% suffered from chronic fever, 9.68% suffered from chronic heart disease, 9.68% suffered from gastric/ ulcer, 9.68% suffered from blood pressure, 9.68% suffered from paralysis, 6.45% suffered from injuries/ disabilities, 6.45% suffered from asthma/breathing trouble and 6.45% of the population other (specific) disease.

From the above two figures (5.1 & 5.2) it is found that, more people of Narayanganj area suffered from chronic illness than the people of Kurigram area. Diabetes rate among the people of Narayanganj is 24.53% compared to 3.23% among the population of Kurigram. Chronic fever rate among the people of Kurigram is 16.13% whereas the people of Narayanganj did not suffer from this disease. Asthma/breathing trouble rate was almost double among the people of Narayanganj compared to the people of Kurigram. Blood pressure rate was more than three times among the people of Kurigram than the people of Narayanganj. The average duration of chronic illness during the lifetime of the people was 76.88 months in Kurigram compared to 50.25 months in Narayanganj.

Table 5.1.3 Distribution of Household members on the basis of suffering from some selected chronic illness

Type of chronic illness	Narayanganj		Kurigram		Total	
	No.	%	No.	%	No.	%
Chronic Fever	0	0	5	16.13	5	5.95
Injuries/Disabilities	1	1.87	2	6.45	3	3.57
Chronic Heart Disease	3	5.66	3	9.68	6	7.14
Asthma/Breathing trouble	7	13.21	2	6.45	9	10.71
Chronic Dysentery	1	1.89	1	3.23	2	2.38
Gastric/ ulcer	5	9.43	3	9.68	8	9.52
Blood pressure	1	1.88	3	9.68	4	4.76

Table 5.1.3 Distribution of Household members on the basis of suffering from some selected chronic illness(con't)

Type of chronic illness	Narayanganj		Kurigram		Total	
	No.	%	No.	%	No.	%
Arthritis/Rheumatism	10	18.86	6	19.35	16	19.05
Diabetes	13	24.53	1	3.23	14	16.67
Leprosy	0	0	1	3.23	1	1.19
Paralysis	1	1.88	3	9.68	4	4.76
Other (specify)	15	28.30	2	6.45	17	20.23
Total	53		31		84	
Average duration of chronic illness (in month)	50.25		76.88		58.08	

Source: Analysis from HIES data,2010

Though more people suffered from chronic illness in Narayanganj district but their duration was lower whereas the number of people suffering from chronic illness was less but their duration was higher .

Table 5.1.4 Distribution of household number on the basis of whether suffering from chronic illness

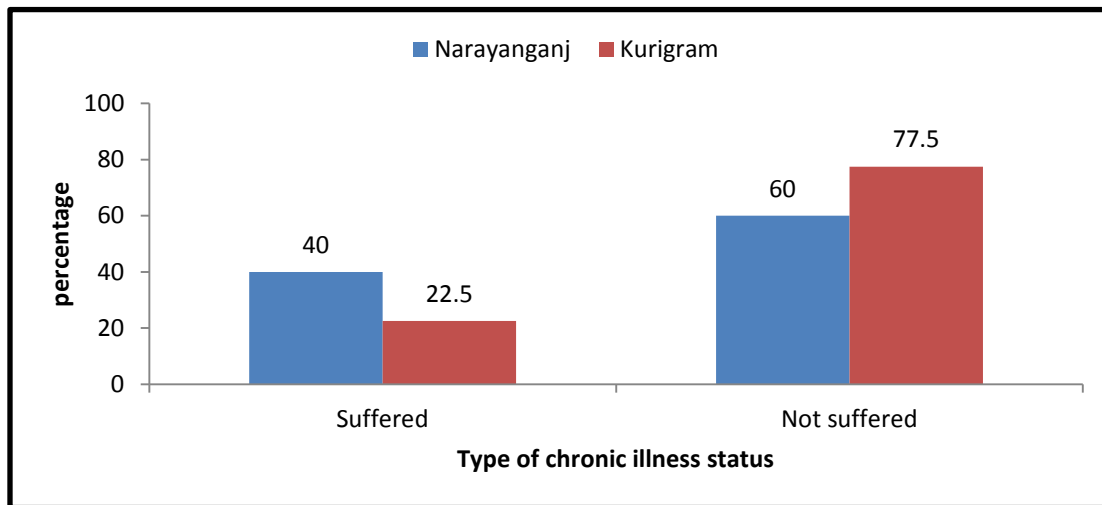
suffered chronic illness	Narayanganj		Kurigram		Total	
	No.	%	No.	%	No.	%
Suffered	40	40	27	22.5	67	30.45
Not suffered	60	60	93	77.5	153	69.55
Total	100	100	120	100	220	100

Source: Analysis from HIESdata,2010

In Nayaranganj district total selected household number for this study was 100 of which 40% suffered from chronic disease and 60% household did not suffer from chronic disease. On the other hand in Kurigram district total selected household number for this study was 120 which 22.5% suffered from chronic disease and 77.5% did not suffer from chronic disease.

Table 5.1.4 also indicated that the health position of Kurigram’s household was better than that of Narayanganj’s household.

The condition of chronic illness of the two districts can be summaries through the following figure-



Source: Analysis from HIES data,2010

Figure: 5.3 Distribution of household number on the basis of suffering from chronic illness

Figure 5.3 show that percentage of suffering from chronic illness in Narayanganj and Kurigram is 40% and 22.5% respectively. This figure also indicate that percentage of not suffering from chronic illness in Narayanganj and Kurigram is 60% and 77.5% respectively.

5.2. Household members suffering of illness

The distribution of population suffering from illness in the two district has been presented by following tables:

Table 5.2.1 Distribution of household members on the basis of whether suffering from illness

Age Category (Years))	Narayanganj				Kurigram				Total			
	Suffered		Not Suffered		Suffered		Not Suffered		Suffered		Not Suffered	
	NO.	%	No.	%	No.	%	No.	%	NO.	%	NO.	%
Age less than equal 10 Years	17	15.5	93	84.5	10	6.9	134	93.1	27	10.6	227	89.4
Age greater than 10 Years	29	8.4	316	91.6	22	5.9	349	94.1	51	7.1	665	92.9
Total	46	10.1	409	89.9	32	6.2	483	93.8	78	8.0	892	92.0

Source: Analysis from HIES data,2010

Table 5.2.1 indicated that in Narayanganj, 15.5% of population who were not more than 10 years suffered illness within last 30 days and 84.5% of them did not suffer from illness within that time period. And among population of more than 10 years 8.4% suffered illness in the last 30 days whereas 91.6% did not suffer illness in that time period.

The table also indicated that in Kurigram, 6.9% of population who were not more than 10 years suffered illness within last 30 days and 93.1% of them did not suffer from illness within that time period. And among population of more than 10 years 5.9 % suffered illness in the last 30 days whereas 94.1% did not suffer illness in that time period.

It can be concluded that in Narayanganj district more people (10.1%) suffered from illness in last 30 days than those of (6.2%) Kurigram district in the same time period. So health status of the people in Kurigram was better than that of the people of Narayanganj.

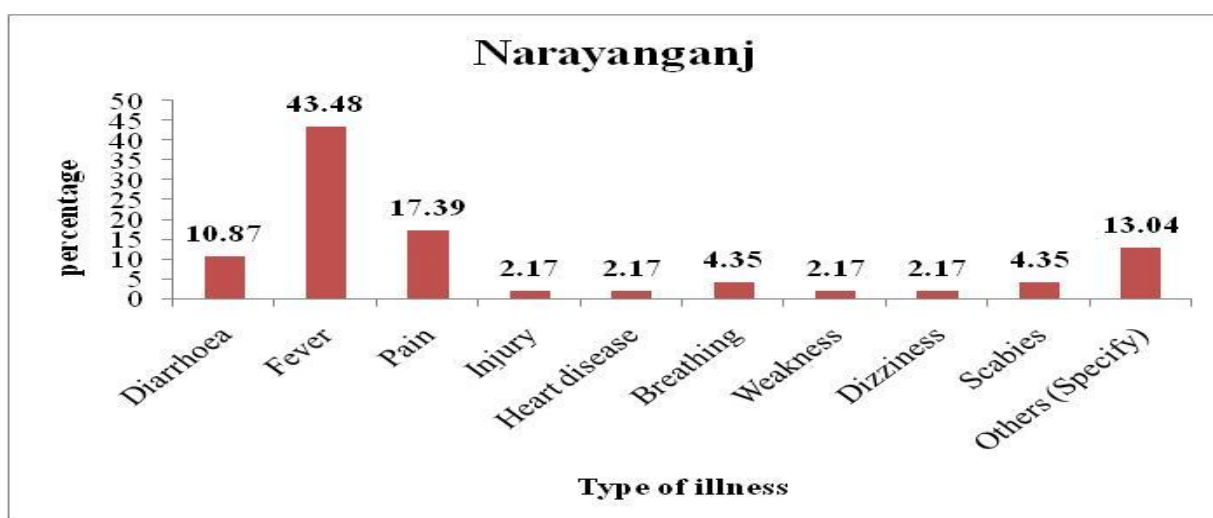
Table 5.2.2 Distribution of population on the basis of whether suffering from illness

suffered illness	Narayanganj		Kurigram		Total	
	No.	%	No.	%	No.	%
Suffered	46	10.11	32	6.21	78	8.04
Not suffered	409	89.89	483	93.79	892	91.96
Total	455	100	515	100	970	100

Source: Analysis from HIES data,2010

In Narayanganj area total selected population for this study was 455 of them 10.11% suffered illness within last 30 days and 89.89% people did not suffer from illness within that time period. On the other hand in Kurigram area total selected population for this examination was 515 which 6.21% suffered illness within last 30 days and 93.79% people did not that time period. Table 5.2.2 indicated that the health position of Kurigram's people was higher than that of Narayanganj's people.

People in Narayanganj were suffered from different illness, some of which with suffering ratio are listed by the following figure-

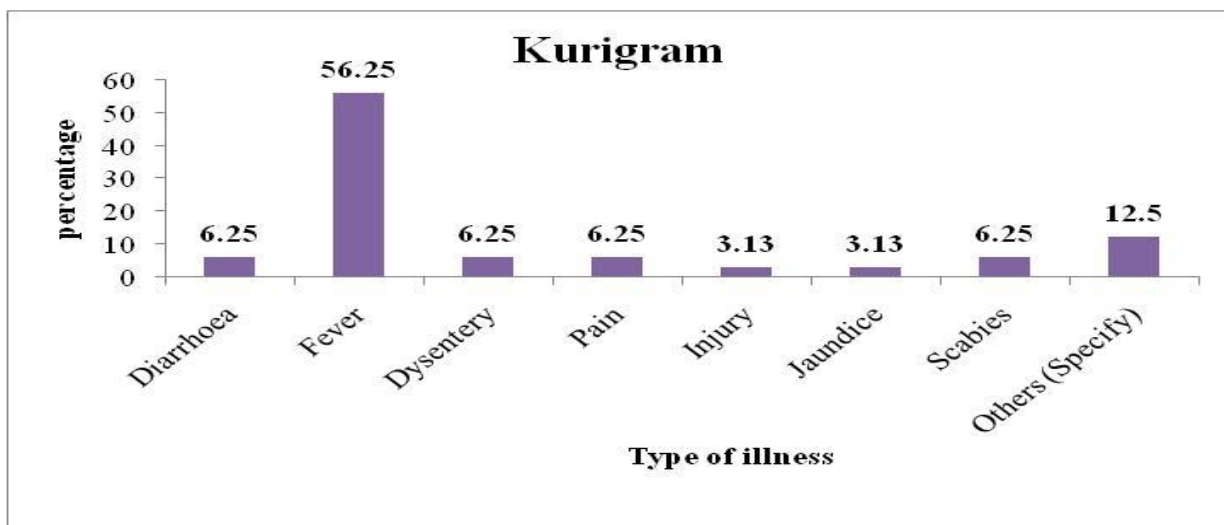


Source: Analysis from HIES data,2010

Figure: 5.4. Distribution of Household members on the basis of suffering from some selected illness in Narayanganj

In Narayanganj area total selected population for this study was 455 among them 46 people suffered from illness. Figure 5.4 showed that the highest proportion of the population (43.48%) suffered from fever while 17.39% of them suffered from pain, 10.87% suffered from diarrhoea, 4.35% suffered from breathing, 4.35% suffered from scabies and 13.04% suffered from some other (specific) disease.

People in Narayanganj were suffered from different illness, some of which with suffering ratio are listed by the following figure-



Source: Analysis from HIES data,2010

Figure: 5.5 Distribution of Household members on the basis of suffering from some selected illness in Kurigram

In Kurigram area total selected population for the present study was 515 among them 32 people suffered from illness. Figure 5.5 showed that the highest proportion of the population (56.25%) suffered from fever whereas 6.25% suffered from diarrhoea, 6.25% suffered from dysentery, 6.25% suffered from pain, 6.25% suffered from scabies, 3.13% suffered from injury, 3.13% suffered from jaundice and 12.5% of the population other (specific) disease.

From above two figures (5.4 & 5.5) it is found that, more people of Narayanganj area suffered from illness than the people of Kurigram area and in both areas the highest proportion of the population suffered from fever but higher was in Kurigram. Dysentery rate among the people of Kurigram is 6.25% whereas the people of Narayanganj did not suffer from this disease. Pain rate was more than double among the people of Narayanganj compared to the people of Kurigram.

Table 5.2.3 Distribution of Household members on the basis of suffering from some selected illness

Type of illness	Narayanganj		Kurigram		Total	
	No.	%	No.	%	No.	%
Diarrhoea	5	10.87	2	6.25	7	8.97
Fever	20	43.48	18	56.25	38	48.72

Table 5.2.3 Distribution of Household members on the basis of suffering from some selected illness (con't)

Type of illness	Narayanganj		Kurigram		Total	
	No.	%	No.	%	No.	%
Dysentery	0	0	2	6.25	2	2.56
Pain	8	17.39	2	6.25	10	12.82
Injury	1	2.17	1	3.13	2	2.56
Heart disease	1	2.17	0	0	1	1.28
Breathing	2	4.35	0	0	2	2.56
Weakness	1	2.17	0	0	1	1.28
Dizziness	1	2.17	0	0	1	1.28
Jaundice	0	0	1	3.13	1	1.28
Scabies	2	4.35	2	6.25	4	5.13
Others (Specify)	6	13.04	4	12.5	10	12.82
Total	46		32		78	
Average duration of illness(in month)	51		76		64	

Source: Analysis from HIES data,2010

The average duration of illness during the lifetime of the people was 76 months in Kurigram compared to 51 months in Narayanganj. Though more people suffered from illness in Narayanganj district but their duration was lower whereas the number of people suffering from illness was less but their duration was higher.

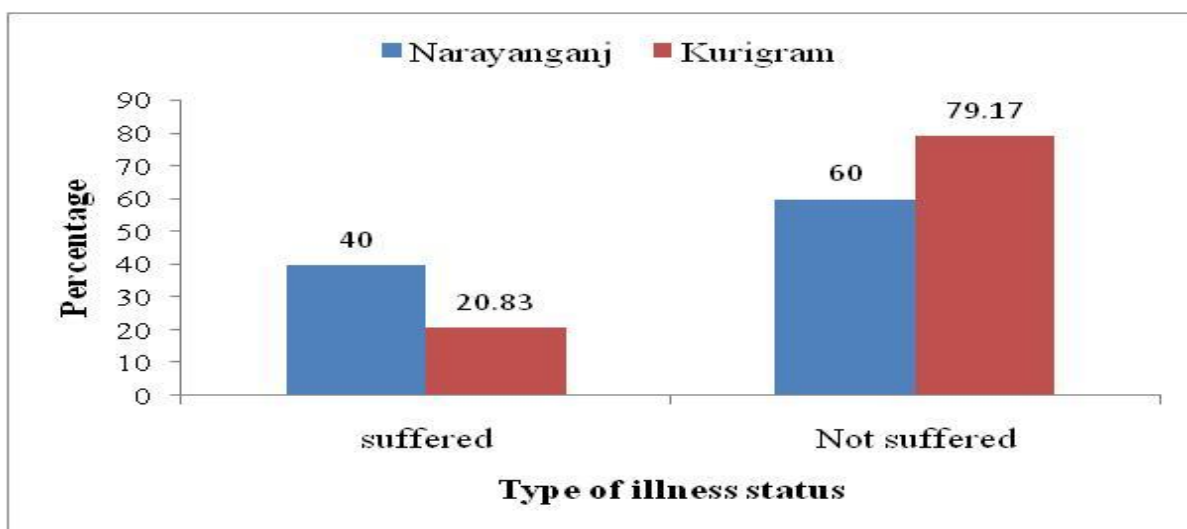
Table 5.2.4 Distribution of household number on the basis of whether suffering from illness

suffered illness	Narayanganj		Kurigram		Total	
	No.	%	No.	%	No.	%
suffered	40	40	25	20.83	65	29.55
Not suffered	60	60	95	79.17	155	70.45
Total	100	100	120	100	220	100

Source: Analysis from HIES data,2010

In Narayanganj district total selected household number for this study was 100 which 40 % suffered illness within last 30 days and 60% household did not suffer from illness within that time period. On the other hand in Kurigram district total selected household number for this study was 120 which 20.83% suffered illness within last 30 days and 79.17% people did not suffer from illness within that time period. Table 5.8 also indicated that the health position of Kurigram’s household was higher than that of Narayanganj’s household.

The condition of illness of the two district can be summaries through the following figure:



Source: Analysis from HIES data,2010

Figure 5.6 Distribution of household number on the basis of whether suffering from illness

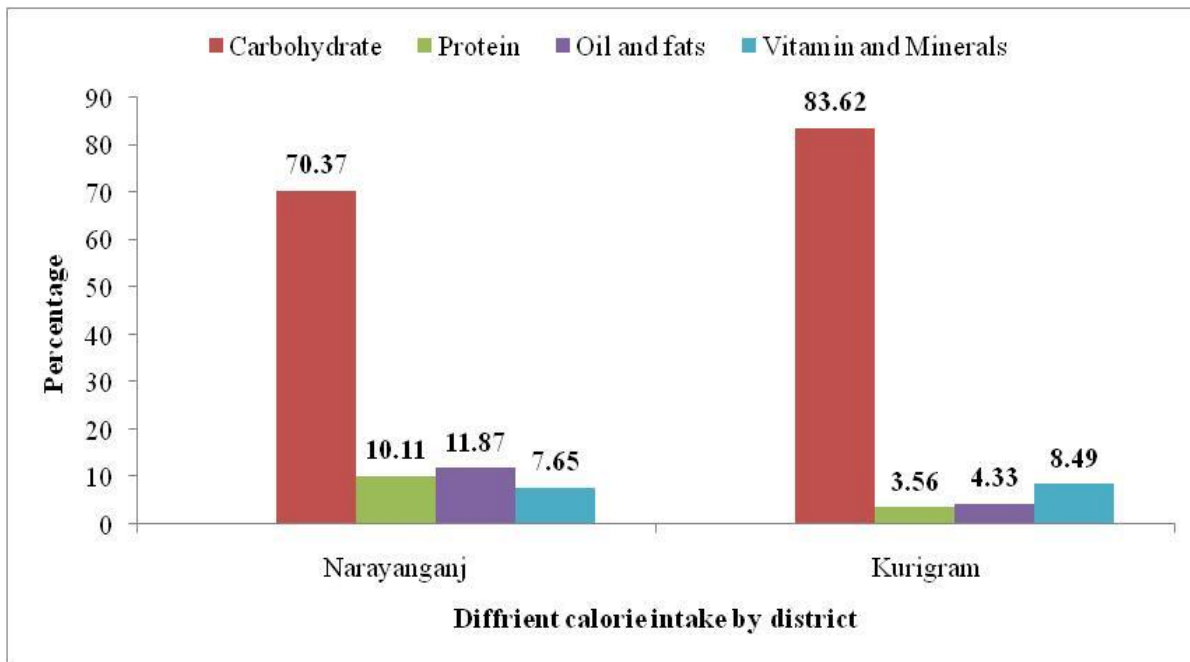
Figure 5.6. show that percentage of suffering from illness in Narayanganj and Kurigram is 40% and 20.83% respectively. This figure also indicate that percentage of not suffering from illness in Narayanganj and Kurigram is 60% and 79.17% respectively.

5.3. Calorie intake status in Narayanganj and Kurigram District

Food is essential for survival and adequate intake of balanced food with required nutrients is important to leading a healthy and productive life. Every food item has its own calorie, protein and other nutrient contents. Nutritional values vary over different food items .Carbohydrate, protein , oil & fats, vitamin and minerals is important element of food needed to maintain good

health and it comes from the consumption of carbohydrate, protein ,oil & fats, vitamin and minerals enriched food items.

Carbohydrate, protein, oil & fats, vitamin and minerals intake has been presented by the following figure -



Source: Analysis from HIES data,2010

Figure: 5.7 Calorie intake status of two district

This figure indicated that per capita intake of protein and oil & fats in Kurigram is lower than that of Narayanganj. There is not much difference between per capita vitamin and mineral intake of the selected two districts.

Figure: 5.7can be illustrated by the table 5.3.1.It was indicated that per capita carbohydrate intake in Kurigram (1808.94 kilocalorie) which were 83.62% of total kilocalorie intake. One the other hand Narayanganj per capita carbohydrate intake (1620.17kilocalorie) which were 70.37% of total kilocalorie intake.

Table 5.3.1 Calorie intake status

Kilo calorie intake	Narayanganj			Kurigram			Total		
	Average	%	Per capita intake	Average	%	Per capita intake	Average	%	Per capita intake
Carbohydrate	7371.77	70.37	1620.17	7760.34	83.62	1808.94	7583.72	77.19	1719.66
Protein	1059.34	10.11	232.82	330.54	3.56	77.05	661.81	6.74	150.07
Oil and fats	1243.98	11.87	273.40	401.36	4.33	93.56	784.37	7.99	177.86
Vitamin and Minerals	800.57	7.65	175.95	788.22	8.49	183.73	793.84	8.08	180.01
Total	10475.66	100	2303.34	9280.46	100	2163.28	9823.74	100	2227.6

Source: Analysis from HIES data, 2010

Table 5.3.1 also indicated that total kilocalorie intake position of Narayanganj is higher than that of Kurigram. Because of higher poverty rate in Kurigram, people there consume more carbohydrate than other foods.

5.4. Contributing factor of optimum diet for health

Multiple Binary Logistic Regression (MBLR) was used to see the possible effect of independent variable on dependent variable. To apply binary logistic regression model, the dependent variable were chronic illness and illness. The dependent variable was made dichotomous by using 0 and 1 code where 0 referred sufferer and 1 referred not sufferer. The independent variable were household size, gender, age, education, carbohydrate, protein, oil and fats and vitamin and minerals. In the analysis result the significant level are expressed as bellow:

***=1% level of significant

**=5%level of significant

*=10% level of significant

Table 5.4.1 Estimated regression coefficients and associated statistics from multiple binary logistic regression model for identifying optimum diet for health of total household of two district, Dependent variable: chronic illness (0=sufferd,1=not sufferd)

	B	S.E.	Wald	df	Sig.	Exp(B)
Household size	-.047	.118	.163	1	.687	.954
Gender	-.446	.634	.495	1	.482	.640
Age	-.038	.012	9.681	1	.002	.963***
Education	-.035	.044	.643	1	.422	.965
Carbohydrate	.148	.425	.121	1	.728	1.159
Protein	.128	.523	.060	1	.806	1.137
Oil and fats	.882	.485	3.298	1	.069	2.415*
Vitamin and Minerals	1.149	.391	8.638	1	.003	3.156***
Constant	2.207	1.140	3.748	1	.053	9.093

Hosmer and Lemeshow Test

Step	Chi-square	Df	Sig.
1	7.462	8	.488

Discussion of the empirical findings from the multiple binary logistic regression models of total household of two district is as follows:

Household size

The exp(B) value is 0.954 which is less than 1 that means if household size increase by one unit then the possibility of suffering from chronic illness is .954 times more than possibility of not suffering from chronic illness.

Gender

The exp(B) value is 0.640 which indicate that in case of female the possibility of suffering from chronic illness is .640 times more than possibility of not suffering from chronic illness by male.

Age

The $\exp(B)$ value is 0.963 which is less than 1 that means If age is increase by one unit then the possibility of suffer from chronic illness is .963 times more than possibility of not suffering from chronic illness.

Education

The $\exp(B)$ value is 0.965 which is less than 1 that means if educational qualification is higher by one unit then possibility of suffer from chronic illness is .965 times more than the possibility of not suffer from chronic illness.

Carbohydrate

If carbohydrate intake is increase than the average amount which is 7583.72 kilo calorie then the possibility of not suffering from chronic illness is 1.159 times higher than risk of suffering chronic illness.

Protein

If protein intake is increase than the average amount which is 661.81 kilo calorie then the possibility of not suffering from chronic illness is 1.137 times higher than the possibility of suffering chronic illness.

Oil and fats

If oil and fats intake is increase than the average amount which is 784.37 kilo calorie then the possibility of not suffering from chronic illness is 2.415 times higher than the possibility of suffering chronic illness.

Vitamin and Minerals

If vitamin and minerals intake is increase than the average amount which is 793.84 kilo calorie then the possibility of not suffering from chronic illness is 3.156 times higher than the possibility of suffering chronic illness.

The **Hosmer & Lemeshow** test statistics bears the evidence of better fit of the model to the data set under consideration.

Table 5.4.1 showed that higher intake of vitamin and minerals than the average amount will increase possibility of not suffering from chronic illness three times than the more intake of carbohydrate from its average amount. Again the more intake of vitamin and minerals than the average amount will increase possibility of not suffering chronic illness three times than the more intake of protein from its average amount.

Table 5.4.2 Estimated regression coefficients and associated statistics from multiple binary logistic regression model for identifying optimum diet for health of total household of two district, Dependent variable: illness (0=suffered, 1=not suffered)

	B	S.E.	Wald	Df	Sig.	Exp(B)
Household size	-.104	.113	.847	1	.358	.901
Gender	.363	.522	.482	1	.488	1.437
Age	.004	.012	.109	1	.742	1.004
Education	-.095	.041	5.398	1	.020	.909**
Carbohydrate	.243	.394	.382	1	.536	1.276
Protein	-.565	.500	1.280	1	.258	.568
Oil and fats	.898	.429	4.378	1	.036	2.455**
Vitamin and Minerals	.285	.368	.598	1	.439	1.330
Constant	.772	1.033	.558	1	.455	2.163

Hosmer and Lemeshow Test

Step	Chi-square	Df	Sig.
1	14.000	8	.082

Discussion of the empirical findings from the multiple binary logistic regression models of total household of two district is as follows:

Household size

The exp(B) value is 0.901 which is less than 1 that means if household size increase by one unit then the possibility of suffering from illness is .901 times more than possibility of not suffering from illness.

Gender

The exp(B) value is 1.437 which indicate that in case of female the possibility of not suffering from illness is 1.437 times more than possibility of suffering from illness by male.

Age

The exp(B) value is about 1 so the possibility of suffer from illness is equal to possibility of not suffering from illness.

Education

The exp(B) value is 0.909 which is less than 1 that means if educational qualification is higher by one unit then possibility of suffer from illness is .909 times more than the possibility of not suffer from illness.

Carbohydrate

If carbohydrate intake is increase than the average amount which is 7583.72 kilo calorie then the possibility of not suffering from illness is 1.276 times higher than risk of suffering illness.

Protein

If protein intake is increase than the average amount which is 661.81 kilo calorie then the possibility of suffering from illness is 0.568 times higher than possibility of not suffering from illness.

Oil and fats

If oil and fats intake is increase than the average amount which is 784.37 kilo calorie then the possibility of not suffering from illness is 2.455 times higher than the possibility of suffering illness.

Vitamin and Minerals

If vitamin and minerals intake is increase than the average amount which is 793.84 kilo calorie then the possibility of not suffering from illness is 1.330 times higher than risk of suffering illness.

Table 5.4.2 showed that higher intake of oil and fats than the average amount will increase possibility of not suffering from illness about two times than the more intake of carbohydrate from its average amount. Again the more intake of intake of oil and fats than the average amount will increase possibility of not suffering illness about two times than the more intake of vitamin and minerals from its average amount.

Table 5.4.3 Estimated regression coefficients and associated statistics from multiple binary logistic regression model for identifying optimum diet for health of Narayanganj's household, Dependent variable: chronic illness (0=suffered, 1=not suffered)

Independent variable	B	S.E.	Wald	Df	Sig.	Exp(B)
Household size	.139	.201	.478	1	.489	1.149
Gender	-.957	1.032	.861	1	.353	.384
Age	-.068	.023	8.676	1	.003	.934****
Education	-.044	.065	.472	1	.492	.957
Carbohydrate	.547	.744	.540	1	.462	1.728
Protein	.361	.741	.237	1	.626	1.434
Oil and fats	2.541	1.097	5.367	1	.021	12.686**
Vitamin and Minerals	-.249	1.009	.061	1	.805	.780
Constant	2.149	1.976	1.183	1	.277	8.579

Hosmer and Lemeshow Test

Step	Chi-square	Df	Sig.
1	13.605	8	.093

Discussion of the empirical findings from the multiple binary logistic regression models of Narayananj's household is as follows:

Household size

The exp(B) value is 1.149 which is greater than 1 that means if household size increase by one unit then the possibility of not suffering from chronic illness is 1.149 times more than possibility of suffering from chronic illness.

Gender

The exp(B) value is 0.384 which indicate that in case of female the possibility of suffering from chronic illness is 0.384 times more than possibility of not suffering from chronic illness by male.

Age

The exp(B) value is 0.934 which is less than 1 that means If age is increase by one unit then the possibility of suffer from chronic illness is .934 times more than possibility of not suffering from chronic illness.

Education

The exp(B) value is 0.957 which is less than 1 that means if educational qualification is higher by one unit then possibility of suffer from chronic illness is .957 times more than the possibility of not suffer from chronic illness.

Carbohydrate

If carbohydrate intake is increase than the average amount which is 7371.77 kilo calorie then the possibility of not suffering from chronic illness is 1.728 times higher than risk of suffering chronic illness.

Protein

If protein intake is increase than the average amount which is 1059.34 kilo calorie then the possibility of not suffering from chronic illness is 1.434 times higher than the possibility of suffering chronic illness.

Oil and fats

If oil and fats intake is increase than the average amount which is 1243.98 kilo calorie then the possibility of not suffering from chronic illness is 12.686 times higher than the possibility of suffering chronic illness.

Vitamin and Minerals

If vitamin and minerals intake is increase than the average amount which is 800.57 kilo calorie then the possibility of suffering from chronic illness is 0.780 times higher than possibility of not suffering from chronic illness.

Table 5.4.3 showed that higher intake of oil and fats than the average amount will increase possibility of not suffering from chronic illness about twelve times than the more intake of carbohydrate and protein from each of their average amount.

Table 5.4.4 Estimated regression coefficients and associated statistics from multiple binary logistic regression model for identifying optimum diet for health of Naravangani's household , Dependent variable: illness (0=suffered, 1=not suffered)

Independent viable	B	S.E.	Wald	df	Sig.	Exp(B)
Household size	-.006	.168	.001	1	.971	.994
Gender	-.423	.785	.290	1	.590	.655
Age	.013	.018	.584	1	.445	1.014
Education	-.100	.056	3.157	1	.076	.905*
Carbohydrate	.866	.607	2.036	1	.154	2.378
Protein	.555	.677	.673	1	.412	1.742
Oil and fats	-.243	.978	.062	1	.804	.784
Vitamin and Minerals	-.309	.937	.108	1	.742	.734
Constant	.111	1.575	.005	1	.944	1.118

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	3.941	8	.862

Discussion of the empirical findings from the multiple binary logistic regression models of Narayananj's household is as follows:

Household size

The exp(B) value is 0.994 which is less than 1 that means if household size increase by one unit then the possibility of suffering from illness is .994 times more than possibility of not suffering from illness.

Gender

The exp(B) value is 0.655 which indicate that in case of female the possibility of suffering from illness is 0.655 times more than possibility of not suffering from illness by male.

Age

The exp(B) value is about 1 so the possibility of suffer from illness is equal to possibility of not suffering from illness.

Education

The exp(B) value is 0.905 which is less than 1 that means if educational qualification is higher by one unit then possibility of suffer from illness is .905 times more than the possibility of not suffer from illness.

Carbohydrate

If carbohydrate intake is increase than the average amount which is 7371.77 kilo calorie then the possibility of not suffering from illness is 2.378 times higher than risk of suffering illness.

Protein

If protein intake is increase than the average amount which is 1059.34 kilo calorie then the possibility of not suffering from illness is 1.742 times higher than the possibility of suffering illness.

Oil and fats

If oil and fats intake is increase than the average amount which is 1243.98 kilo calorie then the possibility of suffering from illness is 0.784 times higher than the possibility of not suffering illness.

Vitamin and Minerals

If vitamin and minerals intake is increase than the average amount which is 800.57 kilo calorie then the possibility of suffering from illness is 0.734 times higher than possibility of not suffering from illness.

The **Hosmer & Lemeshow** test statistics bears the evidence of better fit of the model to the data set under consideration.

Table 5.4.4 showed that higher intake of carbohydrate than the average amount will increase possibility of not suffering from illness about two times than more intake of protein from its average amount.

**Table 5.4.5 Estimated regression coefficients and associated statistics from multiple binary logistic regression model for identifying optimum diet for health of Kurigram's household ,
Dependent variable: chronic illness (0=suffered, 1=not suffered)**

Independent Variable	B	S.E.	Wald	df	Sig.	Exp(B)
Household size	-.020	.165	.015	1	.902	.980
Gender	-.086	.877	.010	1	.922	.918
Age	-.017	.017	.969	1	.325	.983
Education	.093	.084	1.228	1	.268	1.098
Carbohydrate	.121	.634	.037	1	.848	1.129
Protein	-.158	.571	.077	1	.781	.853
Oil and fats	1.284	.567	5.121	1	.024	3.610**
Vitamin and Minerals	.728	.570	1.630	1	.202	2.072
Constant	1.190	1.790	.442	1	.506	3.287

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	10.918	8	.206

Discussion of the empirical findings from the multiple binary logistic regression models of Kurigram's household is as follows:

Household size

The exp(B) value is about 1 which means that if household size increase by one unit then the possibility of not suffering from chronic illness and the possibility of suffering from chronic illness is equal.

Gender

The exp(B) value is 0.918 which indicate that in case of female the possibility of suffering from chronic illness is 0.918 times more than possibility of not suffering from chronic illness by male.

Age

The exp(B) value is about 1 which means that If age is increase by one unit then the possibility of suffer from chronic illness and possibility of not suffering from chronic illness is equal.

Education

The exp(B) value is 1.098 which is greater than 1 that means if educational qualification is higher by one unit then possibility of not suffer from chronic illness is 1.098 times more than the possibility of suffer from chronic illness.

Carbohydrate

If carbohydrate intake is increase than the average amount which is 7760.34 kilo calorie then the possibility of not suffering from chronic illness is 1.129 times higher than possibility of suffering chronic illness.

Protein

If protein intake is increase than the average amount which is 330.54 kilo calorie then the possibility of suffering from chronic illness is 0.853 times higher than the possibility of not suffering chronic illness.

Oil and fats

If oil and fats intake is increase than the average amount which is 401.36 kilo calorie then the possibility of not suffering from chronic illness is 3.610 times higher than the possibility of suffering chronic illness.

Vitamin and Minerals

If vitamin and minerals intake is increase than the average amount which is 788.22 kilo calorie then the possibility of not suffering from chronic illness is 2.072 times higher than possibility of suffering from chronic illness.

The **Hosmer & Lemeshow** test statistics bears the evidence of better fit of the model to the data set under consideration.

Table 5.4.5 showed that higher intake of oil and fats than the average amount will increase possibility of not suffering from chronic illness about three times than more intake of carbohydrate from its average amount. From the table it was also found that more intake of vitamin and mineral than their average amount will increase possibility of not suffering from chronic illness about two times than more intake of carbohydrate from its average amount.

Table 5.4.6 Estimated regression coefficients and associated statistics from multiple binary logistic regression model for identifying optimum diet for health of Kurigram's household, Dependent variable: illness (0=suffered, 1=not suffered)

Independent variable	B	S.E.	Wald	df	Sig.	Exp(B)
Household size	-.210	.172	1.505	1	.220	.810

Table 5.4.6 (con't)

Independent variable	B	S.E.	Wald	df	Sig.	Exp(B)
Gender	1.055	.743	2.015	1	.156	2.872
Age	-.004	.018	.044	1	.834	.996
Education	-.037	.083	.198	1	.656	.964
Carbohydrate	-.812	.667	1.479	1	.224	.444
Protein	.477	.606	.621	1	.431	1.612
Oil and fats	-.241	.588	.168	1	.682	.786
Vitamin and Minerals	1.078	.573	3.538	1	.060	2.939*
Constant	1.377	1.779	.599	1	.439	3.961

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	4.653	8	.794

Discussion of the empirical findings from the multiple binary logistic regression models of Kurigram's household is as follows:

Household size

The exp(B) value is 0.810 which less than 1 that means if household size increase by one unit then the possibility of suffering from illness is 0.810 times higher and the possibility of not suffering from illness.

Gender

The exp(B) value is 2.872 which indicate that in case of female the possibility of not suffering from illness is 2.872 times more than possibility of suffering from illness by male.

Age

The exp(B) value is about 1 which means that If age is increase by one unit then the possibility of suffer from illness and possibility of not suffering from illness is equal.

Education

The $\exp(B)$ value is 0.964 which is less than 1 that means if educational qualification is higher by one unit then possibility of suffer from illness is 0.964 times more than the possibility of not suffer from illness.

Carbohydrate

If carbohydrate intake is increase than the average amount which is 7760.34 kilo calorie then the possibility of suffering from chronic illness is 0.444 times higher than possibility of not suffering illness.

Protein

If protein intake is increase than the average amount which is 330.54 kilo calorie then the possibility of not suffering from chronic illness is 1.612 times higher than the possibility of suffering illness.

Oil and fats

If oil and fats intake is increase than the average amount which is 401.36 kilo calorie then the possibility of suffering from illness is 0.786 times higher than the possibility of not suffering illness.

Vitamin and Minerals

If vitamin and minerals intake is increase than the average amount which is 788.22 kilo calorie then the possibility of not suffering from chronic illness is 2.939 times higher than possibility of suffering from illness.

The **Hosmer & Lemeshow** test statistics bears the evidence of better fit of the model to the data set under consideration.

Table 5.4.6 showed that higher intake of vitamin and minerals than the average amount will increase possibility of not suffering from illness about two times than more intake of protein from its average amount.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

The study has determined household nutritional status and its association with illness of Narayanganj and Kurigram districts in Bangladesh. The analysis includes the determinants of nutritional status through binary logistic regression model (BLRM). This final chapter of the thesis makes an endeavor to draw conclusions and provide recommendations based on the key findings of the research.

6.1 Conclusions

From the description of socio-demographic characteristics it was found that dependency ratio is higher in Kurigram than that of Narayanganj. Educational status is better in Narayanganj than that of Kurigram but in both areas female participation beyond primary level was poor.

The findings indicated that total per capita calorie intake in Narayanganj (2303.34kilocalorie) is higher than per capita calorie intake in Kurigram(2163.28kilocalorie). To become food secure daily requirement is 2122 kilocalorie per capita. So, population of Narayanganj is higher food secure than those of Kurigram.

In Narayanganj the respondent consume protein (10.11% of total calorie intake) more than two times higher than protein intake (3.56% of total calorie intake) of the people of Kurigram. Similarly oil and fat intake (11.87% of total calorie intake) is also higher than that of Kurigram(4.33% of total calorie intake). Per capita carbohydrate consumption in Narayanganj (1620.17 kilocalorie) is lower than that of Kurigram(1808.94 kilocalorie). Vitamin and mineral consumption is about to equal in the two district.

The study found that in the selected two districts the people who are more than 10 years old are more sufferer from chronic illness and illness than the under 10 years children. More people were suffered from chronic fever, chronic heart disease, blood pressure and paralysis than the people of Kurigram. On the other hand more people in Nayaranganj were suffered from breathing trouble, diabetes and other specific chronic disease than the people of Kurigram.

However the study revealed the 40% people in Nayaranganj were suffered in chronic illness whereas in Kurigram this value was 22.5%.

It was found from the study that, more people of Narayanganj area suffered from illness than the people of Kurigram area and in both area the highest proportion of the population suffered from fever but higher was in Kurigram. In both district people also suffered from diarrhoea, pain, injur, scabies and other specified disease. However the study also revealed the 40% household in Nayaranganj were suffered in illness whereas in Kurigram this value was 20.83%.

The coefficient of binary logistic regression model analysis revealed that age, oil and fat consumption and vitamin and mineral intake of respondents had significant effect on their possible suffering from chronic illness in health status of total household of two district. In case of age if age is increase by one unit then the possibility of suffer from chronic illness is .963 times more than possibility of not suffering from chronic illness. For oil and fat consumption if oil and fats intake is increase than the average amount which is 784.37 kilo calorie then the possibility of not suffering from chronic illness is 2.415 times higher than the possibility of suffering chronic illness. And for vitamin and mineral intake if vitamin and minerals intake is increase than the average amount which is 793.84 kilo calorie then the possibility of not suffering from chronic illness is 3.156 times higher than the possibility of suffering chronic illness. It was found that higher intake of vitamin and minerals than the average amount will increase possibility of not suffering from chronic illness three times than the more intake of carbohydrate from its average amount. Again the more intake of vitamin and minerals than the average amount will increase possibility of not suffering chronic illness three times than the more intake of protein from its average amount.

The coefficient of multilple binary logistic regression model analysis has also expressed that education and oil and fat consumption of respondents had significant effect on their possible suffering from illness in health status of total household of two district. Its showed that higher intake of oil and fats than the average amount will increase possibility of not suffering from illness about two times than the more intake of carbohydrate from its average amount. Again the more intake of intake of oil and fats than the average amount will increase possibility of not

suffering illness about two times than the more intake of vitamin and minerals from its average amount.

The coefficient of binary of Multiple binary Logistic regression analysis for Chronic illness in Narayanganj has showed age and consumption of oil and fat had significant effect on possible suffering from chronic illness. It was also found that higher intake of oil and fats than the average amount will increase possibility of not suffering from chronic illness about twelve times than the more intake of carbohydrate and protein from each of their average amount.

The coefficient of binary of multiple binary Logistic regression analysis for illness in Narayanganj has showed that education had significant effect on the possible suffering of illness of people living in Narayanganj. It also revealed that higher intake of carbohydrate than the average amount will increase possibility of not suffering from illness about two times than more intake of protein from its average amount.

The coefficient of binary multiple binary Logistic regression analysis for Chronic illness Kurigram has showed that oil and fats intake had significant effect on the possible suffering of chronic illness of people living in Kurigram. It also showed that higher intake of oil and fats than the average amount will increase possibility of not suffering from chronic illness about three times than more intake of carbohydrate from its average amount. From the table it was also found that more intake of vitamin and mineral than their average amount will increase possibility of not suffering from chronic illness about two times than more intake of carbohydrate from its average amount.

The coefficient of binary multiple binary Logistic regression analysis for illness in Kurigram has showed that vitamin and mineral intake had significant effect on the possible suffering of chronic illness of people living in Kurigram. It also indicated that higher intake of vitamin and minerals than the average amount will increase possibility of not suffering from illness about two times than more intake of protein from its average amount.

6.2 Recommendations

Some measures that can increase the food security and nutritional status of household have been outlined below-

- Necessary programs such as increasing education opportunity, work opportunity should be undertaken to reduce dependency ratio (71%) in Kurigram district to increase food security. Government should take necessary initiatives such as ensuring safe environment, strong food monitoring to stop irregularities and wrongdoing in education sector to improve female participation in beyond secondary education.
- In Kurigram per capita protein calorie intake, oil and fats calorie intake are lower three times than those of Narayanganj but carbohydrate consumption is higher. So responsible authority should be conscious and make effort to maintain the level of calorie intake.
- In Kurigram daily per capita calorie intake(2163.28 kilocalorie),is slightly higher than the minimum requirement to be food secured. There is a chance to get down the minimum requirement of nutritional security. So responsible authority should be conscious and make effort to maintain and improve the level of calorie intake.
- In both districts people above 10 years old more suffer from chronic illness and illness but the ratio is higher in Narayanganj. So this group of people should be given emphasis to make them conscious about different chronic illness and illness. Knowledge on proper food habit and food nutrition should be provided them to avoid chronic illness and illness.
- Food security and educational status is higher but incidence of chronic illness and illness is also higher in Narayanganj. The reason should be identified and necessary steps such as raising awareness about health and nutrition, free health check-up system etc. should be taken to decrease chronic illness and illness in Narayanganj.

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APPENDIX I

Part of HIES English Questionnaire 2010 for Narayanganj and Kurigram Districts

HOUSEHOLD INFORMATION

I. Sex of the respondents

- (i) Male
- (ii) Female

II. Age of the respondents

- (i) WRITE AGE IN FULL YEARS
- (ii) WRITE "00" FOR LESS THAN 1 (one) YEAR

III. Marital status of household population

- (i) Currently married
- (ii) Unmarried
- (iii) Widow
- (iv) Separated

IV. Earning status of household population

- (i) Earner
- (ii) Non-earner

V. Household size

- Number of members in each of the surveyed household

VI. Educational and literacy attainment (all persons 5 years and older)

- What was the highest class that you completed?

00	No class passed	10	SSC/equivalent
01	Class 1	11	HSC/equivalent
02	Class 2	12	Graduate/equivalent
03	Class 3	13	Post graduate/ equivalent
04	Class 4	14	Medical
05	Class 5	15	Engineering
06	Class 6	16	Vocational
07	Class 7	17	Technical Education
08	Class 8	18	Nursing
09	Class 9	19	Other (Specify)

HEALTH AND INJURIES

VII. Have you suffered from any chronic illness/ disability in the last 12 months?

(i) Yes

(ii) No

VIII. If yes what chronic illness/ disability are you suffering from?

01	Chronic Fever	09	Eczema
02	Injuries / Disability	10	Diabetes
03	Chronic Heart Disease	11	Cancer
04	Asthma/Breathing trouble	12	Leprosy
05	Chronic Dysentery	13	Paralysis
06	Gastric/ ulcer	14	Epilepsy
07	Blood pressure	15	Other (specify)
08	Arthritis/ Rheumatism		

IX. For how long have you had this illness?

(i) _____ years

(ii) _____ months

X. Have you suffered from any symptoms of illness/ injury?

(i) Yes

(ii) No

XI. If yes what Symptoms/Diseases did you suffer from?

01	Diarrhoea	14	Malaria
02	Fever	15	Jaundice
03	Dysentery	16	Female diseases
04	Pain	17	Pregnancy related
05	Injury	18	Cancer
06	Blood pressure	19	Leprosy
07	Heart disease	20	Paralysis
08	Breathing trouble	21	Epilepsy
09	Weakness	22	Scabies
10	Dizziness	23	Kidney Diseases
11	Pneumonia	24	Gall stone Diseases
12	Typhoid	25	Other, specify
13	Tuberculosis		

DAILY CONSUMPTION

Less than 10 years old <ul style="list-style-type: none"> • No. of boys _____ • No. girls _____ 	10 years and older <ul style="list-style-type: none"> • No. of men _____ • No. of women _____
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Type of consumed food item on daily basis (Module 9A1-1,9A1-2)

Item	Amount (gm)	Item	Amount (gm)
<u>Food grains</u> Rice – Fine Rice – Medium Rice – Coarse Beaten rice Pop rice Puffed rice Wheat (Atta) Flour Vermicelli/ Suji Bread/ Bonroti Biscuits Cake Other (specify)		<u>Dining out(food outside)</u> Meals(Rice/Biriani) Fish Meat Patties/Cake Sandwich Burger Hotdog Pizza Samucha/Singara/Puri/Cake Coffee Soft drinks/bottle water Other	
<u>Pulses</u> Lentil (musur) Chickling-Vetch(mug) Green gram (boot) Pea gram (kleshari) Mashkalai Other (specify)		<u>Meat</u> Beef/Buffalo Mutton Sheep Hen Duck Other (specify)	

<p><u>Fish</u></p> <p>Hilsa Rhui/ Katla/ Mrigel/ Kal baush Pangash/ Boal/ Air Kai/ Magur/ Shinghi/ Khalisha koi Silver carp/ Grass carp Miror carp Shoal/ Gajar/ Taki Puti/ Big Puti/ Telapia/ Nilotica Mala-kachi/ Chala-chapila Shrimp</p>		<p><u>Vegetables</u></p> <p>Potato/Brinjal White gourd/ Pumpkin Water gourd/Balsam apple Perbol /(Patal) Snake gourd/ Ribbed gourd Green banana/ Green papaya /Arum/Ol-kachu Kachur-mukhi Cauliflower/Cabbage (All types of leafy veg.(Spinach/ Amaranta/ Basil)</p>	
<p><u>Egg</u></p> <p>Hen egg Duck egg Other (specify)</p>		<p><u>Miscellaneous food</u></p> <p>Pickles/Jelly/ Jam Amshatta/Sauce/Sirka Other (specify)</p>	
<p><u>Milk and dairy</u></p> <p>Liquid milk Powder milk Curd Casein (ponir)/ Butter Milk drinks Other (specify)</p>		<p><u>Sugar and molasses</u></p> <p>Sugar/ Misri Molasses(Sugarcane/Date/ Palm) Khaja/ Logenze/ Toffee Chocolate Ice-cream Other (specify)</p>	
<p><u>Sweetmeat</u></p> <p>Rasogolla/Chamcham Shandash/Jilapi Bundia/ Amriti Halua/ Batasha/ Kadma Other (specify)</p>		<p><u>Drinks</u></p> <p>Softdrinks(peepsi/RC/Mojo/Coke, Sherbat/Ovaltine/ Horlicks Tea/ Coffee leaf Liquid(Ros)of SugarcaneDate/PalmGreen coconut/water and Other (specify)</p>	

Item	Amount (gm)	Item	Amount (gm)
<u>Fruits</u> Ripebanana/Mango/Melon/Bangi Jack fruit/Leeches/Ripe papaya Guava/Pineapple Safeda /Palm/Bedana /Apple Orange/Grape Black berry /Amra/Kamranga Others		<u>Oil and fats</u> Mustard oil/Soybean oil Dalda/ Vanashpati Ghee Other (specify) <u>Tobacco & tobacco product</u> Cigarette/Tobacco leaf Gul and Other (specify)	

Type of consumed food item on weekly basis (Module 9B1,9B2)

Spices		Betel leaf and chewgoods	
Items	Amount (gm)	Items	Amount (gm)
Dried chili Green chili Onion Garlic Turmeric Salt Ginger Cummins Coriander-seed Aromatic-seed Clove/Black pepper/Cassia-leaf Other(specify)		Betel leaf Betel nut Zorda/ tobacco leaf Lime Khoer Rolled betel leaf Other (specify)	